

**AN ASSESSMENT OF  
BELIZE'S AGRICULTURAL SECTOR**

**MIDWEST UNIVERSITIES CONSORTIUM**

**FOR INTERNATIONAL ACTIVITIES, INC.**

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## ACRONYMS USED IN THIS REPORT

BCB	Banana Control Board
BDD	British Development Division
BELCAST	Belize College of Arts, Science, Technology
BGA	Banana Growers Association
BIAS	Belize Institute of Agricultural Science
BLPA	Belize Livestock Producers Association
BMB	Belize Marketing Board
BSA	Belize School of Agriculture
BSI	Belize Sugar Industries
BZ\$	Belize Dollar (BZ \$2.00 = U.S. \$1.00)
CAEP	Caribbean Agricultural Extension Project
CAO	Chief Agriculture Officer
CARDI	Caribbean Agricultural Research and Development Institute
CARICOM	Caribbean Common Market
CATIE	Tropical Agriculture Research and Training Center
CBB	Central Bank of Belize
CBI	Caribbean Basin Initiatives
CDB	Caribbean Development Bank
CDC	Commonwealth Development Corporation
CGA	Cane Growers Association
CGA	Citrus Growers Association
CIDA	Canadian International Development Agency
CIMMYT	Centro Internacional de Mejoramiento de Maize y Trigo
DAO	District Agriculture Officer
DFC	Development Finance Corporation

EEC	European Economic Community
GDP	Gross Domestic Product
GGA	Grain Growers Association
GOB	Government of Belize
IMF	International Monetary Fund
MNR	Ministry of Natural Resources - Belize
ODA	Overseas Development Administration (UK)
PAO	Principal Agriculture Officer
PCV	U.S. Peace Corps (Volunteer)
P.S.	Permanent Secretary
REAP	Relevant Education for Agriculture and Production
TRDP	Toledo Research and Development Project
UK	United Kingdom
US	United States
USAID	United States Agency for International Development

## PREFACE

In 1984 the USAID mission to Belize, along with the Government of Belize, agreed to review the country's agricultural sector. The proposal was to assess the present agricultural situation, to identify limitations and opportunities in development, and to suggest actions to assist the development process.

USAID requested that MUCIA (Midwest Universities Consortium for International Activities) do the assessment. A detailed work order was provided by USAID to guide the work. MUCIA supplied a team of eleven individuals for the study. The Government of Belize established a coordinating committee of key leaders in the Ministry of Natural Resources, as well as in several related ministries and organizations. This committee met six times with the MUCIA team during the field work. The Ministry of Natural Resources provided Mr. Rodney Neal, principal agricultural officer, Research and Development, to serve as co-leader of the assessment team.

The team, in concert with the USAID agricultural officer and GOB coordinating committee, decided to organize the assessment into three steps. First, a descriptive analysis of the agricultural sector in Belize was done. Second, limitations, constraints, and opportunities associated with agricultural development were identified. Third, actions to alleviate major limitations and to develop opportunities in agriculture were suggested.

The team resided in Belmopan and traveled countrywide. A library of relevant literature was collected and reviewed; personal interviews were held with numerous individuals, organizations and group representatives; meetings were held with farmers, control boards, industry, government and agribusiness leaders, and interim reports were given to the coordinating committee for discussion. The final version of this report was prepared by MUCIA staff with assistance from various team members.

This report reflects the MUCIA team's perceptions of what we read, heard and saw along with team members' professional judgment and recommendations. The team attempted to follow the work order. Not all aspects of the agriculture sector or rural development were covered, however. Since USAID already had a livestock project, for example, we spent relatively little time looking at the livestock industry. Lack of time and appropriate data placed some limitations on our work.

The members of the agriculture sector assessment team appreciated the opportunity to work with our colleagues and friends in Belize. The excellent support and cooperation of those we came in contact with made the work a pleasure. We also wish to acknowledge Professor Michael S. Chibnik, University of Iowa, for his comments on the manuscript, and John Bielefeldt for editorial assistance.

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## EXECUTIVE SUMMARY

This agriculture sector assessment of Belize, financed by USAID was conducted in late 1984 by the Midwest Universities Consortium for International Activities (MUCIA). MUCIA consultants studied the areas of human resources in agriculture, important export and domestic crops, livestock, forestry, agricultural inputs, marketing, credit, and research and extension services.

A summary of the consultants' studies, as well as the physical and infrastructural environment for agriculture in Belize are summarized in Part I. Part II summarizes the major limitations on Belize's agricultural development, and Part III recommends actions to alleviate these limitations and take advantage of Belize's agricultural opportunities.

### Introduction

Belize's land area is small in absolute terms but large in relation to its population. Agriculture, including small contributions by fisheries and forestry, has recently provided about 40-46% of GDP and an approximately equal share of national employment. More than two-thirds of its export earnings came from farm products, especially sugar, citrus, and bananas. However, domestic food supplies depend to a substantial extent on imports, and food accounts for one-quarter of Belize's import bill. Petroleum products are also a major import item.

For a decade, Belize saw steady economic growth, until 1981-82 when worldwide recession, rising oil prices, declining sugar prices and quotas, and other factors halted its growth. Trade deficits are a growing problem.

Per capita income was a bit less than U.S. \$1,000 in 1983. Literacy exceeds 90%. Government is a parliamentary democracy that welcomes development of the

private sector and external investment. Major agricultural development goals of the Government of Belize (GOB) are expansion of exports, greater domestic food production and import substitution, and a higher standard of living for all people in the nation's agricultural system.

### Physical Environment and Land Use

Belize is a sub-tropical country with high temperatures and abundant, though seasonally and regionally erratic, rainfall. It is estimated that as much as 2.2 million acres (of a total land area of 5.7 million acres) are suitable for agriculture but existing vegetation and soil limitations are major deterrents to expansion of cultivated lands. Only about 15% of potential farm and range lands are now in production.

Heavy rains and flooding of Belize's many rivers and streams are seasonally important obstacles to transportation, especially in the southern part of the country. Hurricanes occasionally cause extensive agricultural damage.

Three million acres are officially classified as suitable for forestry, the dominant economic activity in Belize until the 1950's. Forests of varying composition and commercial value still cover 93% of Belize, although this figure includes extensive areas of milpa, slash and burn, farming in some districts. Only 2.1 million acres are privately owned in Belize. Private ownership is highly skewed; 2% of the holdings include 85% of the private acreage — but land availability is not a major constraint on agricultural production. Under a land reform program begun in 1960, the national government acquires, sells, and titles land suitable for farming; some 2.2 million acres are available for private settlement.

Land leased by the government under long-term agreements (0.6 million acres) is the most common form of tenure for small farmers. Forest reserves (1.6 million acres) and a residual of national land (1.4 million acres) not now devoted to sale, lease, or forestry account for the remaining acreage.

### Agricultural Infrastructure

There are no railroads in Belize. The bridge and highway network is under improvement but feeder and farm-to-market roads, in particular, are one of the foremost constraints on the agricultural sector. Belize's ports cannot accommodate ships with a deep draw and there are consequent delays and expenses in off-loading and re-loading cargo.

Communications are adequate in urban areas but telephones, television, newspapers, radio, or other sources of farm market news are rare in most rural areas. Electricity is also unavailable in many rural areas, and its cost is very high because generation depends on imported fuel; cold storage and transport is consequently limited.

### Human Resources in Agriculture

Belize's population is evenly divided between urban and rural; its age structure has heavily disproportionate numbers below 30 and especially below 15 years of age because young adults emigrate to other countries in large numbers. Emigration holds a high rate of natural population increase to about 2% per annum in real increase. Perhaps more important than this geographic distribution is the ethnic composition of the population. Three groups with Mayan Indian heritage reside in the agricultural sector of Belize—Yucatecan in the north, the Kekchi and Mopans in the south of the country. In addition, there are black Caribs (Garifuna), red Caribs (Amerindians), Mennonites, Creoles and mestizos (called "Spanish"), who also greatly affect the agricultural situation in the country.

In 1983, about 38% of the male labor force worked in agriculture. Female employment in agriculture is uncertain because farm women (and youth) are typically involved as unpaid family labor. National unemployment was 14% in 1983 but joblessness is concentrated in urban areas where more than half of the labor force lives. Only 8% of rural males were unemployed in that year. While there seem to be many opportunities

for additional jobs in agriculture if cultivation were expanded in the large amount of available land, unemployed urban people are not attracted to farming. In fact, local labor shortages occur in rural areas at harvest time, and many workers enter Belize from other countries at this season. Agro-processing may offer the best chances for higher employment in agriculture.

Although primary (95%) and secondary (60%) school enrollments are high, agricultural education and training within Belize are limited. One institution, the Belize School of Agriculture, has offered a two-year course since 1977. Non-formal training by extension services is inadequate and agricultural research is weak.

### Agriculture

Until several decades ago the forestry industry dominated the economy. Commercial food production and non-lumber exports did not become important until this century. The past several decades sugar exports have provided a large part of the foreign exchange earnings, and also employed a substantial part of the farmers and rural laborers. The current economic stress and dim prospects for the sugar industry are forcing Belize to explore other ways of generating agricultural income and export earnings. In addition to the commercial export oriented sector of Belizean agriculture, there is a sizable small-farm sector, the milpa, which practices slash-and-burn cultivation methods and constitute nearly three-fourths of the country's farmers. They produce such crops as rice, fruit and vegetables, and breed livestock such as pigs. Given the short period of time that Belize has been an independent country and its brief experience with commercial agriculture, the country has made remarkable progress. While its interior transportation system is still quite rudimentary and covers only a small part of the country, major improvements have been made in roads and bridges over the past couple of decades. Belize is also blessed with ample land, a relatively highly educated population, a favorable location near major export markets, and has friends that offer

assistance and export markets on preferential terms. It is also able to grow a broad range of tropical crops and has a large reservoir of farming experience in its smaller farmer groups.

It is likely that Belize will be forced to continue to rely on agriculture to provide the base for its development over the next several decades. The bulk of increases in agricultural output will probably continue to come from opening new lands, but is also important for Belize to boost its agricultural yields and to sharply reduce its costs of production. With current exchange rates, yields, and production costs Belize can compete in export markets with few of its product lines. The fact that Belize imports a relatively large amount of food provides some opportunities for local production to substitute for imports without having to push additional agricultural products into highly competitive international markets.

### Limitations

Despite these important advantages, Belize also faces major obstacles in evolving a more dynamic and productive agriculture. Farming in the tropics and in a country that has serious hurricanes is difficult. In part, Belize's agriculture is weak because of the substantial production problems faced by farmers. Soil, water, disease, and weed management are often very difficult. Marketing uncertainties and transportation difficulties compound farmers' problems in Belize. Also, because of its very small size, it is easy for substantial increases in agricultural output to swamp local markets. This means that it is difficult to realize economies-of-scale without secure export markets. The lack of a larger manpower pool of people who are well trained in forestry, agribusiness, and agricultural sciences limits the ability of government as well as the private sector to support agricultural development activities. Also, Belize is very dependent on foreign sources of energy and capital to fuel important parts of its

development activities. Expensive electricity and larger amounts of foreign debts result from this.

Donors such as AID also face major challenges in developing programs to promote agriculture in Belize. While intense, many of Belize's problems are so small and diffused that AID could easily be overwhelmed in trying to manage a large number of small development projects. Aside from the sugar industry and forests, it will likely be unwise for AID to develop projects that heavily focus on single commodities. Rather, AID must focus its efforts on projects that help a variety of agricultural crops and enterprises and also create a more efficient environment for farmers.

#### Potential Projects for AID

The assessment team concluded that seven potential projects merited AID consideration. The first would focus on helping to strengthen the ability of the Ministry of Natural Resources to promote and support agricultural and forestry development. The second project focuses on helping to sharply expand the manpower pool of people with advanced training in agricultural sciences, forestry, and agribusiness. The third project concentrates on helping the country to construct a power generating plant based on use of biomass provided by an energy forest. A fourth project would help to strengthen and reorganize the Development Finance Corporation and assist it to mobilize financial savings in rural areas. The fifth project would focus on helping to modernize and diversify the sugar industry. The sixth project is aimed at helping the government come to a clearer understanding of the problems faced by milpa farmers and ways their problems might be treated by donor or government programs. The seventh and final project would provide more "bricks and mortar" in the form of additional roads, additional rural bridges, wholesale marketing and cold storage facilities, and possibly and drainage surveys.

TABLE OF CONTENTS

i	ACRONYMS
iii	PREFACE
v	MUCIA'S AGRICULTURAL SECTOR ASSESSMENT TEAM
vi	EXECUTIVE SUMMARY
I.	THE ANALYTIC DESCRIPTION
A.	Introduction
B.	Physical Environment for Agriculture
C.	Land Use and Tenure
D.	Agricultural Infrastructure
E.	Human Resources in Agriculture
F.	Agricultural Production Systems
G.	Sugar
H.	Corn
I.	Rice
J.	Edible Beans
K.	Oilseeds
L.	Citrus
M.	Bananas
N.	Cocoa
O.	Other Crops
P.	Forestry
Q.	Livestock
R.	Agricultural Inputs
S.	Credit and Finance
T.	Output and Marketing
U.	Public Support to Agriculture

II. MAJOR LIMITATIONS TO AGRICULTURAL DEVELOPMENT

III. IDENTIFICATION OF AREAS WHERE AID MIGHT FORM PROJECTS TO HELP STIMULATE AGRICULTURAL DEVELOPMENT IN BELIZE

IV. SPECIFIC RECOMMENDED ACTIONS

V. APPENDICES

- A. Bibliography and References
- B. Agricultural History of Belize
- C. Belize Coordinating Committee, Agricultural Sector Assessment
- D. List of Individuals and Organizations Consulted or Interviewed by the Team
- E. List of Projects Financed by Donors and Relating to Agricultural Development

Annex

- Credit - Adams
- Citrus - Cahoon
- Marketing - Egertson
- Human Resources - Fliegel
- Sugar - Giamalva
- Inputs - Hahn
- Forestry - Haygreen
- Corn, Rice, Dry Beans - Jackson
- Oilseeds - Pepper
- Public Service - Pilgram
- Cocoa - Trout

## I. THE ANALYTIC DESCRIPTION

### I-A. INTRODUCTION

Belize, a newly independent Central American-Caribbean country, is large in land area (8,866 square miles) in comparison to its population (about 150,000). The people of Belize are of diverse ethnic backgrounds, about 40% Creole, 33% Mestizo (called "Spanish"), 10% Mayan, 8% Carib (red and black) and the remainder East Indian, European and other (Country Environmental Profile 1984:27-30).

Population growth, at 3.4% natural, is reduced to about 2% per year by emigration, primarily to the U.S. It is estimated that as many as 50,000 Belizeans reside in the U.S. The adult literacy rate is 92%, and presently 85-90% of children complete primary education. Civil strife in Central America has brought numerous refugees to Belize; estimates of the number of Salvadoreans in Belize range from 2 to 15 thousand although the lower figure is probably more nearly correct (Country Environmental Profile 1984:33). Other Central Americans also regularly enter the Belizean rural labor force. About one-half of Belize's population is urban. Although national unemployment is 14%, urban jobless numbers are higher, especially among heads of households and youth.

Historically, forest products were the mainstay of the economy and agriculture has developed only during this century (Ashcraft 1973). As yet, no appreciable mineral or petroleum resources have been found and tourism is limited. Agriculture, forestry and fisheries are the foundations of the Belize economy. Belize is a democratic country with an open economy in which development of the private sector and attraction of outside investment are encouraged.

Belize's Economy

During the past decade Belize has experienced steady growth that peaked during 1978-81, when GDP increased 4.9% per year. However, as noted in Table 1, there was virtually no growth in 1982-83 because of worldwide recession and declining prices for Belize's exports, particularly sugar. Annual inflation has been as high as 15-20% in recent years, but the current rate is similar to that of the U.S. Trade deficits averaged \$BZ 71 million from 1977 to 1983. Its heavy dependence on foreign trade and external events (i.e. petroleum prices, import quotas, and currency devaluations) is a major problem for Belize. Table 2 shows that nearly three-quarters of its export earnings come from primary products: sugar, molasses, citrus, and bananas.

TABLE 1: GROSS DOMESTIC PRODUCT IN BELIZE BY SECTOR, 1980-83

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
TOTAL GDP (million \$BZ) in current prices (2 \$BZ =1 \$U.S.)	295	313	296	308
<u>Sector</u>	<u>Percentages</u>			
Agriculture, fisheries and forestry	24	24	22	22
Manufacturing	15	15	13	13
Construction	6	5	5	5
Trade, restaurants, hotels	19	18	17	17
Transportation	9	11	12	13
Public Administration	11	11	11	11
Other	16	16	20	19

Source: Ministry of Economic Development, 1984a.

TABLE 2: MAJOR BELIZEAN EXPORTS, 1980-1983

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
TOTAL VALUE (Million \$BZ in current prices) (2 \$BZ =1 \$U.S.)	164	149	120	130
			<u>Percentages</u>	
Sugar and Molasses	61	59	56	54
Bananas	4	3	4	4
Citrus Products	8	9	12	11
Fish Products	5	10	11	11
Timber	2	2	3	2
Garments	18	15	11	13
Other	<u>2</u>	<u>2</u>	<u>3</u>	<u>5</u>
TOTAL	100	100	100	100

Source: Ministry of Economic Development, 1984a.

In recent years about 85 to 90% of Belize's exports have gone to the U.S., Canada, and the U.K., as shown in Table 3, and more than half of exports currently go to the U.S., vs. about one-third in 1970.

TABLE 3: DESTINATION OF BELIZEAN DOMESTIC EXPORTS (%)

<u>COUNTRY</u>	<u>1970</u>	<u>1975</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
USA	37.8	51.6	43.5	44.1	52.5	52.7
U.K.	31.0	41.9	48.1	38.9	28.7	26.7
CARICOM	5.7	3.4	3.4	5.1	4.5	3.9
OTHER	25.5	3.1	5.0	11.9	14.3	16.7
TOTAL	100	100	100	100	100	100

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Source: Development Associates, 1984.

Belize's economy is also very dependent on imports. Because of the limited size of local markets, manufacturing and processing for local consumption is generally high-cost, and merchants prefer to import. Table 4 shows major categories of imports and their relative importance.

TABLE 4: MAJOR BELIZEAN IMPORTS FOR DOMESTIC CONSUMPTION, 1980-1983

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
TOTAL VALUE (million \$BZ current prices) (2 \$BZ =1 \$U.S.)	\$299,509	323,934	255,999	225,840
		Percentages		
Food and Beverages	24	27	25	26
Manufacturing	30	30	26	26
Machinery	19	18	18	17
Fuel	18	16	18	20
Chemicals	7	7	9	9
Other	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>
Total	100	100	100	100

Source: Ministry of Economic Development, 1984a.

Major components of the total labor force (39,800 people) in 1982 were: agriculture, fisheries and forestry 43%; manufacturing 10%; government 12%; and commerce 14% (Ministry of Finance and Economic Planning, 1982). A final indicator of economic development is per capita income, which reached \$1,955 BZ (\$978 U.S.) in 1983 (Ministry of Economic Development, 1984a).

Several other important features of Belize's economy are worth highlighting. First is the overall small size of the economy, which limits the scale of enterprises that can be formed to serve domestic markets or substitute for imports. Second, the near-term outlook for the sugar industry, which has supplied a large part of Belize's foreign exchange, is not promising. Prices and preferential export quotas have both declined. Belize must look to earn future increases in foreign exchange outside the sugar industry. Third, because the Belizean dollar is tied to the U.S. dollar, the ability of the country to export varies indirectly

with the strength of U.S. currency. The present strength of the U.S. dollar has crimped the export competitiveness of some of Belize's exports and also made imports less expensive than they would have been with a weaker dollar. Because of the fundamental features of its economy, Belize will likely be forced to do a number of relatively small things to increase exports, decrease imports, and promote the expansion of the domestic market. Because of the resource base of the country, most of these development efforts must be focused on agriculture.

### Agriculture

Agriculture in Belize ranges from milpa (slash and burn) cultivation to large mechanized farms producing sugar cane, citrus, mangoes, cocoa, bananas, and cattle. Capital formation in agriculture has increased slowly except in specialized export enterprises. Agriculture (including fisheries and forestry) is the largest contributor to the national economy. Table 5 shows output of major agricultural products 1978-82.

TABLE 5: BELIZEAN AGRICULTURAL PRODUCTION, 1978-82

<u>Agricultural Products</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982 p.</u>
Sugarcane (long tons)	1,123,100	989,300	1,013,500	970,100	1,059,000
Oranges ('000 boxes)	686	568	1,109	1,063	1,065
Grapefruit ('000 boxes)	303	188	408	586	703
Corn ('000 lbs.)	43,000	34,000	41,500	46,600	47,000
Paddy ('000 lbs.)	14,000	14,700	19,000	23,890	17,500
Red Kidney Beans (('000 lbs.)	2,160	2,240	3,073	3,809	3,900
Honey ('000 lbs.)	422	498	502	483	480
Pork (fresh)('000 lbs.) <u>1/</u>	764	659	487	383	350
Beef (fresh)('000 lbs.) <u>1/</u>	2,577	2,562	2,310	2,216	2,000
Poultry ('000 lbs.) <u>1/</u>	3,800	4,500	4,300	5,216	5,500
Timber ('000 bd. ft.)	6,233	8,180	9,333	9,500	8,500
Bananas ('000 boxes)	520	842	785	549	524

1/ in commercial slaughterhouses

Source: Ministry of Natural Resources, 1982; Ministry of Finance and Economic Planning, 1982.

Agriculture employs 43% of the work force and generates about one-quarter of GDP. Agricultural exports are an important part of Belize's agricultural economy, representing about 45% of the gross national product. Sugar has accounted for more than half of agricultural exports for the past 30 years. Citrus and bananas are other important export products; less significant agricultural exports are beef, rice, mangoes, and honey.

Imports play a major role in furnishing domestic food supplies, representing 25% of total Belizean imports. Milk and dairy products make up roughly a third of food imports; other major imported foods include pork and pork products, vegetables, canned fruit, and wheat. Most of the basic foodstuffs for national

consumption--corn, rice, and beans--are produced primarily by small farmers. Mennonite communities produce much of Belize's milk and poultry products in mechanized operations. Larger farms are generally oriented to export crops. The Government of Belize has five general goals for the agricultural sector: (1) to increase production of export commodities; (2) to substitute locally grown products for imported foods; (3) to improve capacity to process primary agricultural products; (4) to create favorable settings for investment of both domestic and foreign capital in Belize; and (5) to distribute lands in a manner to facilitate growth.

#### I-B. PHYSICAL ENVIRONMENT FOR AGRICULTURE

The 8,866 square miles of land surface in Belize include 266 square miles of offshore cays. The country is 174 miles in length and 68 miles wide. Rainfall extremes range from 60" in the north to 180" in the south; January to April are the drier months. Mean annual temperature is 70° F. with a relative humidity of 82%.

Geographically the low Maya mountain range dominates the south of the country. Siliceous soils of the mountains are not well-suited for agriculture. Calcareous soils in the northern lowlands cover 35% of the country (Country Environmental Profile 1984), but conditions of topography and rainfall are highly variable and these soils, while fertile, often have excess or insufficient moisture or insufficient and phosphorous deficiencies. Lowland soils of the Toledo district are fertile but subject to reduced yields under short-cycle milpa agriculture (World Bank 1982). Acidic siliceous soils of the lowland pine ridge have low fertility and a compact clay subsoil.

Of the total land area of 5.7 million acres, some 2.2 million acres are classed as suitable for agriculture. Three million acres are classed as suitable

for forestry. It is estimated that less than 15% of the land suitable for agriculture is now in cultivation. Because modern agriculture is relatively new to Belize, soils have not as yet been seriously degraded, but potential for erosion and damage to soil structure and fertility does exist. Much of the land suitable for agriculture must be cleared of existing vegetation. This is a costly operation and regrowth is rapid under prevailing tropical conditions.

Rivers and streams are numerous in Belize, and surface waters are used for domestic purposes by 70% of the population. Excess precipitation causes production problems in most agricultural areas during peak rainfall periods; drainage systems are needed in some areas. Heavy rains and the periodic flooding of rivers and streams bring many problems in southern Belize: roads are impassable, bridges are flooded, and transport of both products and people is at the mercy of water levels for prolonged periods during much of the year.

#### I-C. LAND USE AND LAND TENURE

Historically, land settlement and use was related to forestry. Absentee landlords held large tracts of land under freehold title, principally for logging, during almost three centuries of extensive exploitation of native forests. According to official statistics, 93% of Belize is classified as "forest" land but this figure includes extensively deforested milpa farming areas in Cayo and Toledo districts as well as open pine savannas (Country Environmental Profile 1984:93). Fifteen forest reserves have legal status and cover 28% of the country. Some of these reserves are under pressure for agricultural use. Only about 8,700 acres of forest plantings have occurred during the past 35 years under reforestation programs.

Table 6 shows basic categories of land tenure in Belize.

TABLE 6. FORMS OF LAND TENURE IN BELIZE

<u>Tenure Form</u>	<u>Acreage</u>	<u>Percentage</u>
Private Lands	2,104,822	37
Leased Lands	573,346	10
National Lands	1,433,822	25
Forest Reserves	1,562,880	28
<hr/>	<hr/>	<hr/>
TOTAL	5,674,880	100

Source: Unpublished data from the Lands and Surveys Records, Ministry of Natural Resources, December 1983.

Private lands are held in fee simple or under location ticket. The latter is a temporary deed issued to developers and investors in the process of improving a tract of land. It may be granted free of charge by the government pending compliance with a specific development plan. Upon compliance the holder may use this land as collateral for credit. Leased land is primarily government land rented to private interests under long term agreements. This is the most common tenure form for small farmers. National land is a residual of lands not owned, leased or held in forest reserves. Forest reserves have been set aside either for the future or as reservations for the Mopan and Kekchi. Logging is permitted in some of these reserves. Table 7 shows that ownership of private land is strongly skewed; 2% of the holdings include 85% of the land. A land reform program in which the national government acquires, sells, and titles land was introduced in 1960. A cadastral survey is underway but lacks resources to complete its work. Belize, however, has abundant land and its availability is generally not a constraint on national agricultural production goals.

TABLE 7. DISTRIBUTION OF PRIVATE LANDS IN BELIZE BY SIZE

<u>Size in Acres</u>	<u>Number of Parcels</u>	<u>Percentage</u>	<u>Number of Acres</u>	<u>Percentage</u>
< 2	2,464	29	--	--
2 - 10	2,237	27	15,007	1
11 - 35	2,479	30	54,491	3
36 - 100	640	7	49,319	2
101 - 500	368	4	78,836	4
501 - 1500	116	1	99,253	5
<u>&gt; - 1500</u>	<u>158</u>	<u>2</u>	<u>1,809,920</u>	<u>85</u>
Total	8462	100%	2,104,832	100%

Source: Unpublished data from the Lands and Surveys Records, Ministry of Natural Resources, December 1983.

#### I-D. AGRICULTURAL INFRASTRUCTURE

The docks of Belize's seaports cannot accommodate ships with a draw greater than 17 feet, and there are consequent limitations, delays, and expenses in offshore reloading of cargo. Belize has an international airport but flights are limited. Roads have been improved considerably but remain, perhaps, the major constraint in developing the nation's full agricultural potential, especially in the Toledo-Stann Creek area, where an extensive bridge network is needed to assure reliable transportation of people and products.

Communications networks are adequate in urban areas but the rural sector is deficient in those services that would foster information and education for agricultural development. Telephones are rare in rural areas as are television and daily newspapers, informational radio, and other media that might provide farm market news.

Because of the small size of the domestic market, several services and facilities that could help to promote agricultural development are not available on a nationwide basis. Examples are local input supply stores; local facilities to purchase, store, handle or process products; post-secondary education and agriculturally-oriented trade schools; and a full complement of local extension offices.

Electricity is not available to farms in many rural areas. High fuel costs in generating electricity result in high electricity costs -- more than \$BZ 0.40/KWH (compared to BZ 0.17/KWH in Columbus, Ohio) -- and cold storage facilities, refrigerated transport, and home refrigeration is often unavailable.

Formal agricultural credit, while generally adequate in Belize, is not always available to individual small farmers who lack collateral, and rural people have very limited access to deposit services.

In the area of infrastructure, special mention must be made of governmental research and extension services. These are vital to agricultural development but they have some serious limitations at present in their staffing and organizational structure.

#### I-E. HUMAN RESOURCES IN AGRICULTURE

Agricultural development is largely a product of the people in agriculture and related industries. Analysis of the age of the Belizean population (Ministry of Economic Development, 1984a) shows 46% below 15 years, 27% at 15 to 30 years, 12% at 30 to 45 years, 8% at 45 to 60 years, and 7% over age 60. The disproportionate number of people at the younger ages means that Belizeans tend to migrate to other countries in large numbers beginning in their late teen years and continuing to age 30. This outmigration appears to be permanent because there are no bulges of population at higher age levels.

Belize's population is rather evenly divided between urban and rural. Proportionally, in fact, the urban population--unlike that of most developing countries--actually declined during the 1970's.

More important than this overall geographical distribution is the ethnic composition of the population--a feature which sharply distinguishes Belize from the rest of Central America. Creoles, whose language and culture dominates Belizean society, comprise about 40% of the population. Mestizos (called Spanish) account for 33%. An additional 10% of the population are Mayan Indians (Yucatec, Kekchi and Mopan). Other important ethnic groups are the Black (Garifuna) and Red Caribs who are a mixture of West African and Amerindian origins respectively, comprising 8%; and the Mennonites (3%). These various groups have differing roles in agriculture, forestry and fisheries.

A labor force survey for late 1983 (Ministry of Economic Development, 1984b) shows that 38% of the male population over 14 years of age was employed in agriculture, while 10% of the corresponding female population worked in agriculture. This latter figure is, no doubt, an underestimate because farm women are typically involved, along with children under 14 years of age, as unpaid family labor on farms.

Overall unemployment in Belize was 14% in 1983 and superficially, at least, there appears to be great opportunity for additional jobs in agriculture. The World Bank recently estimated that 39% of Belize's 5.7 million acres of land were suited for agriculture. Even though much of this land does have limitations, there is no question that the acreage is available for agricultural expansion. However, 55 percent of the total labor force resides in urban areas; only 8.0% of rural males were unemployed in 1983. It is quite clear that a majority of the unemployed males are urban residents and it is not obvious that they would be attracted to agricultural employment. Locational differences are also important.

In Toledo, Stann Creek, and Belize districts, male unemployment ranges from 13% to 20%, while in Cayo, Corozal, and Orange Walk it is 4% or less. There are local labor shortages in farming areas during harvest seasons, and peak labor demands cannot be met by domestic labor. While accurate figures are unavailable, at least 30% of the labor for the sugar harvest comes from other countries (Cuellar, pers. comm., 1984).

Nevertheless, some new employment opportunities may exist in the agricultural sector. If more favorable attitudes toward agriculture as a business proposition and an avenue of upward mobility could be developed in the schools, more young people might be encouraged to enter agricultural enterprises. Agro-processing jobs might attract some unemployed non-farm people, especially if plants were located in or near urban areas. Moreover, rural female unemployment (27% in 1983) is much higher than that for males, and even higher than that for urban females. Rural women, too, provide a sizable pool of potential employees in new agricultural businesses and industries.

Education has produced an adult literacy rate of more than 90% and 95% of children are enrolled in primary school. Sixty percent of primary graduates attend high school. The rate of secondary school completion is lower, and obstacles such as distance to schools and fees may limit rural enrollments. Some agricultural content is available in the curricula of primary and secondary schools, but generally it is aimed at creating an awareness of agriculture rather than technical training.

A Belize School of Agriculture in Cayo was established in 1977 to provide a two-year course to train agriculturalists. Graduates mostly go into farming or government agricultural services. Training abroad is difficult to attain. Non-formal education in agriculture is provided mainly by the extension services of the Ministry of Natural Resources (MNR). Youth education and adult education

for farm women are most directly served by the Ministry of Labour, Social Services and Community Development. The Ministry of Labor, like the MNR, maintains district offices with programs in nutrition, gardening, and other home-related topics. Field staff of the two ministries try to coordinate their work on agricultural topics. It is not clear, however, that the important role of women in farm decision-making, and the primacy of women in some aspects of livestock production as well as horticulture, is well served by the division of educational services between the two ministries.

#### I-F. AGRICULTURAL PRODUCTION SYSTEMS

Non-mechanized slash and burn cropping in Toledo, cattle farms in Belize district, citrus orchards in Stann Creek, and the Mennonites' mechanized grain production in Cayo each have differing characteristics in use of land, labor, capital and management resources.

One approach to a functional classification of farm units is provided by Aldana (1984). This classification was originally developed as part by CAEP's work. Each functional group in the classification includes a set of households that face similar economic, ecological and social situations. The system is a useful base line for identifying target populations for programs, credit, research, and extension, but specially tailored programs will need to be designed to account for the human and technical differences--including ethnic differences--in each class of farm households.

There are 6,000 to 8,000 farmers in milpa farming (many of whom combine part-time farming with fishing or wage work). While more prominent in the south, milpa cropping may be found in all districts and among all ethnic groups. Farming methods are basic slash and burn preparation and planting of corn, rice, beans, plantains, and root crops, primarily for family food production. The corn milpa

will have 4 to 10 acres cultivated annually on a farm of 30-50 acres. No improved inputs are used and yields of corn range from 700 to 2,500 pounds per acre. An adaptation is the milpa with rice, grown in pure stands of one to three acres on a farm of 5-15 acres. Rice is the cash crop and yields range from 1,300 to 2,000 pounds per acre. Milpa farming in the Cayo, Belize, and Stann Creek districts frequently adds fruit trees, vegetables or some livestock, but is still based on subsistence family food production, with a little added income sought from low capital investments in supplementary crops.

A transitional cropping pattern may be called mixed farming, and is found in Cayo, Corozal and Orange Walk among Maya and Mestizos. It is characterized by farms of 25 to 100 acres with some mechanization and some other use of capital inputs. Crops are diversified, and farmers have access to credit and technology. An estimated 1,000 families use this mixed pattern.

Mechanized mixed farming is found on a few hundred farms providing specialized crops for the industrial market. These farms, usually 20 acres or less, raise crops such as sugar and may use advanced technology. An adaptation of this mixed mechanized system is commercial monocropping, generally on farms of 15-50 acres using government mechanization services. Income is usually supplemented by part-time off-farm work. Several hundred of these farms produce rice in the Toledo-Stann Creek area, and 3,000 of them grow sugar cane in the Orange Walk-Corozal area.

Livestock farms consist of a few units with 100 acres or more and 50-150 head of cattle, mostly in the Cayo District. A few farms have small scale poultry operations in the Belize District. Swine are produced on family milpa, primarily in Toledo, usually with 5-10 head per farm.

There are about 350 citrus growers in the Stann Creek and Cayo Districts, generally with fewer than 30 acres each. Citrus production on smaller units is part of mixed enterprises.

Estate agriculture may serve to describe a kind of farm found throughout Belize. Bananas, citrus, sugar cane, mangoes and cattle are raised on farms larger than 50 acres, with varying degrees of intensity of capital, technology and management. Some of these are integrated units operated in whole or in part by the processor, especially for cocoa, citrus, and mango production. Many of these suffer from low levels of technology and the vagaries of the external market.

A final class of farms is the "integrated communities." The Mennonites practice integrated, diversified, and mechanized agriculture. Located in Cayo, Orange Walk and Toledo, they have a strong impact on production of such items as grains, poultry, beans, and milk.

#### I-G. SUGAR

Sugar cane has been the base of the Belizean agricultural economy for several decades. It has provided more than 50 percent of export earnings and 70 percent of agricultural exports. There are approximately 60,000 acres of cane produced by 4,400 farmers in Orange Walk and Corozal districts. However, this industry is in serious difficulty because of reduction of preferential export quotas, very low world sugar prices, inefficient transport facilities, relatively low yields, and inadequate technologies.

Most cane is grown by small farmers who work an average of about twelve acres, although a few farms have more than 1,000 acres in cane. With favorable sugar prices in the 1970's farmers mechanized their operations and prospered, but many now believe the industry is over-capitalized, thus increasing unit production

costs. Average yields of cane are about 19.5 long tons per acre, which compares to a yield of 30 tons attained in areas under the best management practices.

Two complete sets of on-farm costs of production data are presented in the Annex (Sugar). While there are differences between those two sets of figures, even the lower set of costs (see Table 8) estimates a 1983 production outlay of BZ \$47 per ton (at the average yield of 19 long tons/acre) in comparison to cane prices of \$56 per ton in 1980, \$61 in 1981, \$35 in 1982, \$36 in 1983, and approximately \$25 in 1984 (A. L. Ayuso, pers. comm.).

TABLE 8: ESTIMATED MINIMUM COST OF CANE PRODUCTION IN BELIZE, 1983

<u>Cost Item</u>	<u>Annual Cost/Acre</u>	<u>Cost Ton (19 Ton/A)</u>
Land Preparation	BZ \$ 119.80	BZ \$ 6.31
Planting	38.00	2.00
Cultivation	192.00	10.11
Harvesting	475.00	25.00
Other Expenses	71.00	3.74
	<hr/>	<hr/>
TOTAL	\$ 895.00	\$ 47.11

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Source: Cane Farmers Association, 1983.

Farmer response to this cost/price squeeze has been a reduction in agro-chemical inputs from about 250 pounds per acre a few years ago to 50 pounds per acre in 1984; a reduction in pest control measures; an increase in the number of ratoon (resprouted) crops; and a drastic increase in the number of farmers in arrears for production loans (46% in Orange Walk in 1984).

The 1983-84 sugar crop was handled as follows: 41,000 tons to the U.K. at 18 cents (U.S.) per pound; 24,000 tons to the U.S. at 21.8 cents (U.S.) per pound; 10,000 tons reserved for domestic consumption; and 32,000 tons unsold in the face of a 5.5 cents (U.S.) per pound world market price. The two sugar mills owned by Belize Sugar Industries (BSI) are losing money in processing and are for sale. Net processing losses of BSI have averaged BZ \$2.66 million in each of the past three years.

Cane farmers have further problems. Fields are old and need replanting. Serious disease problems exist. Low prices have discouraged efficient economic production practices. Long hauls and waiting times to unload for processing have led to low extraction yields at the processing plants (farmers get 65% of the processor's sugar sales). The Belize Sugar Board issues licenses for cane production, but licenses can presently be held by non-cane producers. It appears that 45,000 acres would be an appropriate production quota (60,000 present). A system of licensing for cane producers only, with forced cuts in allotments to reach a 45,000 acre goal, should be instituted by the industry.

Closing of the Corozal mill--the smallest, oldest and least efficient--is one option if Belize is to try to remain in the sugar business, but a major social and political problem is the possible loss of 600 jobs if the Corozal plant were closed. Interested parties including the government are seeking a solution to the future of the sugar industry in Belize. It is obvious that some immediate hard decisions must be made. Cane farmers must recognize both the declining world market for cane sugar and the problems the industry faces in Belize. Each farmer needs to analyze his production and make plans for diversification to other enterprises. A healthy sugar industry in Belize must be built on reduced acreage and much-improved efficiency, both in the field and in handling and processing.

The major limitation on the future development of Belize's sugar industry (apart from depressed world markets) is the very high cost of production at both farm and processing levels. Cost-cutting measures should include improved hauling procedures and a coordinated cutting schedule for prompt delivery, prompt processing, and maximum conversion efficiency of optimum-quality cane at the mills. Payments should be based on sucrose content to reward quality producers. Corozal yard should be maintained as a collection point for hauling to Orange Walk, if the Corozal mill is closed. Cane varieties susceptible to smut should be replaced with resistant varieties.

#### I-H. CORN

Corn is grown on 28,000 acres (1983) by about 9,000 farms in all districts. It is principally used for human consumption. There is slow but steady growth in acreage and total production, and more corn is being fed to poultry and other livestock. Cayo district produces nearly half the corn of Belize with Orange Walk and Corozal next in line. Belize is normally self-sufficient in corn, but yields are low, at a national average of less than 1,500 pounds per acre (yields on mechanized farms run in the neighborhood of 2,500 pounds per acre). Post-harvest and especially storage losses are high.

It is estimated that 60 percent of the corn produced in Belize is grown under the milpa system. Production practices on both milpa and mechanized farms are far below their potential. Yields of 4,000 to 5,000 pounds per acre should be attainable, and there is evidence of yields up to 7,000 pounds per acre in experimental areas. Other Central American countries have higher yields: El Salvador's average, for example, is about 3,000 pounds per acre. Corn producers in Belize are very price responsive. When the Belize Marketing Board increased the price per pound from 16 cents in 1979 to 20 cents in 1980 and 24 cents in

1981, acreage increased accordingly. This took place when world market price was approximately 12 cents.

Milpa production as a part of total corn production is steady or decreasing. Declining productivity on some milpa lands as well as a tendency toward mechanized corn production explain this trend. The higher commercial production goes mainly to a growing domestic poultry and swine feed market. It appears that Belizean farmers can produce much more corn. This production, however, must be made at reduced cost if they are to compete in world markets.

Details on costs of corn production in Belize are included in the Annex. In the basic milpa system, an estimated 24 to 40 days of labor are expended on an acre of corn. This is the overriding input. In mechanized corn production, assuming a yield of 2,500 pounds per acre and a price of 24 cents (highest recorded price), the gross income would be BZ \$600 per acre. Costs of \$347 per acre in 1981/82 in Cayo give a net return of \$253 per acre. When the price was 18 cents/pound, as in 1982, the net was \$103 per acre. However, very few farmers get top prices because of discounts for moisture content and foreign matter. Harvest, handling, and storage losses are reported to be high, sometimes as much as 40% of the product.

About 30% of the corn produced in Belize is marketed. The two major purchasers of corn are the Belize Marketing Board (BMB) and commercial elevators in the Mennonite communities; each purchase about equal amounts. Rather substantial amounts of storage capacity are required because of the seasonal nature of corn production. Although quantity appears sufficient, quality of storage facilities is inadequate. Problems involve poor handling, drying, and storage technologies and equipment. Transportation is almost entirely by truck. No railroad system exists in Belize. Transportation costs are high as a result of high energy costs, dispersed production, and road conditions.

The domestic market for corn is quite competitive, with the BMB supporting the market at a minimum price. A high proportion of the corn in storage is held in the Mennonite community, which thus has a dominant position in the off-season market.

Exports of corn have not been possible because of the higher price of corn in Belize relative to that in competing countries. Any export opportunities will depend on competitive prices, achievable only by lowered unit costs of production, or on possible protection in the CARICOM market. Potential for an increased domestic market for corn lies in its use for livestock feed. Farmers who feed poultry, swine, or cattle will see corn as a major cost input, and its price must be favorable in comparison to livestock product prices. Again, there is a clear need to reduce the cost of producing corn.

Packages of optimum corn production technology for each type of producer and for each farmer's resource situation must be developed, demonstrated and promoted through a concerted research and extension program. Action by the BMB or a similar organization to improve storage facilities is also important; it might consider establishing a relationship with a U.S. university or technical consultants to analyze corn handling and storage, make recommendations for better practices, and implement and monitor changes.

#### I-1. RICE

Rice, while grown in all districts, is most important in Toledo and Belize and as a staple in the diet of the Creole and Garifuna populations. Domestic rice consumption is high, averaging 6,500 tons of milled rice per year (Ministry of Natural Resources 1983). In 1981 there were 7,400 acres in rice--4,000 acres in Toledo, 600 in Stann Creek, and 300 in Belize with lesser amounts in the other districts, plus 2,500 at Big Falls Ranch, a large commercial producer, in Belize

district. The Big Falls Ranch firm has had financial problems and its rice acreage has recently dropped below 1,000. The pronounced regional production pattern means that much rice must be transported from production to consumption areas.

In a year of average rainfall, more than 25% of rice production is milpa rice, mainly upland varieties. Milpa production accounts for 60 percent of the rice grown in Toledo District, where both upland and wet rice are produced. Mechanized production is found along the southern highway and at the Big Falls Ranch.

Belize is usually self-sufficient in rice and potential exists for expanding both acreage and yields per acre. Of interest is the pivotal position of Big Falls Ranch in overall rice production. In 1981 it grew 55 percent of the Belizean product. Its production is critical to the self-sufficiency of Belize in this important foodstuff.

The Toledo Research and Development Project (TRDP) is benefiting rice production. Its focus has changed from lowland mechanized to upland improved milpa production, and TRDP has demonstrated potential for greater productivity as well as relief of the land pressures evident in several milpa farming areas.

Milpa rice production depends on family labor availability and quality of land; a relatively high price elasticity of supply on the part of the small farmers strongly affects how much they will produce. Labor requirements for milpa rice, as reported by TRDP, are approximately 26 days per acre.

In mechanized rice production at Big Falls Ranch and elsewhere, cost data are estimated at BZ\$328 per acre for 1983. With a yield of 2,500 pounds per acre and a price of BZ\$24, gross income would be \$600 and potential net \$272. From this, prorated costs for land and land clearing must be deducted. It appears that mechanized rice is profitable at these cost, yield, and price levels. One

reservation is that the cost of government-provided mechanization is highly subsidized.

As shown in the Annex (Rice), the farmgate cost of rice must have added to it the costs of transport and milling, which more than double the cost to \$BZ 0.51 per pound, in contrast with a world price at the same time of BZ \$0.22 (F.O.B. Bangkok). This contrast demonstrates the difficulty Belize will have in developing an export market.

Milpa rice farmers have responded to the relatively high domestic price offered by the BMB by putting more land into production rather than by investing in modern production improvement inputs such as fertilizer. Government efforts to aid milpa production should focus on measures to introduce higher yielding varieties, demonstrate better cultural practices, and reduce post-harvest losses.

Rice produced on Belize's farms moves into market channels largely through the BMB or Big Falls Ranch. Other buyers take only a small portion of the rice. Since the Big Falls Ranch produces its own rice, the dominant market buyer is the BMB, which operates as the buyer of last resort to support the minimum price or to provide otherwise unavailable outlets to rice producers. Price competition seems efficient because of the position of the BMB as a "benevolent" buyer.

The bulk of the rice storage and milling capacity is held by BMB in the southern part of the country or by Big Falls Ranch in the Cayo District. Storage and milling capacity appears to be adequate except in the northern part of the country. As with corn, storage problems associated with moisture, insects, and molds are common. Handling and milling losses are also reported to be high. A small-scale pilot rice handling unit (cleaning, drying, milling, storing) might be developed as a demonstration project. Strategically located and privately operated, it should draw on the expertise of U.S. grain-handling and university consultants to assist with problems of storage and handling.

In recent years, almost all the rice produced in Belize has been consumed domestically because of a shortfall in production resulting from the cutback in Big Falls Ranch production and general production problems in 1984. Rice exports would likely be feasible only within CARICOM. The domestic market will probably continue to be the major outlet in the near future

#### I-J. EDIBLE BEANS

Dry beans are a very important item in the Belizean diet. Red kidney, a variety introduced in the 1930's, made up 90% of 1981 production and is preferred by most ethnic and social groups. This presents a problem, because present red kidney varieties are not well adapted to Belize's conditions; they are subject to severe disease problems. Efforts to expand use of other varieties have met with consumer resistance.

Belize is normally self-sufficient in dry edible beans. In 1978-1982 average production of edible beans in Belize (Ministry of Natural Resources, 1982) was 6,200 acres and more than 3 million pounds, or 493 pounds per acre at a price of BZ \$0.78 per pound. During this period the acreage ranged from 4,800 to 7,000, production from 2.2 to 4.0 million pounds, and yields from 300 to 600 pounds per acre.

Beans are produced countrywide in both milpa and in mechanized systems. Fifty-five percent of production is in Cayo district, and 25% in Orange Walk. The Cayo share is largely produced under mechanization by the Mennonites, the remainder mostly as a milpa crop. Producers are price-responsive and high prices set by the EMB have increased both acreage and per-acre yields of beans.

Milpa dry beans are raised in one or two crops per year, interplanted with or following the corn crop. One estimate is that 46-52 days of labor per acre are required for a crop (TRDP 1983a).

In mechanized bean production, costs are approximately BZ \$358 per acre, yields 800 pounds per acre and, with a 90 cents per pound price, nets BZ \$361 per acre. The significance of these data is that partially mechanized bean production using relatively modest technology can show a reasonable profit. The domestic demand for edible beans has generally been strong enough to preclude exports, and it appears that about 4 million pounds of dry beans per year will satisfy the domestic market. Improved methods and reduced costs on milpa farms plus expanded mechanization in bean production should present opportunities for exports. The CARICOM price for red kidney beans in 1980 was BZ \$1.80 per pound, while the domestic price at that time was \$0.60 per pound.

Edible beans move into Belize market channels through the BMB or directly from on-farm storage. Again, most of the private storage is in the Mennonite communities. The BMB buys from 20 to 30 percent of the total supply of beans in an average year at pre-set support prices. Storage of beans presents a major problem for both BMB and private farmers. Because of poor storage facilities, quality can deteriorate and the product may become unpalatable after six months of storage.

#### I-K. OILSEEDS

Oilseed production has not been significant in the past in Belize. An annual expenditure of BZ \$5 million to import fats and oils (BZ \$30/capita in 1983) has focused attention on the potential for an oilseed industry in the country. In addition to import substitution and reduction of trade deficits, an oilseed industry could create employment, provide a protein supplement for livestock feed, and aid in crop diversification.

Very limited research or experience exists in Belize on producing, handling, processing, or marketing of oilseeds. It has recently been demonstrated that a number of oilseeds can be grown, but erratic past experiences in producing some of these crops strikes a note of caution for oilseed development schemes.

At present the relatively large per capita use of fats and oils, principally lard, relies on imports from the U.S. and the U.K. Other countries in CARICOM must also import these products. A recent projection indicates that CARICOM countries will have a deficit of over 30,000 metric tons of edible vegetable oils by 1990. This prediction may strengthen arguments for considering a Belizean oilseed industry.

Soybeans, the oilseed crop getting the most attention in Belize, may be used as an example. Conservative yields, based on CARDI research and production data, are 17 pounds of oil per 100 pounds of soybeans (at 13% moisture). At a yield of 1,500 pounds per acre, 20,000 acres could provide soybean oil as a substitute for all 1983 imports of fats and oils.

This quantity of soybeans would also produce almost 21 million pounds of 38% soybean oil meal for livestock protein supplement feed. Ten million pounds of soybean meal were imported in 1983, and the production example here would double present needs for feed. Higher meat consumption per capita, and/or exports to CARICOM would be needed to use the feed products if a soybean industry is to substitute totally for imported fats and oils. An expanded Belizean swine industry could also supply some lard.

New varieties of soybeans have shown experimental yields above 2,500 pounds per acre, but such varieties need to be field tested in potential growing areas throughout Belize. Other possible crops have variable and often untested potential. Sunflowers have not been grown or researched to a significant degree in Belize; CARDI is presently testing varieties but diseases limit optimism about

sunflower's potential. Sesame has a 50% oil content but yields are quite low; CARDI is testing varieties and many believe sesame has some potential, particularly for small farmers. There are 9,000 acres of coconut in Belize. Little research on management practices has been done. A coconut rehabilitation scheme is underway, but interest appears to lie with production for local farm markets or home consumption. One report indicates that a small crushing-refining facility may be feasible as a prerequisite to expansion of coconut production.

Peanuts allow both mechanized and labor intensive cropping, and production of peanuts for human consumption and processing into peanut butter has expanded in Belize in recent years. Production in 1982 was 400,000 pounds, mostly in the Cayo district. Marketing has been a problem because the EMB has not been active as a buyer. A peanut processing plant was opened in 1983, west of Belmopan and products include peanut butter and salted nuts. Purchasing contracts have been developed between the processing plant and peanut growers. The success of this processing facility will help to determine the growth of the peanut industry in Belize, and the potential for production of peanut oil.

There does seem to be potential for oilseed crop development in Belize and for the concomitant national goal of import substitution. Yet, before large investments are made in oilseeds, an accelerated national production research program is needed, as is continued analysis of processing, handling, pricing and marketing issues. If an oilseed industry is to be launched, both internal and external funding might be sought for research on oilseed issues. An oilseed development task force should be organized to oversee an integrated approach to all aspects of oilseed development. It could bring experienced oilseeds personnel from the U.S. to advise on procurement, processing, management and organization, use, and marketing of oilseed products; it should develop production technology packages for appropriate oilseed crops and farming systems (milpa and mechanized);

and it should accompany technological aid with economic and market analysis by extension specialists, CARDI researchers, and external oilseed specialists. An oilseed extension production specialist should be posted within the MNR.

#### I-L. CITRUS

The citrus industry in Belize is based on oranges and grapefruit. The old and small units grow predominantly grapefruit. Over 90% of production is in the Stann Creek Valley, primarily by 360 growers with present groves of about 12,000 acres. It is estimated that 250 growers (72%) have less than 10 acres of citrus, while the two largest producers (also processors) have about 3,500 acres of oranges and 650 of grapefruit. Exports of citrus products (frozen concentrates) were valued at over BZ \$12 million in 1983, an amount second only to sugar in export earnings and approximately 8% of total domestic exports of Belize.

According to the Citrus Growers' Association (1984) total fruit production has varied from 928,000 boxes in 1982 to 1,649,000 boxes in 1980. Production in 1983/84 totalled 1,441,000 boxes of which about 80% was oranges, and 20% grapefruit. Average number of boxes per acre for that year was estimated at 160.

Citrus concentrate is produced by two processors, each of which has extensive acreage of citrus in its own right. The industry is controlled by a Citrus Control Board operating under a 1967 ordinance to license companies and to establish a Citrus Growers Association (CGA). The CGA negotiates price with processors, issues grower licenses, and furnishes supplies and services to growers. The Citrus Control Board has established a price formula and in 1984, for the first time, prices for fruit were known in advance. Either processor has the capacity to take all fruit produced in Belize, and recent modernization of one plant will greatly improve its efficiency.

The deterioration of citrus groves in recent years has been the result of unstable prices and producer/processor conflicts. At present, a citrus loan program is underway for improvement and expansion on 8,000 acres. The program is funded by the Commonwealth Development Corporation (CDC). Loans are administered by the Development Finance Corporation (DFC). Rehabilitation work should result in production increases as early as 1985, although expansion projects will not show effects until about 1990.

The marketing channels for citrus are highly integrated and concentrated, with the two large processors buying roughly 90 percent of the citrus grown in Belize. The localization of most production in the Stann Creek area keeps transportation costs low and current improvements in processing facilities have kept processing costs competitive. Inefficiencies in the citrus industry appear to center in production rather than processing.

Price negotiations are carried on between the Citrus Growers' Association and the two processors at the beginning of each crop year. The Citrus Control Board acts as arbitrator in case of deadlock. Price negotiations are based on a pricing plan known as the Ayuso formula, which successfully established prices for both the 1983-84 and 1984-85 crops. The formula incorporates cost of production, cost of processing, staffing and shipping expense, and total gross revenue.

The structure of the citrus market has few buyers and a large number of sellers who operate as one in pricing. Strong countervailing power exists on both sides of the market and bargaining appears to be fairly equitable.

Deterioration of groves may be attributed to several factors. A 1979 CDC assessment showed that 40% of orange and 52% of grapefruit groves had 50% or less of the optimum number of trees per acre. This understocking of trees was the primary factor associated with low yields (less than 150 boxes per acre). Also

contributing were weed problems, low fertility, and general lack of proper management procedures. Many of the smaller citrus groves are owned by people nearing retirement who are reluctant to make needed investments or management changes. The small grower with less than 10 acres is in a difficult position. An efficient unit needs 25-30 acres to provide reasonable income and economies of scale in equipment use.

While citrus is well adapted to the climatic conditions of Belize, care must be taken in relation to soils where groves are to be established. Detailed soil survey data for potential areas of citrus expansion are needed, as are soil tests and plant response data for an industry-wide fertilizer program.

Optimism prevailed in the citrus industry in Belize in 1984, when oranges were selling at more than BZ \$12 per 90 pound box. Many believe that present average production of 150 boxes per acre can reach 300-400 boxes under the citrus rehabilitation program. Markets to CARICOM and the U.S. are very favorable at present and are likely to remain favorable for several years.

The potential for citrus industry growth in Belize appears to rest with concentrates rather than fresh fruit. At present, approximately 70 to 75 percent of the citrus concentrate processed in the two major plants is sold in Trinidad and is thus protected by the CARICOM agreement. An estimated 20 to 30 percent of the citrus concentrate goes to the U.S. under the Caribbean Basin Initiative (CBI) program, which allows citrus concentrate to move into the U.S. free of quotas or tariff. This program is a 12-year duty-free agreement, and Belize's processors appear to have a protected market in the U.S. even in the unlikely event that the Trinidad market would falter. The market for citrus concentrate in U.K. under the Lome II protectionary market agreement has slipped in the last two years because of the emergence of the U.S. as a buyer under the CBI, and the devaluation of the British pound against the Belizean dollar. However, it should be pointed

out that the U.K. market under Lome II is a potential future safety valve for citrus exports from Belize. Unrealized market opportunities could probably be tapped by promotional activities for the citrus industry via a formal market expansion agency.

Cost/return data presented in the Annex indicate that even at a price of BZ \$6.50 per box of oranges, with a yield of 250 boxes per acre, a return to capital and labor of BZ \$17,700 for 20 acres is possible. Export prospects and long term investment in citrus look very favorable, but good judgement on location of new groves, better application of technology, and good management will be essential.

The Citrus Growers' Association and the MNR should jointly develop and finance an extension program to study current problems and provide training commensurate with the size and economic significance of the citrus industry. This program should work with individual farmers planning to rehabilitate or expand groves under the existing loan scheme. The availability of certified, high-quality nursery stock is limited. The GOB should establish and maintain a certified, virus-free nursery program. Also, undue representation of processors on the Citrus Control Board needs legislative change. The makeup of the CCB should represent the interests of all growers.

#### I-M. BANANAS

Belize's banana industry began in earnest in the early 1970's. Areas of commercial production are in Stann Creek and the Toledo districts, where there are presently about 1,600 acres, of which 300-500 acres are new. The industry is a mixed private and public operation, with a Banana Control Board overseeing production. Initially there were 30 farmers with 30 acres each, but only 8 of

these remain and only a limited acreage is in the hands of small producers. The Banana Control Board has assumed the management function for the industry and has hired an experienced individual from Honduras as general manager. Banana marketing is almost completely vertically integrated from producer to packer. Shipping and marketing is performed under contract by Fyffes Group Ltd., a subsidiary of United Brands, and production goes to the U.K. Quality control is stringent with a 20% rejection rate. Management assistance to assure quality is provided to growers but expanded extension and consulting help is still needed.

Production and export value of bananas have fluctuated considerably. Over the period 1979-1983, production ranged from 513,087 boxes (1983) to 764,862 boxes (1980). Boxes per acre ranged from 327 to 509 and value of production from \$EZ 4.2 to 7.0 million. Yield figures are considerably below those of other banana growing areas of the Caribbean and Central America, which average about 1,000 boxes per acre.

The banana industry has undergone serious financial, technical and managerial problems in recent years. The government is now examining the possibility of changes, including perhaps a shift of the industry into private hands, but it is unlikely that the private sector will enter production without assistance in development planning, credit, and technical-managerial help.

Soil and drainage problems have plagued the industry. Present management suggests that 4,000 acres are needed for the industry to be competitive and efficient. Additional plantations are needed, and GOB should establish a rehabilitation and expansion loan scheme similar to those in effect for citrus and cocoa. Soil survey and testing work in areas of likely expansion must be part of any loan scheme.

I-N. COCOA

Cocoa is indigenous to Belize. It was cultivated by the early Mayans and with the exception of a few commercial farms, is now found in semi-wild stands in Toledo, Stann Creek and Cayo on about 3,000 acres. Since 1978, Hershey Foods Corporation, through an agreement with the Belizean government, has stimulated interest in expanded cocoa production. An 800 plus acre plantation in the Cayo District is the center of Hershey activities. This commercial operation includes research, production, and processing facilities; it also provides technical assistance to farmers. The agreement obligates Hershey to buy all of Belize's cocoa production at world market prices through 1993.

Hershey's accelerated cocoa development project will initially have 600 acres planted by 60 farmers with 10 acres each. Projections are that by 1990 there will be 10 large farms of more than 100 acres producing 50 percent of the crop and 40 farms of 16 to 100 acres producing 12% of the crop. The balance will be produced by 650 farmers with less than 15 acres each. A total of 8,500 acres is envisioned with 7 million pounds produced at a value of BZ \$12.2 million.

Changes in the world cocoa supply (Africa has shown a sharp decrease in output) provide an opportunity for Belize to add cocoa to those crops such as bananas and citrus that provide both export earnings and diversification and employment in agriculture.

Land is available at reasonable cost for cocoa development, and the Hershey technology and market are available to all producers. Although cocoa plantations are a long term investment, returns to both capital and labor are attractive under good management. Estimates of 800 pounds per acre of cocoa produced at the present price (1984) of BZ\$1.80 will give a return of BZ \$936 over operating costs. If

prices drop to BZ \$1.00 per pound, the lowest of the past 5 years, income per acre, less operating costs, would be \$496 per acre.

Experience to date and DFC data indicate a direct cost of BZ \$2,000-3,000 to establish an acre of cocoa to the fourth year, when a significant harvest begins. If production of 800 pounds per acre and a price of BZ \$1.40 per pound are assumed, a producer should break even (pay establishment and operating costs) after the sixth year.

Technical aspects of cocoa production are very significant in success of the operation. Post-harvest handling (fermentation, drying and storage) affects quality and price. The accelerated cocoa development plan calls for 5 to 6 new full time extension officers to assure project success. Hershey should be strongly encouraged to support research and extension work, including soil surveys and an education program for growers, particularly small farmers and those distant from the Hershey facility.

#### I-O. OTHER CROPS

Coconuts were perhaps the first plantation crop in Belize and a major crop between 1910 and 1940, when as many as 6 million whole nuts were exported annually. The industry has since declined and today Belize is a net importer of coconut products. All of the present estimated production of 4 million nuts is consumed domestically. An estimated 8,900 acres of coconut, concentrated along the coastal fringe and on the cayes, is handled mostly by small growers. A coconut rehabilitation scheme is now underway in Belize with goals of improving the productivity of existing trees and providing high-yield, disease-resistant, hurricane-tolerant varieties. Finding markets, continuing technological

development and application, and assuring appropriate inputs are the challenges to development of a larger coconut enterprise.

Coffee is frequently mentioned as a crop with potential for development in Belize, but production has been very limited. Coffee is primarily grown as a backyard home-consumption crop. Trade statistics show an import of 200,000 pounds of processed coffee in 1980. By assisting in providing improved nursery stock, the Ministry of Natural Resources plans to stimulate a small industry and national self-sufficiency. Technical information packages need to be prepared to help with the potential of this crop.

A wide range of tropical fruits are grown in Belize. With the exception of citrus and bananas, discussed earlier, and the special case of mangoes, most fruit is grown on a small scale for home consumption. Some surplus production enters local markets. Propagation material for some of these fruit trees is provided by MNR. Future development will heavily depend on the infrastructural improvements needed to produce, process and market at competitive prices.

Fresh vegetables are produced in most parts of Belize, primarily for home consumption. Individual farmers in the Belize and Cayo districts make a business of providing vegetables to urban markets. These markets are generally not well organized and cold storage facilities are lacking. Seasonal variations in production and price make vegetable growing somewhat risky. Also, imports from neighboring countries constitute a threat to local producers.

CARDI is doing some research on white potatoes, onions, cabbage and tomatoes. There are many technical problems in vegetable production--varieties, diseases, insects, fertility, weed control and proper handling. Quality of vegetables, especially at certain marketing periods, is crucial. There seem to be some opportunities for processing locally grown vegetables in small processing units to supply the domestic market and replace present imports. It is imperative that

this processed food be of high quality, skillfully merchandised, and competitively priced to attract Belizean consumers. Belize's vegetable producers (both home and commercial growers) should be provided with much-needed technical and market information on vegetable production. In the short run, commercial vegetable production does not appear to have a strong potential in Belize.

A major limitation on development of vegetable enterprises in Belize is the unpredictable domestic market. Growers need better marketing facilities, wholesale and retail price information, new processing facilities, and improved storage facilities for fresh produce at large markets.

#### I-P. FORESTRY

For three centuries the economy of Belize relied on the exploitation of its forests. During this time forestry was virtually the only reason for existence of the British settlement in Central America. As recently as 1955 more than 60% of the nation's export revenues were derived from forest products. By 1968 this figure had declined to 5%, as a combined result of resource depletion, declining demand, and a calculated de-emphasis of the industry by the colonial government. About 5,500 square miles of forest land are commercially exploitable, according to FAO (1978) and the Country Environmental Profile (1984:95), but only about 2% of the estimated volume is mahogany or cedar and 3% is pine; the remainder is other ("secondary") hardwoods. Mahogany was and still is the principal species for export. Other species have potential value but tropical hardwood forests are very heterogeneous; no one species dominates, and selective cutting of the more valuable species is difficult.

About 1.6 million acres of Belize's forest land are now held in forest reserves. Some of these lands are under pressure for agricultural use. The

private sector owns about one-third of the forest land in Belize, some of which contains the best remaining stands of mahogany. One private firm recently purchased 632,000 acres and has plans for timber development including pulp and paper products, wood fired electric power generators and lumber milling.

The Forestry Department of the MNR has emphasized timber development on lands in the forest reserves plus the Cockscomb Basin. There is a serious need for a comprehensive national land use policy to guide both forest and agricultural development.

While data are difficult to obtain, estimates of 50 million cubic feet of annual forest growth of commercial species are reasonable. This compares to the present harvest of less than 1.8 million cubic feet annually. Deforestation is not yet a serious problem in Belize, but in the long term, both silvicultural and human managerial skills need to be strengthened. Only in this manner can exploitation and economic return proceed under a system that assures viability of the forest resource over time.

The public resources devoted to forestry in Belize are very limited (4 permanent forest officers with degree training). There is need for more trained silviculturalists and forest products specialists. A few large private firms in forestry do have technical and managerial expertise, but many smaller firms are needed for a prosperous industry. There are very few small wood based industries, although potentially good markets exist for export products. Lumber mills are few in number and generally in need of modernization. Several studies of the sawmilling industry show little hope for change, short of redevelopment by competent staff.

Paper products require large-scale operations for economic efficiency. One paper mill is being planned at present but will take several years to complete.

There is a strong potential for development of wood-fired power plants in Belize to meet local and even national electrical demand. Only a small part of existing forests would need to be cleared to begin a project, and cleared lands could then be converted to "energy plantations" of fast-growing species for future fuel stock. GOB should plan and seek funding for one or more such plants, each of 3 MW capacity and each requiring 1000 acres of agro-forestry fuel stock per year. Each unit could supply 20% of present electrical usage in Belize.

A major limitation on forestry development in Belize is lack of forest planning. GOB and MNR should establish a commitment to forest industry development, adopt policies to encourage responsible exploitation, and create sound plans and policies within the Forestry Department. Foreign investment ventures, when given development opportunities on forest lands, should also be required to accept responsibility to assist in developing infrastructure, training local people, and devising sound management plans etc. Staff in the Forestry Department must be strengthened with foresters trained in tropical forestry and in forest products.

#### I-Q. LIVESTOCK

An overview of livestock production in Belize was prepared in October 1984 (see also Winrock 1982 and USAID 1983). On the basis of these studies, livestock development project was initiated in 1984 with emphasis on dairy production and market development, swine improvement, livestock forage improvement, processing facilities, a biological residue laboratory, and a strengthened MNR capability for agricultural policy analysis.

An indigenous livestock industry in Belize began about 1950 and Belizeans now include a variety of livestock products in their diets. The large amount of

arable land has provided one incentive for the cattle industry. Swine and poultry for home consumption are major items of family food on small farms.

FAO data (1980) show the following numbers of livestock in Belize: cattle 58,000, swine 27,000, sheep 3,000, goats 1,000, and poultry 340,000. The same source showed trade in 1980 as follows: 150 MT beef exported, 100 MT fresh pork imported, 460 MT bacon and hams imported, 40 MT poultry imported and U.S. \$4,440,000 imports of dairy products. Livestock officials in Belize estimate 1983 production at 16 to 20 thousand pigs, almost 2 million commercial broilers (about 6.6 million pounds), and 50 thousand pounds of turkey meat. At present, beef and poultry production meets domestic demand. Pork and dairy products are still imported at relatively high levels.

In 1978, there were 1,386 farms with cattle, an average of 35 head per farm, and an average of 4.9 acres of farmland used per animal. In this sense 241,000 acres were used for cattle from the estimated 1 million acres available. Cayo district, followed by Orange Walk, leads in cattle numbers. Relatively large acreages per animal, market weights reached only after several years, lack of a steady export market, and high production costs relative to market price are limits on the productivity and profitability of beef. It has been estimated that roughly 75 to 80 percent of the cattle inventory in Belize is in the hands of large producers. Many of them are owned by sugar, banana, and citrus operations.

Two major outlets assemble and process cattle for distribution to consumers. The first is the Belize Livestock Producers Association (BLPA), which assembles cattle for export to Martinique. The second is the seven inspected slaughterhouses that kill on a custom basis for private butchers. Cattle are purchased for the butchers by dealers.

Cattle pricing is largely a matter of private agreement between butcher buyers and sellers or the BLPA and sellers. Market information appears to be

scant, especially among sellers, although information available through the BLPA helps to stimulate some competition. The alternative outlet to the export market does make the butcher buyers somewhat more competitive in the prices they offer.

The limited size of Belize's population restricts domestic beef demand. The long-run potential for growth must come from export markets in the Caribbean, Europe, and perhaps the U.S. under protectionary market agreements. If production and processing costs can be lowered, it seems possible that grass fed beef from Belize can compete in unprotected markets.

Dairying in Belize comes from small scale units. One processing plant handled about 1,250 gallons of milk per week in 1981 (Winrock 1982). In 1978 about 31 percent of farms with cattle were milking cows. Orange Walk and Cayo led in numbers of dairy cows, primarily because of the Mennonite settlements there. One estimate of per cow production is 12 pounds of milk per day over a 180 day period. There are large imports of milk in condensed and dry forms. Opportunity exists to replace at least part of these imports with increased local dairy production. A major problem with fresh milk is its perishability. Unless production and processing are top quality and refrigeration is available to producers, handlers, and consumers, it will be difficult to expand the market in the short run.

Of the 16,011 pigs in a 1980 census (Ministry of Natural Resources, 1980), 29% were in Toledo District, 25% in Orange Walk, 14% in Cayo, 14% in Corozal, 12% in Belize and 3% in Stann Creek. Pigs are found mainly on small farms, with an average herd size among those with pigs of 5.53 animals on their 11.88 acres; 29% of farms surveyed had fewer than 5 pigs and 87% had fewer than 10. Pigs are raised in an "extensive system" of small litters, slow growth, and nutritional deficiencies that result in only 3 to 5 pigs weaned per litter.

Hog production is a relatively minor enterprise in Belize, and the marketing structure is not well developed. Hogs are either slaughtered on the farm or in one of the seven inspected slaughterhouses in the country. Pork is processed into sausage, hams, and bacon in seven meat processing plants in Belize. Large amounts of cured pork, ham, bellies and lard are imported to satisfy the strong demand for pork products. Increased hog production and pork processing have been designated as an import substitution activity in Belize, but little if any export potential exists for the immediate future.

Poultry and eggs are popular foods in Belize. About 30 pounds of broiler were consumed per capita in 1980. Poultry are raised in small backyard operations as well as large integrated production systems. Both production and consumption are expanding rapidly and broiler prices, at BZ \$1.65/pound (October 1984), have come down almost to those of the competitive outside market. Broiler production is perhaps a model of desirable import substitution. Belize is self-sufficient in poultry and in many of the production inputs. A good handling and merchandizing system has been established.

The poultry industry is centered in the Mennonite communities where operations--hatching, feed inputs, processing and marketing--are strongly integrated within the community. Poultry pricing tends to be administered by plant management at the retail market price less transportation, handling, and processing costs. Quantity contracts are used to establish production quotas. The competitive structure of the commercial poultry industry appears to be functioning well even though the balance of bargaining power rests with the processors in the wholesale poultry market.

The bulk of the eggs marketed in Belize also come from commercial operations in the Mennonite communities. Retail markets are generally dependent on supplies from these farms. All of the poultry and eggs produced in Belize are used in the

domestic market. There are no imports of eggs, with the exception of hatching eggs. The export potential for either product does not appear to be promising, although some potential might exist in CARICOM if continued improvements in local productive efficiency take place.

The numbers of sheep and goats are relatively minor in Belize. Both provide meat for family consumption. Performance of animals is similar to that in other tropical regions.

Per capita consumption of meat products in Belize as of 1980 (unpublished data, Ministry of Natural Resources) was 16.3 pounds of beef, 22.8 pounds of pork, and 29.6 pounds of poultry. The 28,145 households in Belize were estimated to have spent a total of BZ\$22 million for all meats in 1980. Of this total, 24% was spent for beef, 17% for pork, 54% for poultry and 3% for other meats.

Demand for livestock products is related to two principal factors: population growth and per capita consumption. Both of these factors should show positive though perhaps limited effects on the future demand for livestock products within Belize.

GOB should continue to stress its commitment to the present livestock development project. High transport and slaughter costs could be partly alleviated by providing opportunity for some commercial swine production in Belize district, near this consumption center, and assuring feed and other input supplies. Productivity of swine on small farms in southern districts should also be improved, and regional processing plants should be established. Central livestock assembly points, marketing cooperatives, and price and marketing information services would enhance the competitive position of smaller producers.

## I-R. AGRICULTURAL INPUTS

Providing adequate inputs in a timely manner at competitive prices is a function crucial to development of Belize's agriculture. Feeds, seeds, agricultural chemicals, fuel, and equipment are the main inputs, mostly imported. The challenge is not only to secure and distribute inputs but also to assure that costs are within the margins that producers must have.

Within Belize, inputs move by truck. While the main roads are reasonably good, secondary roads are both limited and inadequate. Petroleum products, a major input for agriculture, are imported at high costs. Until biomass generation or hydropower systems are developed to replace oil in generating electricity, these costs will continue to be high.

Livestock feed is imported by three dealers, primarily for poultry feeds (10 million pounds in 1983). More concentrates are now in use for both swine and cattle feeding. Most inputs for the integrated poultry industry are internally produced within Belize.

Farm machinery inputs are in the hands of four dealers. Sales are variable and dealers have not sold a new tractor in three years. Much used equipment moves into Belize from the U.S. and Canada, particularly in the Mennonite communities. Some farm input supply stores have recently appeared in rural areas. Availability of supplies has been a particular problem particularly in the Toledo area, where GOB has had to provide some inputs not available through private channels. One firm serves the fertilizer needs of the country under a concessionary agreement with the government. This plant operates at only 25% of capacity. There appears to be a high correlation between commodity prices and fertilizer usage. There is some concern for the competitive price of this input with a single firm handling the entire supply.

Agricultural chemicals imported in 1983 (800,000 pounds) were valued at BZ \$1.9 million. Three firms handle most of the chemicals, often distributing them through growers' associations for sugar cane, citrus, and banana production. No current regulations exist on sales or applications of pesticides. Legislation is being drafted. The chemical industry as well as government officials seem dedicated to a strong pesticide safety program.

Among seed, corn is the largest import item. Costa Rica, Guatemala and the U.S. supply most of it. Except for corn and vegetables much of the seed input is selected and saved from prior crops.

Several small firms process and distribute modest amounts of beef, chicken, peanuts, jams and jellies, vegetables, and milk to local consumer markets. Product quality and the lack of a constant supply often limit the amount that local wholesalers will buy, particularly when imports are readily available at competitive prices. The problem of the processor lies in attaining enough volume to realize economies-of-scale.

The amount and location of good storage facilities for agricultural products is a serious problem at present.

In general, agricultural inputs in Belize have the following characteristics: (1) lack of adequate quantity at needed locations, (2) insufficient and inefficient use, (3) inadequate quality of seed and chemicals, and (4) high price because of imports, lack of competition and distribution problems. The government has played a major role in attempting to get necessary inputs to farmers, but by and large it has not functioned to assure price or quality controls.

A nearly-completed study by Agrodev Canada, Inc. should provide more data on all aspects of Belize's input supply problems. The analysis will lay out four options for the government in dealing with inputs. These alternatives include a

government agency with complete control over inputs to a system, somewhat similar to the present one, and various private suppliers administered through a control board.

### I-S. CREDIT

The rural financial market in Belize includes a government owned bank, 4 privately owned banks, the Development Finance Corporation (DFC), and some credit unions. The commercial banks provide most of the farm credit, but the DFC also plays an important role in funding long term investments. Eight of the 21 credit unions play a minor role in small loans to rural people. There are 16 branches of commercial banks in the larger towns but most rural people have limited access to them. Some rural people hold their savings in the Government Savings Bank.

Formal lenders emphasize secure and tangible loan collateral. Transaction costs for both lender and borrower are high. Loan recovery problems are serious and lenders resist lending to farmers because agricultural prices, incomes, and repayment capacities are not secure. It appears that many investments in agriculture are financed by the farmer himself, his family, or his friends, as in most developing countries. Substantial remittances from Belizeans living abroad provide one source of informal finance. It is also common for stores, cooperatives and farm product dealers to supply short-term credit to farmers, with loan charges included in the cost of the purchased item. It appears that these credit charges are not excessive.

Commercial banks lent about BZ \$17 million for agriculture in 1983. These banks allocate about 25-30% of their total loans for agricultural purposes. DFC, the principal source of farm loans, disbursed about BZ \$6 million in 636 new loans in 1983. A significant number of DFC borrowers are in arrears because of the

economic problems of Belizean agriculture. DFC funds come from external sources and several programs are targeted for specific agricultural projects. Current loan rates are 8 to 12% compared to the commercial banks' 16%. Demand for the attractive loan rate of DFC is greater than the supply of funds.

Commercial banks provide very few loans to small farmers and DFC reaches only a minority of the rural poor. Three-fourths of loans by DFC in 1983 were for BZ\$50,000 or more, some to small farmers' groups. Estimates are that about 40% of farmers in Belize have access to formal loans, a relatively high proportion in relation to that of other developing countries. Some agricultural financial specialists feel that formal loans are not the appropriate development tool for producers who are not "creditworthy." Analysis suggests that a sharp expansion of formal agricultural credit is not in order in Belize.

Syndicates are a pervasive form of informal finance in Belize. People put a certain amount into the syndicate each pay period. Determination of the ordering of the use of these funds is by lot. The syndicate is in essence a form of forced saving outside the formal system.

Overall agricultural development and improvement of farm incomes are needed to foster an effective credit system. GOB should strive to create an atmosphere that induces a sound credit system that stands on its own and mobilizes more rural savings. The charter of DFC should be changed to make it a complete bank. GOB should foster a broadly based savings mobilization program throughout all systems in the credit markets, including innovative savings incentives. Outside donors should be encouraged to do less targeting of funds provided to DFC. Government and DFC banks should charge full commercial rates on loans and pay higher rates on savings. Technical assistance to DFC and credit unions on data processing, training and savings mobilization are needed.

## I-T. OUTPUT SECTOR

Belize's agricultural products flow from farm to consumer (domestic or foreign) through an output system that varies in adequacy and efficiency. Domestic production and imports furnish the supply of products marketed and distributed in the output sector. A sizable portion of the staple products consumed in Belize such as rice, beans, corn, poultry, beef and fresh fruits are produced locally. This domestic supply must be supplemented with imported fresh vegetables, pork products, milk, canned fruits and vegetables, lard, cheese and baking products.

The output sector of agriculture faces a limited domestic market as a result of small human and livestock populations in Belize. The human demand for domestically produced and processed foods has also been limited by the propensity to rely on certain staple home-produced goods in a large portion of the society, and by the acquired tastes and preferences of many urban consumers for imported foods. In the latter case, these goods are often priced lower than domestic goods, are strongly advertised, and are of higher quality.

Export market demand has also been limited for most products from the output sector because of (1) Belizean production costs and product prices that are higher than those of equivalent goods in competing world markets, (2) lower quality products, (3) less reliable supply, and (4) a Belizean dollar stronger than the currencies of some buying countries. This situation has meant that agricultural exports have depended on protected and concessionary markets as outlets for citrus concentrate, bananas, sugar, and beef. These protected markets include the Caribbean Community (CARICOM), the Caribbean Basin Initiative (CBI), and the Lome II Agreement with the EEC. All of these offer protection by tariff or exemption from tariffs for processed foods and limited amounts of fresh and live products

from Belize. Few Belizean products are able to compete with those of the major exporting countries of North and South America in unprotected markets.

Collection and storage functions are done by the private sector and by a quasi-governmental agency, the Belize Marketing Board (BMB). A number of channels are used and the degree of organizational structure varies considerably. Assembly markets tend to be better organized on the average than food distribution markets. Even in major population centers the central wholesale food distribution markets, which carry mostly domestic products, are poorly organized. Retail outlets in larger towns are fairly well organized and stocked, mostly with imported canned goods.

Transportation of products from farmer to buyer is largely by truck; both private agencies and the BMB are involved. Although vehicles appear adequate in quantity and quality, the transportation system is hampered by poor roads, especially in certain times of the year and certain parts of the country. Costs vary depending on commodity and location. If roads were better, the system would be relatively efficient.

Only minimal amounts of processing of agricultural commodities occur in Belize except for citrus, sugar cane and rice. These last three industries have a relatively high level of technology and tend to be cost efficient in processing. Some processing for import substitution purposes has been attempted. Fruits have been processed into jams and jellies in modest degree, but financial and quality control problems have surfaced in the industry. An attempt is being made in the Mennonite communities to can and distribute vegetables. A peanut butter factory is developing on a limited scale. One fluid milk packaging plant operates, and seven livestock slaughter plants are operating. Two relatively large and efficient poultry processing plants exist. With the exception of these poultry processors, most processing plants in Belize face some or all of these problems:

(1) high costs because of low levels of technology and skills, (2) low capacity that reduces chances for economies of scale, and (3) lower quality of product than imported goods. It should be pointed out, however, that sanitary conditions are quite good in processing and slaughtering plants in Belize.

Agricultural products are priced in a number of ways: (1) open market buying and selling (limited in raw product markets and less limited in food markets), (2) private agreement between buyer and seller, (3) administered pricing, (4) formula pricing, and (5) contract pricing. The competitive market structure in which buyers and sellers bargain on prices ranges from moderately competitive to strongly dominated by a few firms on one side of the market. Bargaining power in the market varies but generally favors the buyer in produce markets and the seller in consumer markets. The exceptions here may be citrus, bananas and sugar, which have relatively strong producer bargaining associations or are operated largely by the government.

Regulations on sanitary conditions in meat, poultry and other food processing operations are adequate. Regulations on the conduct of firms with respect to pricing, trade practices, and market dominance are inadequate and/or are poorly monitored and enforced. The potential for growth and efficiency of the output sector of Belize's agricultural economy depends on the ability to solve or ameliorate the following constraints:

#### Marketing Constraints

The generally poor condition of the road system delays or prevents movement of agricultural products in a timely manner to points of greatest net marginal value. Many marketing problems of local areas can be tied to problems of transportation. This situation hits hardest on perishable goods. A poorly-developed road system will increasingly become a limiting factor on agricultural

development. Improvements in highways, bridges, and feeder roads should result in narrower price differentials between deficit and surplus areas of the country, improved quality of products, and generally lower costs--important conditions as the country proceeds in programs of import substitution and export expansion.

Strong competition from other countries in world markets exists for almost every commodity produced in Belize. Currently there is almost no agricultural product of Belize that can move into the world market without some concessionary protection. This situation could change with a currency depreciation. However, an opportunity does exist to seek out markets unnoticed or untapped by other developing countries. The GOB should organize a market development and promotion agency. This agency could be operated by a private organization with expertise in merchandising, selling, and devising persuasive market development schemes aimed at both protectionary markets and new open markets for Belizean products. The root of much of the problem of Belize's agricultural products in world trade--high costs and low quality--should be addressed, even if improvements are only minor.

Lack of market regulations and/or monitoring of non-competitive pricing practices, unfair trading activities, unequal access to markets, and deceptive buying and selling touches most agricultural producers in Belize's relatively small and fragile economy. This constraint can manifest itself in misallocation of resources and incomes as well as stagnation in growth and development. The GOB should review, revise, and enforce its regulatory structure.

There is a general lack of the market information needed to monitor markets and to analyze problems, decisions, and policies. This lack of data affects not only public policy makers but also individual farmers. Better market information can improve pricing efficiency through clearer signals and strengthen the bargaining position of the agricultural producer in markets often dominated by a

few buyers. The MNR should develop a market information center, supported by a checkoff from farmers' sales as well as government funds. Price information could be made available through weekly or monthly reports to local agricultural offices, radio, and eventually to farmers themselves. Stress should be put on information to help producers decide what is a "fair" price, where to sell, and perhaps when to sell. The program need not be elaborate at the start but it should supply reliable, unbiased and steady information on agriculture.

Marketing and control boards are not reaching their full potential as market stability and competitive tools. Instead they are often constrained by unclear and confusing operational guidelines, by inadequate data bases for analytical work and decisions, by limited economic analytical skills to assess the consequences of alternative courses of action, by lack of interest on the part of some members and uninformed decisions, by imbalanced interests on some boards and in some cases conflicts of interest, and by unwanted political influence.

The level of technical skills needed to solve day-to-day problems of storage, handling, processing and merchandising agricultural products is often lacking. This constraint manifests itself throughout the agriculture and results in lower quality products at higher prices. A competitive position in domestic and export markets is stymied. The domestic market for Belize's agricultural goods is limited by a small total population. Furthermore, a majority of this population is urban and has access to high quality imported foods at relatively low prices. These consumers are reluctant to buy higher priced and lower quality products, even if marketed as import substitutes. Another major part of the populace includes consumers of a staple diet of beans, corn and rice with little in the way of meat or processed food. This market also offers limited demand. There is here a serious constraint on import substitutions unless costs are lowered and quality increased. The COB should develop a consultancy program aimed at assisting

managers and technical personnel in solving the problems associated with assembly, storage, handling and processing of agricultural products. This program could involve experts from the U.S. on long-term contracts to provide short-term training, analysis and problem solving in the areas of plant layout, cost reduction, merchandising, quality control and market promotion. GOB should also give continued support to the USAID/CAEP program, which could eventually be broadened to coordinate much of the training in marketing and processing. It could also help to set up a market information system.

Food processing capacity is limited. Processors are not generally large enough to produce efficiently and technically advanced enough to provide a high quality product. The GOB should give support and some concessions to new processing industries to protect their early growth so that economies of scale can be reached. The program might include continued use of tariffs. It should also include, however, monitoring to assure progress in quality and cost control during the protectionary period.

A lack of central markets and assembly points for livestock raises assembly costs, reduces the bargaining position of sellers, reduces ability to monitor marketing practices by buyers, and reduces the level of market information available to producers. Regional holding areas and central markets for livestock assembly and sales should be established. These could be operated by the BLPA and financed by a levy on sales. Opportunities also exist to improve the bargaining position of producers by strengthening livestock, grain, citrus and other producers' organizations. These organizations are needed in a market structure that may be dominated by buyers or suppliers rather than producers.

## I-U. PUBLIC SUPPORT FOR AGRICULTURE

The Government of Belize supports the agricultural sector in several ways. Four major components are analyzed here: policy making, planning and information services; agricultural research; agricultural extension; and agricultural services. The Annex (Public Support for Agriculture) gives a detailed discussion of each of these components.

### Policy Making and Planning

The Government of Belize functions through its several ministries. The Ministry of Natural Resources (MNR) has principal responsibility for agricultural development; however, several other ministries are also involved. The Ministries of Works, Education and Finance and Economic Planning also play direct roles in rural development. Within MNR, functions are performed by staff units as well as government boards (Marketing, Banana Control, and Citrus Control) and such projects as the Accelerated Cocoa, Livestock Development, and others. Legislation and policies are developed and modified over time at many levels of government. Policies frequently are influenced heavily by political considerations. There is need for a more comprehensive set of legislation to guide policy development (e.g., the price setting policies of the Marketing Board).

Policy formulation is a dynamic interactive process in an open society with interest and pressure groups. The goals of government now include: (1) development of export markets and trade; (2) provision of domestic products to replace imports; (3) reduction of trade deficits; (4) distribution of government lands; (5) provision of markets for farmers and assurance of consumer supplies at reasonable prices for both producers and consumers; (6) provision

of training and education for farmers; and (7) encouragement of private and foreign investment.

### Information Services

The data base and framework of analysis for planning and policy making in agriculture are inadequate. Best judgements of field extension workers are the main source of information at this time. Both physical and economic data are needed for sound decision making by government officials and agricultural programs. Well intentioned plans in the MNR and elsewhere in government are often presented in the form of objectives and targets, but planners lack the information to do effective work.

### Agricultural Research and Extension

Research and extension (of an applied nature), extension education and training, and essential support services are part of effective agricultural development. These functions can only be performed by an adequate supply of competent agricultural professionals. Belize needs to train agricultural professionals but because of the country's limited size it will also need to rely on outside sources for specialized information. In general, the government will need to supply most of the staff as the private sector generally does not see a short run return on investment in research, education, and services nor a long run return because of the limited size of the market in Belize.

As of October 1984, the staff consists of the following. There are nine posts in the MNR's research program. Only 4.9 FTE of these are actually devoted to research and two positions within the unit are nearly full time administrative jobs. There are 2.1 FTE researchers assigned to teaching or special projects. The manpower is woefully inadequate.

In extension, there are 51 total posts listed, of which only 33.1 FTE are presently devoted to extension activities. This condition of many open posts has existed for more than 15 years according to Ministry officials.

In services (veterinarian, animal health, quarantine, livestock, apiaries) there are 29 posts listed and 23.8 FTE filled. Commodity groups support research and extension work in sugar and to some degree in citrus, bananas and cocoa. A total of 16 FTE are provided by these commodity groups. Regional work provides five people: three in CARDI, one in CARICOM, and one in extension associated with the CAEP Project.

One of the dilemmas facing Ministry administrators (in addition to trying to fill open posts and add new positions) is that of adequately serving specially funded outside donor projects while carrying on a full fledged program with an already limited staff. There are now six to eight externally funded agricultural development projects with external staff that call for counterpart staff from the Ministry. Major projects are Citrus Rehabilitation, Accelerated Cocoa, Toledo Research and Development, Livestock Development, CAEP Extension Improvement, and Coconut Rehabilitation. These are or shortly will be staffed in Belize by 16 full time experts from other countries as well as 2 FTE visiting consultants. Nearly all of these projects specify a part or full time local counterpart, but seldom is new Belizean staff added to meet this requirement.

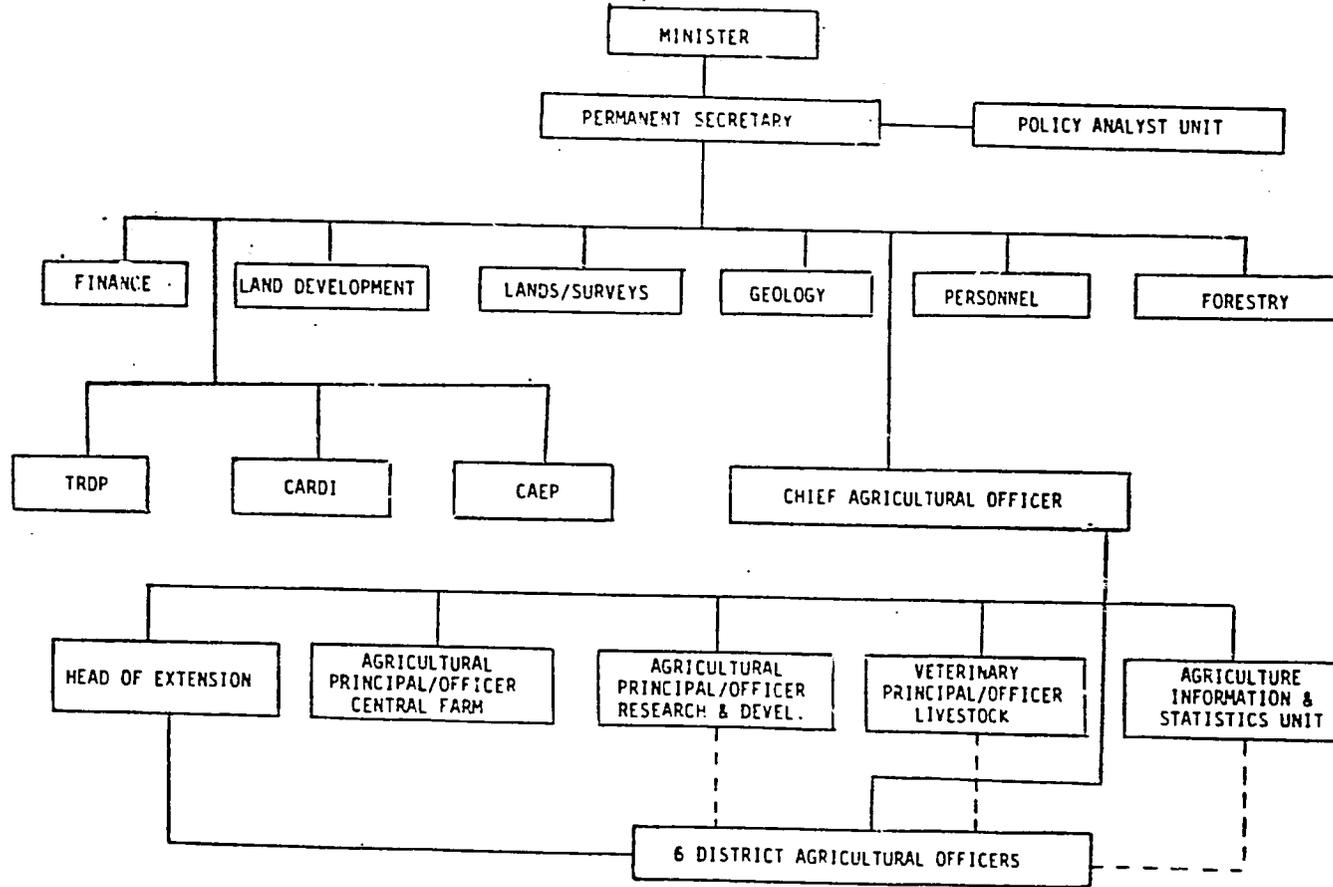
The result is that ongoing research, extension and service programs, already understaffed, must shift to accommodate counterpart or cooperative demands. The extent of this problem is shown in the Annex. In the Ministry of Natural Resources, 61.8 FTE of 89 listed posts are now operational, 10 are away in training and 7.2 FTE are assigned to counterpart work. Many foreign experts work in Belize without the required counterparts, as in the Toledo Project where six professionals are in place on a long term project with no direct counterpart staff. It is evident

that the government and the MNR, as well as existing and potential project support organizations, must deal with this question of "overburdening the system."

This requires steps to strengthen and reorganize the structure of MNR and the filling of vacant positions. Key research and extension functions within MNR should be headed by principal officers. It is necessary to form an organizational hierarchy with clearly-specified duties and reporting channels. The current system seems to lack this type of organization and many duties are "shared" (see MNR organizational chart). Central farm should be managed by a director responsible to a principal officer. These positions as well as a new position of training and education officer for research and extension should be designated and filled. The forestry staff should be expanded and vacant positions for District Agriculture Officers need to be filled with high quality people. MNR should continue management and supervision training for all staff, define specific roles and tasks, and delegate responsibilities so that decisions in MNR are not made by committee. Consultant help in organizing management tasks facing MNR administrators should be sought.

One of the major deterrents to long range improvement of Belize's research and extension efforts is the traditional civil service system. This system may serve general public services very well, but it is not consistent with the professional nature of agricultural research and extension, in which highly trained and motivated staff are essential. These staff need adequate support and appropriate rewards and sanctions for their performance. There must be a concerted effort to modify the existing civil service system so that administrators can shift resources to priority areas, reward excellence, remove incompetence, and create high morale.

ORGANIZATION STRUCTURE  
MNR - AGRICULTURE - 1984



Source: Rodney Neal, Principal Agricultural Officer, Research and Development, MNR.

Current agricultural research work is primarily in the areas of agronomic or livestock production technologies, in response to short run practical questions of cropping practices and livestock nutrition. Three principal research organizations exist: the Ministry itself, at Central Farm; CARDI's regional program of Caribbean Agricultural Research and Development; and the Toledo Research and Development Project (TRDP), a U.K. funded program. Work in sugar cane is also done by Belize Sugar Industries. More recently, Hershey has begun cocoa research in Belize, and research on rice and livestock is a part of CARICOM's activities. In view of the number and heterogeneity of Belize's agricultural problems, present research is less than adequate. Some good work is underway but an expanded adaptive research program coupled with extension would pay big dividends. Local researchers also need more regular contact with agricultural specialists out-of-country. There is very little economic or farm management research, and there is also a decided lack of training of MNR staff in these areas. More advantage can be taken of regional research; improved linkages with CATIE, CARDI, CIMMYT and other institutions and universities are needed. Each of the farming systems in Belize offers much room for a set of alternative production practices that would raise productivity and income to the benefit of individual farmers as well as national production goals.

In 1981, the Ministry of Natural Resources entered the Caribbean Agricultural Extension Project (CAEP) and developed a national extension improvement plan. As of 1984 (according to an impartial outside evaluation) most of the goals of that plan have been or are being implemented. This phase of the project has separated extension education from regulatory service functions; decentralized extension work and placed officers in each zone; provided transport; and trained staff in programming, job expectations, performance appraisal and supervision. Extension is now in position to expand greatly its field activities

and its impact on agricultural productivity. Outside support will be essential to continued development.

A national Extension Advisory Council is in place and a similar council, expanded to include research, could secure future outside support for activities while it continues to serve in an advisory capacity. The supervisory function in extension and research services is also critical to successful programs. Principal officers and supervisors need to be carefully selected and trained in the management of programs and handling of people.

One obvious weakness in the extension program involves a need for examples of successful work--cost-benefit analyses and people-impact stories. This evaluation and publicity work must be done if the government and the farmers of Belize are to support extension.

#### Agricultural Services

The agricultural service sector seems to be suffering more from inadequate levels of training of personnel and physical support for their work than from any great lack of number of posts. There is a total of 29 posts (24 of which are filled) in connection with meat inspection service, veterinary and animal health service, mechanical services, quarantine and inspective service, and apiary service and education. One area needing attention in Belize is pesticide control and applicator training. This program ought to be implemented immediately with existing staff who already have contact with farmers and the agro-chemical industry.

It appears that the Mechanical Services Division is short of accomplishing its purposes. Perhaps these services should be put in private hands and some sort of support or subsidy provided to small farmers directly. The machinery service may then approach a solvent status.

The apiary services seem to provide more of an educational than a service function. Because of its development potential it deserves greater attention and needs to be incorporated into the extension organization.

## II. MAJOR LIMITATIONS TO AGRICULTURAL DEVELOPMENT

While Belize has various factors that limit agricultural development, it also has a number of pluses. For example, it has an orderly government and a systematic judicial system. Most people in Belize are literate and the Belizeans clearly feel in control of their own destiny. Unlike many low income countries, Belize has land development rather than population pressure problems. It also has access to several preferential or protected markets for some of its agricultural goods, and the Caribbean Initiative provides additional opportunities for exporting. It is located close to major markets in Central America, Mexico, the U.S., and the Caribbean, and has access to assistance to promote agricultural development. The wide diversity of agroclimates, soil and water conditions, and rainfall also allows the country the option of growing a wide variety of crops. Finally, the attitude of the government and general populace toward private enterprise is conducive to development in rural areas where many of the production and marketing activities are best carried out by private entrepreneurs. The discussion in Part I and the individual consultant reports in the Annex point out a number of factors that inhibit economic development in rural areas. In the discussion that follows we synthesize the major limitations that cut across the individual consultant reports. The major limitations that bind agricultural development can be grouped into five categories: human resources, natural resources and climate, the small size of the economy, external factors, and weaknesses in public services.

### Human Resources

Although Belize's polyglot population is highly literate, technical skills, business acumen, and farming experience are often rudimentary. This is

understandable given the shortage of technical training in the country, the limited number of businesses, and a short history of commercial agriculture. Heavy outmigration from the country contributes to these problems, as many young people leave to work in other countries. While Belize has a small core of people with advanced training in agricultural sciences, forestry, and rural social sciences, this pool of trained people must be expanded and further trained if Belize is to accelerate the development of its agriculture. The pool of entrepreneurs who create agribusinesses and become innovative farmers and lumbermen must also be increased. A special challenge will be to assist an increasing number of milpa farmers from diverse ethnic backgrounds, who are obviously very judicious managers of their opportunities, to break out of their economic bonds. Their shackled managerial and farming abilities must be released into more non-farm economic activities, and into an expanded range of farming opportunities. The milperos are a large reservoir of farm managers who ought to be drawn increasingly into commercial agriculture.

#### Natural Resources and Climate

In large part, Belize has been relatively slow in developing commercial agriculture because of natural conditions that make it generally more challenging to farm than in other parts of the world. It has been difficult, costly, and hard work to clear some land for agricultural use. Once the land is cleared, weeds, diseases, soil management, and drainage problems are ever present for farmers. In some cases soils are very shallow, have a hard pan that limits drainage or root penetration, have serious nutrient deficiencies, or have a large clay content that limits workability. On some lands farmers may have only brief periods of time during which the moisture content in clay soils is not too high or too low for seedbed preparation. This forces the use of relatively large

machinery to prepare the ground quickly. In many cases poorly drained soils limit yields and also limit the ability to get on the land with machines at harvest time. The luxurious vegetation that covers much of the country can lull the uninformed into thinking that the soils underneath are able to produce similarly abundant agricultural crops. All too often, however, once the land is cleared the environment is hostile to farming.

### Small Size of the Economy

Efforts aimed at increasing local production of any commodity to substitute for imports quickly runs into the problems of the very small size of the domestic market. Relatively small increases in the output of goods such as peanuts, milk, poultry, beef, or fruits, and vegetables can easily break the local market. Because the Belizean economy is relatively open, local producers must also compete with producers in Mexico and other nearby countries, and in the U.S., for local markets. This makes it difficult for local producers to realize economies-of-scale in many of their operations, especially if they must be based first of all on local markets.

### External Limitations

Because of its small size, Belize is very susceptible to changes in external forces. Also, since the Belizean dollar is fixed to the U.S. dollar, incentives for both its imports and exports march in step with the overall rise and fall of the U.S. dollar. During the early 1970's, when the U.S. dollar was relatively cheap, both the U.S. and Belize found it relatively easy to export, and at the same time found that imports were relatively expensive. This changed dramatically in the late 1970s as the value of the U.S. dollar appreciated, versus other major currencies, and caused imports to boom while export languished. Belizean fortunes

have suffered the same fate. As long as the U.S. dollar remains strong, and the Belizean dollar is fixed to the U.S. currency, Belize's exports markets will be reduced and local producers will face strong competition from importers. Unless Belize moves to more protection for its local producers via tariffs or quotas, devalues its own currency, or provides export subsidies, its own producers will remain at a cost disadvantage vis-a-vis producers in many other countries.

The shrinking market for Belize's major export, sugar, is also largely beyond the control of the country. Changing consumer tastes and popular sugar substitutes have made major inroads into the worldwide demand for sugar in the past few years. Unless other major uses for sugar, such as alcohol, become economic, it is likely that sugar will continue to be a shrinking industry. While Belize still has some important preferential export quotas for its sugar, it is highly likely that the size of these quotas, and possibly the price paid under these quotas, will decline in the future.

Belize imports a large part of its energy needs. Its import bill, and thus its balance of payments, is very strongly affected by the price and amounts of oil products imported. Farm fuel and fertilizer costs are closely tied to the price of oil, as is the cost of generating electricity in rural areas. Relatively expensive electricity adds to the costs of agricultural production and limits the number of non-farm industries that can operate in rural areas. Belize will only reduce its vulnerability to oil price changes by producing more energy locally.

### Public Sector Problems

Because Belize is a young nation with a young agricultural sector it is not surprising that the public sector has problems in adequately supporting agricultural development. Road and bridge deficiencies, for example, are a major restraint on agricultural development, and these problems must be largely resolved

by government. Likewise, improved shipping facilities are also needed to facilitate increased agricultural exports, especially cattle. (At the same time, improved port facilities would also allow cheaper imports.)

While Belize has public services in agricultural research, extension, and agricultural finance that are better than those of some other low income countries, they must be strengthened to support agricultural development more adequately. The Government of Belize faces a major challenge in providing public support services for very diversified agricultural and forestry needs. It cannot possibly hope to train and employ enough of its own agricultural specialists to solve all the technical problems that arise in Belize. These technicians must be knowledgeable in several different technical areas including research and extension, and have enough professional contacts outside the country to get access to those people who can treat highly specialized agricultural problems.

Belize also has problems in systematically formulating agricultural policies and plans. Important decisions are often fragmented among several ministries or government agencies, and too few of the major policy decisions are supported by careful staff analysis. The Ministry of Natural Resources should be strengthened and given some additional jurisdiction over agricultural policies to resolve this problem.

Likewise, decisions affecting rural financial markets in Belize are also fragmented. Credit unions, the Development Finance Corporation (DFC), and the commercial banks mostly go their own separate ways. While this is not all bad, it does result in some gaps in providing financial services in rural areas. The rural poor have only limited access to formal loans, and have very little access to attractive financial savings services. Current procedures in the Development Finance Corporation do not induce many rural poor to use DFC's facilities. The

fact that DFC is heavily dependent on external sources of funding also warps the agency in undesirable directions.

Government will be forced to play a larger role in helping to remedy deficiencies found in the agricultural marketing system. In addition to improved transportation, mentioned earlier, Belize must improve the quality of its wholesale and cold storage facilities for agricultural products. This would be beneficial to producers, handlers, and consumers of fruits, vegetables, and dairy products. These facilities, along with a government market information service, could help to moderate the wide swings in prices that many producers of perishable products face.

### III. IDENTIFICATION OF AREAS WHERE AID MIGHT FUND PROJECTS TO HELP STIMULATE AGRICULTURAL DEVELOPMENT IN BELIZE

The following discussion identifies seven possible projects that AID might consider funding in the near future. In the last part of the section we list additional projects that merit more analysis and possible AID consideration in the long run. These suggested projects flow from the discussion in Part I and the more detailed reports of the various consultants included in the Annexes.

As in most countries, AID is limited in the projects it can use to address agricultural and rural problems. Some serious difficulties, such as exchange rates that limit Belizean exports, cannot be addressed with foreign assistance. Additional problems are best addressed by local governments, private firms, or other donors. Still other problems, while intense, are too small or local in nature for a donor to address directly. It would be unwise for AID to design projects that focus on single crops or products, aside from livestock, forestry, or sugar. Instead, AID will be forced to focus most of its efforts on developing support services that facilitate agricultural development in a number of crops and enterprises. Because of Belize's heterogeneity, its economic growth likely will come through expansion of a number of relatively small activities.

#### General Support Services

Most of the consultant reports point out that Belize needs more people trained in the agricultural sciences, agrobusiness, forestry and rural social sciences. Some of these individuals will benefit from very specific training as in citrus diseases. Others will need general training, such as in extension practices or economic analysis. Part of the training will require out-of-country degree work, while still other people can benefit from short courses and

professional tours. Some of the people that might be trained should come from the Ministry of Natural Resources. Others might be drawn from the Development Finance Corporation, other government agencies, the private sector, and commodity organizations.

A majority of the consultants also point out that many Belizean farmers face serious technical problems that limit their ability to increase agricultural output. In many areas of the country weeds strangle crops, soil texture and drainage problems limit mechanized cultivation of land, numerous diseases attack crops, and seeds give low yields under local conditions. While Belize can import some useful research results from other countries, many of its most important research problems are time-and-place specific. Additional local agricultural research capacity will be needed to address the very heterogeneous conditions that Belize faces. Improved information and extension services must also be part of this process. Because of its small size, Belize cannot expect to develop local specialists in all of the technical areas where it has agricultural problems. Local people must have enough training, however, so they can identify the problems and know who to contact for help. Helping to link Belizeans with universities and other research organizations outside the country should be an important part of AID's work.

Several consultants also pointed out that the process of agricultural policy formulation is fragmented and sometimes not adequately supported by careful analysis. Important product pricing policies are sometimes made ad hoc, forest resources are used with little planning, and the government has a difficult time ordering its agricultural development priorities in responding to donor proposals. Agricultural interests would be better served if there was some consolidation of agricultural policymaking and if this was supported by more systematic analysis. Critical land use and drainage decisions that must be made by policymakers will

also be hindered until more detailed surveys are made of the land and water resources in Belize.

Many of the agricultural development suggestions made in the attached consulting reports will require more extensive use of loans by individuals, firms, and farmers' associations. Most farmers require additional loans to make long-term investments in agriculture such as land clearing, planting of tree crops, buying livestock, installing drainage facilities, and buying more machinery. While the financial system in Belize is currently doing a fair job of serving the borrowing needs of a substantial number of the farmers in Belize, financial intermediaries, especially the Development Finance Corporation, will be required to expand and improve the quality of their services to meet growing financial needs. While formal loans are available to many farmers in Belize, attractive formal deposit facilities are not. Also, the procedures currently used by formal lenders make it costly for them to lend to small farmers, and inflict substantial loan transaction costs on those who are not preferred clients.

Most of the consultants stressed the importance of improved roads and bridges for agricultural development. Many of Belize's land and timber resources are not accessible by dependable roads and bridges. Costs of market intermediaries as well as farmers are significantly increased by these transportation deficiencies. With uncertain road conditions, especially in the southern part of the country, farmers and intermediaries find it difficult to evolve dependable marketing arrangements and to supply high quality produce.

As several of the consultants pointed out, agricultural marketing problems are made more difficult by the lack of convenient wholesale marketing facilities in or near major towns and cities. This includes some modest cold storage facilities where perishable crops, such as vegetables, might be stored for short periods of time to facilitate more orderly marketing and smaller price swings.

AID has had very good luck with helping to build these types of facilities in several other countries in Latin America. The experience gained through these other projects could make it easier for the Belizeans to develop such a project.

Equity and political considerations require AID and the Government of Belize to provide direct assistance to the numerous small farmers in the country. While about a third of these small farmers are involved in the sugar industry in the northern part of the country, an even larger number of small milpa farmers are scattered throughout the rest of the country. These farm units are heterogeneous, face dramatically different agro-economic conditions, and are often difficult to reach with existing transportation facilities.

While some of these small milpa farmers spend most of their time farming, many of them derive substantial parts of their household income from off-farm employment. A diversity of languages and ethnic backgrounds further compounds the problems of helping milpa farmers. While several of the projects that we suggest for AID will have some indirect effect on the well-being of the milpa farmers, we could not reach a consensus on projects that would more directly affect milpa farms. Both AID and the Government of Belize need a clearer understanding of the problems and opportunities faced by milpa farming before developing milpa projects. This should include a synthesis of research done on the milpa system in Belize as well as in surrounding countries, and some surveys in Belize to establish the economic conditions under which milpa farmers operate. This type of general information will be necessary to formulate any milpa project that has a reasonable chance of success, and to adjust existing public services so they provide more assistance to milpa farmers.

### Commodity-Specific Projects

Belize's extensive timber resources, its major energy deficiencies, and serious problems in the very important sugar industry merit AID's attention. For several centuries the economy of Belize largely depended on its extensive and varied forests. While the supply of some of the most valuable hardwoods has been depleted, Belize still has very extensive forests and a climate that is conducive to rapid growth of wood products. Sun, water, and soil have created an immense supply of latent renewable energy stored in Belize's forests. At the same time, Belize imports a very large part of its energy, especially to fuel electrical generation. AID should help the Belizeans to use systematically some of the biomass available in its forests for generation of electricity, and to think of at least some of its woodlands as energy forests. This would provide some additional rural employment, substitute for some of the energy imports, facilitate development of more high quality lumber, and also provide additional electricity for use in rural areas.

It is difficult to find anyone who is optimistic about the short-run, let alone the long-run, prospects for the sugar industry. Changing tastes and sugar substitutes are forcing countries to reduce the preferential sugar quotas of Belize. It is very likely that Belize will be forced to contract its sugar industry and redeploy some of the land and labor resources currently employed in this industry. The social and economic implications of this adjustment are so large that they merit concentrated attention by both the Government of Belize and AID. Resources in the sugar industry must be redeployed to absorb a significant amount of the labor currently involved in the industry, help to substitute for some of Belize's current imports, and also provide additional products that can be exported, such as alcohol.

### Near-Term Projects Proposed by the Team

It appears to us that AID ought to consider seven projects aimed at stimulating agricultural development in Belize. The first project would aim to increase the capacity of the Ministry of Natural Resources to support, promote, and coordinate agricultural development. A second project might focus on training a relatively large number of Belizeans in agricultural sciences, agrobusiness, forestry, and rural social sciences. A third project could focus on the Development Finance Corporation to help it expand the quality and range of financial services it provides. A fourth project would fund improvements in rural roads, bridges and marketing facilities. A fifth project might fund additional study and analysis of milpa farmers in Belize in order to identify more direct ways of helping this important group. A sixth project would focus on developing a new facility to generate electricity based on biomass provided by carefully managed energy forests. The seventh project would focus on helping to reorganize and diversify the sugar industry.

Additional discussion of these seven suggested projects is presented in Part IV of this report.

### Additional Issues that Might Merit Future AID Consideration

The following issues are problem areas that might merit future study by AID and the Government of Belize. They may or may not lead to fundable projects.

1. Because of the small size of the economy there is limited scope for multiple firms to be intermediaries in agricultural input and output markets. The government should be interested in measuring and monitoring the degree of competition in these markets. The government needs to sustain some measures of industry efficiency when only one firm controls the market.

2. Drainage and soil management problems are severe in many of the parts of the country and merit more serious and long-term study and treatment than will be possible under the projects we have suggested.
3. We also did not look closely at the access that farmers have to machinery rentals, but we heard complaints about the machinery rental services of the Government. It may be useful to take a more careful look at farmers' access to machinery rentals and how government services could be improved or replaced by private rentals.
4. The government is increasingly concerned about environmental and health impacts of the chemicals used in agriculture. AID might be able to help in this matter through funding some small studies and making outside experts available to the government.
5. A relatively large number of Belizeans live outside the country and many of them send foreign exchange remittances home. If the government becomes interested in increasing the savings rate in Belize, it may want to induce a larger flow of these remittances into formal financial intermediaries. AID might be able to encourage the government to give more attention to the savings issue by funding studies on remittances.
6. A large number of Belizeans leave the country to work elsewhere. If AID becomes heavily involved in training programs aimed at adding to the technical training of locals, it will be important to understand more about the characteristics of these migrants to assure that a large percentage of the people trained by AID stay in the country.
7. Various types of cooperatives play a significant role in agriculture. More information on these cooperatives along with information on other types of group action in the countryside may provide insights into how the government might better address problems of rural poverty.

8. Our agricultural sector survey focused mainly on farming activities in rural areas. Research in other low income countries strongly suggests that non-farm sources of income are often very important to the rural poor. It would be useful for AID and the government to understand more clearly the nature and extent of non-farm rural enterprises. This understanding might lead to projects that would speed development of these units.
9. Agricultural and forestry technicians are forced to rely heavily on experts outside of country to help resolve some specific problems in rural areas. It would be very useful to know how these technicians now get their information and the nature of their out-of-country contacts. There may be ways for AID to strengthen these contacts through training or technical assistance projects.

#### IV. SPECIFIC RECOMMENDED ACTIONS

Many different persons and organizations helped in addressing the limitations and suggested actions in Part III. Some recommended actions are general and long-run in nature such as more training. Obviously USAID can't treat every problem. In addition, some constraints such as climate, soil types, and natural disasters are not solvable. There are, however, specific issues that agencies such as USAID can address, and that will provide both short-run and long-run benefits to Belize. They are:

1. Help the Ministry of Natural Resources to strengthen its research, extension, policy formation, organizational structure, and agricultural information services.
2. Develop a training project to educate people at the B.S. and M.S. levels in both forestry and agricultural sciences as well as agribusiness.
3. Develop a biomass electricity generation project based on energy forests.
4. Help the DFC convert to a more full-fledged bank, and also mount a savings mobilization effort in rural areas.
5. Reform the sugar industry through crop and enterprise diversification, especially into oil-producing crops.
6. Develop a program aimed at the milpa and small farmers in the country.
7. Design bricks and mortar projects on roads, bridges, wholesale facilities, cold storage facilities, and possibly a land survey.

Brief descriptions of each of these projects follow:

1. A PROJECT TO ASSIST THE MINISTRY OF  
NATURAL RESOURCES TO STRENGTHEN ITS SERVICES.

Purpose

To help the Ministry of Natural Resources to organize, strengthen and increase its research, extension, policy formation, and agricultural information services.

Project Description

Most new or expanded agricultural activities in Belize must rely heavily on more technical assistance from the Ministry of Natural Resources. Problems associated with switching to new enterprises (such as oil crops), improved drainage, modern methods of weed control, and substituting for imports or expanding exports will require high quality government assistance. These problems will also require the government to be more systematic in forming agricultural policies and also in providing farmers with marketing information. Because of the small size of Belize, a relatively few government technicians must be able to provide a diverse set of integrated services. The project will allow the Government to fill vacant positions in both extension and research, to provide and change organizational mechanisms and structures to insure better cooperation and integration between research and extension, and to add people to do policy analysis and provide marketing information to farmers and agribusinesses. (The out-of-country training associated with this project will be done under a separate training project). This project will provide funds to develop a national extension specialists staff, purchase equipment, support some in-country training, and to contract outside consulting assistance to support development of the Ministry's activities. This will include contracts with U.S. universities to provide the

same short-term consultants over a period of years to work with the Belizean colleagues on specific production problems in citrus, cacao, rice, etc. and work jointly with Ministry staff on local development problems.

#### Relationship of Project to AID Country Strategy

The Ministry of Natural Resources must play a primary role in most agricultural development activities that AID promotes. It will likely be the source for most of the policy direction and technical assistance given to farmers and agrobusinesses involved in import substitution or export promotion programs involving agriculture or forestry. Its development support services, along with those of the financial system, must be improved if agriculture is to play a more dynamic economic role in Belize.

#### Host Country and Other Donors

The Government has a strong interest in strengthening the agricultural support services in the Ministry of Natural Resources. Staff in the Ministry are very interested in establishing working relationships with agricultural and forestry specialists outside the country who they could call on for assistance. The Ministry currently receives some assistance on its research program through CARDI, and also receives help with its extension efforts through an AID regionally funded program handled jointly by MUCIA and the University of the West Indies in Trinidad. The British Overseas Development Administration also has been active in research on milpa farming and rice cultivation in the southern part of the country. Both the regional extension programs and the British research are scheduled to terminate in the near future.

Beneficiaries

Because the Ministry of Natural Resources supports most rural development activities, farmers and those in the forestry industry will be the main direct beneficiaries of this project.

2. A PROJECT TO TRAIN PEOPLE IN FORESTRY, AGRIBUSINESS,  
AND AGRICULTURAL SCIENCES IN BELIZE

Purpose

To help train 100 young Belizians in agricultural or forestry sciences, rural social sciences, and agribusiness. The training will include short-course training, degree work at the Bachelor and Master's levels, and visits to other countries by executives and policymakers.

Project Description

Belize has only a small number of well-trained people in agricultural sciences, forestry, and agribusiness. It also has limited capacity in the country to train people in these areas. This project will provide support for about 100 Belizians to earn bachelor's or master's degree in the U.S. Funds will also be provided for some short-course training, both in-country and out-of-country, on development topics. In addition, travel grants will be made available for decision-makers in agriculture or forestry to visit relevant programs and institutions for short periods of time.

People participating in this training program will be drawn from those government agencies interested in agricultural development, forestry, agricultural producers' organizations, institutions of higher learning and research, financial institutions, and private businesses that serve agriculture. Priority will be given to training people in organizations participating in projects sponsored by AID.

### Relationship of Project to AID Country Strategy

Most of AID's projects aimed at carrying out the country development strategy require the involvement of well-trained Belizians, and in many cases these projects require additional Belizians as counterparts to technicians working on AID activities. Because Belize is very short on trained people in agriculture and forestry, a number of government positions and several counterpart positions are not filled. More trained Belizians will be needed to staff, supervise, and support expanded development activities in rural areas.

### Host Country and Other Donors

Belizians currently have relatively few opportunities to get training in agriculture or forestry outside the country. With very limited foreign exchange, the government has been unable to support significant numbers of scholarships for study abroad. This is unlikely to change in the near future without outside assistance. Other donors provide relatively little in the way of training assistance in the areas covered by this project, although their project may make demands on the limited pool of trained people that already exists.

### Beneficiaries

Initially, the main beneficiaries of the project will be the 100-odd people who receive support for training abroad, and those who receive short-course training and travel grants. The ultimate beneficiaries of the project will be those in rural areas who receive more and higher quality services from those who have been trained.

### 3. A FORESTRY INDUSTRIES PROJECT FOR BELIZE

#### Purpose

To help construct a power plant and associated provide wood fuel to produce 10 million KWH of electricity per year.

#### Project Description

For most of its history Belize depended largely on its forests for income. While a large part of the country is still covered by dense jungle, the country now realizes relatively few benefits from its forest industry. At the same time Belize is forced to rely heavily on energy imports to run its vehicles and power its generators. The costs of electricity, especially in rural areas where small generators provide most of the electricity, are quite high. This project will help to build a plant and an associated energy forest, jointly funded by the government, a private firm, and AID, to use wood fuel to generate electricity. About 1,000 acres of hardwood forest would be needed to fuel the plant each year. As land is cleared it will be replanted to fast growing species to fire the boilers in the future. Waste heat from the power plant will provide energy for lumber drying kilns at low cost.

#### Relationship of Project to AID Country Strategy

Oil is the most important item in Belize's import bill. These imports are a major reason for the balance-of-payments problems of the country. A single plant built by this project could produce up to 20 percent of Belize's current electricity needs. It would allow Belize to substitute locally generated electricity for oil imports and also ease balance-of-payment problems, both priority areas in the country development strategy. The project should also help

to lower the costs of electricity, provide some additional lumber for export, and provide some additional local employment.

#### Host Country and Other Donors

The government is very interested in making better use of its forests and also in developing local sources of energy. Currently, none of the other donors have significant interests in using wood products to fuel power generation in Belize.

#### Beneficiaries

This plant will employ several hundred people directly, and could help to produce higher quality lumber that might lead to additional employment in other wood products industries. A much larger number of people in the country will benefit from having access to additional lower-priced electricity, especially in rural areas.

4. A PROJECT TO EXPAND SERVICES PROVIDED BY THE  
DEVELOPMENT FINANCE CORPORATION AND TO STIMULATE  
FINANCIAL SAVINGS MOBILIZATION IN BELIZE

Purpose

To help the Development Finance Corporation (DFC) in Belize to become a full-service bank that better supports more rapid agricultural growth. Also, to promote the mobilization of private, voluntary savings in rural areas by DFC and selected credit unions.

Project Description

The Development Finance Corporation provides a significant part of the loans used in agriculture and also extends most of the long-term financing available in the country. It does not provide deposit services, however. The bulk of its loanable funds come from external donors. The project aims to help the DFC broaden its activities to include checking accounts, savings accounts, and time deposits. DFC will also absorb the savings account functions of the Government Savings Bank, in order to become more independent of external sources of funding, and also to extend financial services to a much larger number of rural people. Many rural households do not now have access to formal loans and most of them lack access to attractive savings deposit facilities. The project builds on previous AID efforts to expand DFC's livestock loans, and complements projects by other donors aimed at expanding the overall size of DFC's portfolio. While some additional loanable funds will be provided by the project to DFC, the main objectives are to improve the quality and range of financial services that DFC provides in rural areas, especially to savers.

DFC must upgrade its data processing procedures and do additional staff training and also to begin accepting savings deposits. Improved data processing will allow DFC to lower its cost of providing financial services, allow management to maintain better control over loan recovery, and also allow DFC to keep better track of its operating costs. Part of the funds provided by the project will pay for technical assistance, training, and equipment to upgrade DFC's services. Some funding will be used to underwrite part of the costs of promoting rural savings mobilization in DFC and a small number of rural credit unions. Half of the project's funds will go to an account in the Central Bank that will be open to DFC on concessionary terms, but conditioned on DFC's savings mobilization performance.

#### Relationship of Project to AID's Country Development Strategy

The AID development strategy stresses easing of balance-of-payments problems, promotion of exports and import substitution, diversification away from sugar, and assistance for the poor. This project will allow the DFC to become more self-financed through local savings mobilization, and thus lessen the need for Belize to borrow externally to fund its agricultural credit programs. Improved and expanded services by DFC will strongly support efforts to expand agricultural output for both exports and import substitution. A stronger DFC will also play a vital role in helping to finance new enterprises undertaken by sugar producers who diversify their operations. While an expanded and improved DFC will be able to provide some additional loans to low income borrowers in rural areas, the main service to the rural poor will be their improved access to attractive savings opportunities in DFC and credit unions.

### Host Country and Other Donors

Some members of the government are discussing the possibilities of allowing DFC to offer a broader range of financial services, and there has also been some informal discussion of combining the DFC with the Government Savings Bank. In the past, a number of external donors, particularly the Caribbean Development Bank, have helped the DFC to expand its loan volume through various loans and grants. Most of these programs have been targeted at various groups or enterprises.

### Beneficiaries

About half of the rural households in Belize now have little or no access to loans from formal financial institutions. Only a very small percentage of rural households have access to attractive savings deposit facilities. This project will allow the DFC to improve and expand its lending activities, especially among farmers who want to diversify their production away from sugar cane, and those potential borrowers who are excluded from the formal credit market because of the high transaction costs imposed on borrowers by current DFC procedures. The project will also allow DFC and a few credit unions to expand sharply the numbers of rural households with convenient access to financial savings services.

5. A PROJECT TO HELP RESTRUCTURE AND DIVERSIFY  
SUGAR PRODUCTION IN BELIZE

Purpose

To implement a program in the sugar cane growing areas of Belize to rationalize sugar cane processing, and also help producers diversify away from cane production.

Project Description

The sugar industry provides a majority of the foreign exchange in Belize, employs a large amount of local labor, and provides income for about one-third of the farmers. Recent low sugar prices and shrinking preferential sugar export quotas have placed severe strains on the industry. The industry must adjust by consolidating and modernizing sugar processing, reducing the amount of resources devoted to sugar cane production, finding other uses for sugar (such as alcohol), and/or diversifying into other crops, such as soybeans, and enterprises that substitute for imports or that might be exported.

The project will help provide technical assistance, research, and loans to the industry and producers to help make these adjustments. This will include closing one of the two sugar processing facilities in the country, setting up a coordinated transportation and cane cutting schedule for hauling more cane to the remaining mill, and studying the possibilities of ethanol production from sugar products. A major part of the project will be focused on helping sugar cane producers to switch some or all of their resources into other enterprises. Special emphasis will be placed on helping farmers grow new oil crops--especially soybeans. Associated applied research, extension, and credit programs provided by the Development Finance Corporation will be part of these efforts.

### Relationship of Project to AID Country Strategy

With the sugar industry in decline, Belize faces a serious problem in earning enough foreign exchange to cover its needs. Helping to meet these foreign exchange needs is a major objective in AID's country development strategy. This project will help with this problem in two ways. First, the project will allow the sugar industry to lower its costs of production so that Belize can continue to earn foreign exchange through exports of sugar or sugar products. Second, the project will encourage the production of goods that substitute for imports and also provide some additional agricultural exports. Import substitution is another important goal in the country strategy.

Since many of the producers of sugar cane and most of the workers in the industry earn low incomes, the project will also assist in easing rural poverty, still another of AID's major objectives.

### Host Country and Other Donors

The government in Belize is concerned about the decline of the sugar industry and faces serious economic and political problems if the industry's problems are not carefully handled. GOB, with other governments and donors, has studies on the sugar industry that lay out the various economic options.

### Beneficiaries

About 4,400 farmers and tenants currently produce sugar in Belize on about 60,000 acres of land. Up to another 1,000 workers depend on the sugar industry for a major part of their income. These individuals, especially the tenants and small farmers, will be the main beneficiaries of the project.

6. A PROGRAM AIMED AT MILPA AND  
OTHER SMALL FARMERS

Purpose

To fund a research project aimed at clarifying the nature and extent of the economic and social problems faced by milpa and small farmers in Belize.

Project Description

Half to two-thirds of the farmers in Belize practice slash-and-burn (milpa) agriculture. Most of these small farmers have low incomes. They are scattered throughout the country and are heterogeneous in crops, ethnic background, off-farm occupations, access to transportation, and motivations for farming. The British have done a good deal of research on problems of milpa farming in the southern part of the country, but they have been unable to discover major ways of improving the milpa system. Relatively little is known about the characteristics and activities of milpa farmers in other parts of the country. This project will fund additional research on milpa farming in Belize. This will include surveying research on slash-and-burn agriculture in other parts of Central America and the Caribbean, a synthesis of research on small farmers in Belize, and primary data collection in rural areas to clarify the social and economic conditions under which milpa farmers operate. The field research will be aimed at showing the major sources of income of small farmers, documenting their land-use patterns, their costs of production, their use of technologies, their commercial sales, and their access to public services. The primary objective of the study will be to identify ways in which the Government of Belize and donors might help raise the standard of living of milpa farmers.

### Relationship of Project to AID Country Strategy

Many of the poor people living in rural areas of Belize are involved in milpa farming. Helping these rural poor is a major objective of AID's country development strategy. Unfortunately, with the information that is available to AID, it is not possible to identify a project that will directly help milpa farmers. Additional evaluation and research on this topic is necessary to identify ways to assist milpa farmers.

### Host Country and Other Donors

Helping small farmers, especially in the southern part of the country, is given high priority by the Government. It is having a difficult time identifying ways to help heterogeneous milpa farmers. Several donors, such as the Caribbean Development Bank and the ODA, have targeted funds via the DFC at small farmers in Belize. Because of the high costs of extending small loans and loan recovery problems, the DFC has had a difficult time extending credit to small farmers who are not members of farmers' associations. As mentioned earlier, ODA has also found it difficult to identify ways to improve milpa farming techniques in the southern part of the country, despite the expenditure of about U.S.\$ 5 million on research and technical assistance in the Toledo District.

### Beneficiaries

Initially, the results of the research funded by this project will allow development planners and donors to make better decisions about designing projects to help milpa farmers. If the research can help identify better ways to help milpa farmers, up to 7-8,000 small farmers in Belize could be benefitted.

7. BRICK AND MORTAR PROJECT ON ROADS, BRIDGES, WHOLESALE FACILITIES, AND COLD STORAGE FACILITIES

Purpose

To stimulate investments in agricultural infrastructure such as roads, bridges, wholesale marketing centers, cold storage facilities, and land and drainage surveys.

Project Description

For the next several decades it is likely that Belize will realize substantial increases in agricultural output by bringing more land into intensive production. New transportation and marketing facilities will be needed to encourage and handle this output. More detailed knowledge about the quality of soils and drainage problems will also be necessary to make more reasoned decisions about which lands to open to farming and ranching.

While Belize has made substantial progress in improving its transportation system in recent years, additional rural roads and bridges are needed to provide access to productive agricultural land. This project will build 200 additional miles of all weather roads in rural areas, and install 20 new or improved bridges. Because wholesale facilities for agricultural products are poorly developed in Belize, this project will also fund construction of six wholesale food facilities on the edges of the major towns. This will include construction of cold storage facilities that will be rented to individuals who want to store perishable goods. The project will also fund additional soil, land, and drainage surveys to identify the best land for future agricultural development.

### Relationship of Project to AID Country Strategy

Increased agricultural output to substitute for imports or to export will depend on improvements in agricultural infrastructure. Improvements will be necessary to make Belize's products more competitive in terms of price and quality.

### Host Country and Other Donors

AID already has plans to help with improving bridges, especially in the southern part of the country. The World Bank also has projects aimed at helping to improve some of the primary roads in the country and to improve repair of government owned vehicles.

### Beneficiaries

Improvements in the transportation facilities under this project will be concentrated in those areas identified as having the greatest potential for increasing agricultural production. Existing and new farmers in these areas will be the main beneficiaries of these new roads and bridges. The new wholesale food centers will benefit both farmers and marketing intermediaries who sell or assemble food products. Urban consumers will also benefit by having access to these facilities to buy fresh goods directly from farmers.

APPENDIX A

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**APPENDIX B**  
**AGRICULTURAL HISTORY OF BELIZE\***

When English buccaneers and logcutters first came to "British Honduras" in the 1600s they found it largely unsettled. Although there had been a large population in the area during the classic period of Maya civilization about a thousand years earlier, only a few Mayas remained in Belize by the time the Europeans came to the New World. The reasons for the collapse of the Classic Civilization are not known.

Neither is it entirely clear why the Spanish, who claimed all of Central America, did not settle the area. The earliest British settlers, buccaneers who found the area's isolated position an excellent place of refuge, quickly discovered that the cutting and exporting of wood was more profitable than piracy. The settlement of Belize was founded around 1640 and by the 1700s had become an important point for the export of logwood. In the latter half of the eighteenth century mahogany replaced logwood as the major export when the price of logwood dropped sharply and a demand for mahogany arose.

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\* Adapted from Chibnik (1975). Detailed histories of Belize also include Ashcraft (1973), Clegern (1967), Humphreys (1961), and Waddell (1961).

The woodcutters required a labor force and because there was only a small indigenous population, slaves were brought into British Honduras, mostly from Jamaica, in the 1700s. By 1756 the population of the settlement of Belize was listed as 300 persons, with 800 slaves (Settlement Report 1948:194) and by 1795 as 2655, with 2024 slaves (Leon 1958:194). Slaves were given "provision grounds" on which they grew rice, corn, and root crops using slash and burn methods. Owners wanted the slaves do some farming to relieve the owners of some responsibility to provide food for the workforce.

Slavery was abolished in 1833, as in other British territories, but according to Waddell "the mass of the slave population seems to have continued in forest labour as free men" (1961:15). It seems reasonable to assume that part-time agriculture also continued, but finally in a series of treaties from 1763 to 1786 the Spanish gave the British the legal right to cut wood within certain boundaries. In return the British agreed not to establish commercial agriculture or industry in the area and not to set up a civilian or military government.

Forestry continued to dominated the economics of Belize throughout the nineteenth century. The primary obstacle to agricultural development was, according to Ashcraft (1961:75), the "disinclination" of the developing economic forces in the settlement to see plantations established. Their interests were in forestry and in importing food. Labor was scarce because of the small size of the population, and the forestry interests did not want to lose any workers to commercial estates. Importers did not want domestic food production to interfere with their trade. Although it was known that there were large tracts of fertile land in Belize, most of these were controlled by forestry interests and their hostility to agriculture made these lands unavailable to prospective farmers.

Nonetheless, by 1870 some sugar was being exported from the north of the country on lands the foresters considered marginal, and from the extreme south

on other marginal lands by southern expatriates of the U.S. Civil War. Attempts at commercial agriculture also began in the Stann Creek area at this time, including some fruit companies and a factory for the extraction of cohune oil (Morris 1883:26-27). The impetus for this agricultural development was a decline in the market for mahogany about 1850 and the granting of colony status in 1862 by the British.

Nearly all of these early agricultural enterprises failed. While Romney et al. (1959:118) attribute these failures to poor farming techniques, Ashcraft (1973:44-45) feels that the basic problems were opposition from local economic forces, scarcity of labor, and high agricultural production costs because of the very poor transportation system. Rivers sufficed for the transportation needs of the mahogany cutters and as late as 1891 virtually no roads existed in the colony.

In retrospect, it is also clear that weed and drainage problems, serious soil management difficulties, and disease made it difficult for early farmers to prosper in Belize. These problems continue to affect farming in the country.

#### TWENTIETH-CENTURY ECONOMIC HISTORY

Starting around 1880 a large number of bananas and plantains were grown in the Stann Creek area. They were thought to be the best cash crops at that time and there was a market for them in Belize City (Romney et al. 1959:118). Large scale operations, including United Fruit, came into the area and some inhabitants went into full time banana production, which was more profitable than woodcutting. The prospects for the industry seemed so good that the colony's first railway of 25 miles was completed in 1908 in the Stann Creek Valley to aid growers. The

banana industry failed around 1920, mostly because of Panama disease, but some small farmers turned their attention to other crops.

Early in the twentieth century the market for mahogany, chicle, and other forest products improved for a brief period. After about 1920, however, because of increasingly poor market conditions and local depletion of the resource, forest products became less and less profitable. In addition, the price of imported food rose steadily and mechanization of forestry cut the work year from eleven to five months. The country, then, was faced with two serious problems, a labor surplus and an unfavorable balance of trade. The merchants of Belize did a brisk business exporting whiskey to the U.S. during Prohibition, but this means of alleviating the unfavorable balance of trade came to an end in 1933 (Ashcraft 1969:88-89). The factors that had hampered the development of commercial agriculture in the nineteenth century remained. A road system barely existed, internal marketing facilities were inadequate, the bulk of the land was still controlled by the forestry interests, and powerful local merchants continued to discourage domestic production because of their import business. Commercial agriculture, with the exception of the banana boom and bust, developed very little in the period between 1900 and World War II.

The mechanization and decline of forestry forced workers in that industry to seek alternative sources of income and subsistence and some began to farm. Although the number of subsistence producers increased as did, probably, the size of their plots, domestic production still did not come close to satisfying the needs of the country and much food continued to be imported. Cash cropping for local markets was difficult for small farmers for the same reasons that deterred large-scale commercial agriculture--poor roads and inadequate marketing facilities.

World War II raised the demand for timber for a brief period and a number of men were also able to obtain war-related jobs in the United States, Great Britain, and the Canal Zone. When the war ended, however, the country was thrust back into its previous economic position.

The years since World War II in Belize have been marked economically by a sharp drop in the importance of forestry and an increase in the importance of agriculture. In 1950 timber and chicle accounted for over 80 percent of exports, in 1959 not quite half, and by 1965 only 14 percent. The place of forestry in the national economy has been replaced mostly by sugar in the north of the country and citrus in the Stann Creek Valley. The sugar and citrus industries are controlled by foreigners and the employment they provide is for the most part seasonal, so many small farmers still combine part-time work on their own farms with part-time wage work in export agriculture.

The development of commercial agriculture has been aided by improvements in communications. Before World War II the only major roads in Belize were a link connecting Belize City and Corozal in the north and a 25 mile stretch in the Stann Creek Valley that replaced the railway. Although the transport system is still poor, roads now connect all of the major towns and some of the villages.

The sugar and citrus industries have also benefited from protected markets offered by the British. After the decline of mahogany prices in the 1920s, Belize's unfavorable balance of trade was covered by direct subsidies from Great Britain. The British were quite willing to give new industries an impetus by the means of protected markets.

Aid to Belize in the form of protected markets rather than direct grants lessened only slightly the economic dependence of Belize on the U.K., and at mid-century several government reports and development schemes examined the prospects of reducing this dependence through agricultural development (Development Plan

1964-70, Downie 1959, Tripartite Report 1966). The recommendations of these reports were sometimes contradictory. The U.N. mission of 1963 and the Tripartite Report assert that "the correct policy is to take full advantage of British Honduras' extremely favorable man-cultivable land ratio and to specialize in the production of capital intensive crops, which. . . depends in practice on private foreign investment in estate agriculture" (Tripartite Report 1966:6). This goal runs counter to other recommendations that large scale immigration be encouraged and that "peasant production should be the basis on which most of the agricultural exports are produced" (Romney et. al. 1959:51).

A national Development Plan (n.d.), which apparently was supposed to be the basis of government policy during the 1960s and '70s, while not adopting the recommendations concerning immigration, was ambiguous about the relative emphasis that should be put on capital intensive agriculture and small farm production. Reuss (1966:8) has pointed out that this ambivalence led to governmental agricultural policies with difficult goals. He summarized the basic aims of the agricultural policies of the Belizean government as follows: to boost agricultural production in order to substitute for food imports and increase agricultural exports; to assist small farmers and encourage co-operatives; and to keep the cost of living stable. In the early 1970s, it was argued that the Belizean government sidestepped these conflicts by aiming its help mostly at large scale producers and providing meaningful assistance to the small farmer. Today, however, the interests of small farmers are also being stressed.

APPENDIX C

BELIZE COORDINATING COMMITTEE  
AGRICULTURAL SECTOR ASSESSMENT

<u>NAME</u>	<u>ORGANIZATION AND TITLE</u>
David Aguilar	Principal Lands Officer, MNR
Alvaro Bautista	Head, Agricultural Division, Development Finance Corporation
Sandra Bedran	Executive Director, Belize Marketing Board
Clarence Borland	Economist, Office of Economic Planning
Henry Flowers	Chief Forestry Officer, MNR
Liborio Gonzalez	Chief Agricultural Officer, MNR, and Committee Chair
James Hyde	Permanent Secretary, MNR
Charles Jenkins	USAID Agricultural Officer
Cyrilo Mahung	General Manager, Development Finance Corporation
Fred Mangum	Chief of Party, Belize Livestock Development Project
Wendell Parham	Resident Director, Central Farm
Carlos Santos	Agricultural Development Advisor, MNR
Balmore Silva	Principal Livestock Officer, MNR
Rodney Neal	Principal Agricultural Officer, Research, and Co-Leader, Assessment Team

APPENDIX D

LIST OF INDIVIDUALS AND ORGANIZATIONS  
CONSULTED OR INTERVIEWED BY THE TEAM

<u>NAME</u>	<u>TITLE or ORGANIZATION</u>
Richard Wilk	USAID
Kim Kennedy	PDAP Advisor
Don Smucker	CAEP Project
Elton Jones	C of C, Belize City
L.A. Espat	Chairman of BMB
Marshall Godwin	USAID/Washington
Norris Wade	Hershey Hummingbird - Belize
Jim Corbin	Cocoa Project
H.S. Penjette	FAO Consultant Census
C.A. O'Reilly	Economist, MNR
Alfonso A. Tzul	Information Office, MNR
Christine Bakerville	Agronomist, TRDP
John Stenhouse	Agronomist, TRDP
David Johnson	Agronomist, TRDP
Steve Hickman	Engineer, TRDP
Michael Brown	Economist, TRDP
Mike Long	Project Leader, TRDP
Efrain Aldana	CAEP/UWI
USAID/CICID Team	Livestock Development Project
Cyrilo Mahung	DFC Manager
Alvara Bautista	DFC
Mr. F.J. Garbutt	Managing Director, Central Bank
Clarence Berland	Economic Division Office
Annette Gilzene	DFC
Mrs. Luben	Central Bank
William McDonald	Royal Bank of Canada
Mrs. Brenda Johnson	Manager, Credit Union League
Mr. Rodriguez	Manager, DFC Belize
Franco Tzul	Manager, DFC Punta Gorda
Sandra Beltran	Belize Marketing Board Manager
Edmond Zuniger	Dist. Acct., Punta Gorda
Mrs. Enriquez	Treasurer's Office, P.G.
Cypriano J. Avilez	Credit Union Officer, P.G.
Mr. Santos	Big Falls, Belize Mktg. Board
Almon Plett	Mennonite farmer, Spanish Lookout
Hugh Fuller	Belize Sugar Industry
A.L. Ayuso	Secretary, Belize Sugar Board
Henry Flowers	Chief Forest Officer, Belmopan
Oscar Rosado	Principal Forest Officer, Belmopan
Sam Brimpong	Mktg. Officer, Forest Department
Jim Nilsen	Utilization Offer., Forest Dept.

Barry Bowen  
 Gilbert Canton  
 John Roberson  
 Carol Thompson  
 A.C. Duncan  
 Amir Segura  
 Stanley Calder  
 Earl Green  
 Larry Chaote  
 Frank Earlman

Hillbank Agro-Industries Ltd.  
 Minter Naval Stores, Belize Ltd.  
 Belize Timber Ltd.  
 British High Commission, Belmopan  
 Belize Estate and Produce Co.  
 Barrow Lumber Co., Belize City  
 British High Commission, Belmopan  
 Forest Officer, Augustine  
 DAO, Orange Walk Town  
 Quality Poultry Products, Spanish  
 Lookout

INSTITUTION

LOCATION

Belize Marketing Board  
 Belize Livestock Producers Assn.  
 Belize Meats Inc.  
 Corozal Farmers Group Meeting  
 Belize School of Agriculture  
 Central Farm  
 Central Agricultural Supply  
 Sugar Board  
 Sugar Board  
 Chamber of Commerce  
 Office of Economic Development  
 Sugar Cane Producers Cooperative  
 TRDP Research Center  
 Banana Board and Field Operation  
 Citrus Growers Association Board  
 Citrus Processors Facilities  
 and Managers (2)  
 Meat Processing Facilities  
 Food Processing Facilities  
 Rice Mill and BMB Facility  
 Farm Visits

Belize City  
 Belmopan  
 Belize City  
 Corozal District  
 Teaching Staff  
 Research Staff  
 Rodney Allen  
 Corozal  
 Orange Walk  
 Belize City  
 Belmopan  
 Orange Walk  
 Toledo  
 Cowpea Area  
 Stann Creek  
  
 Stann Creek  
 Belize City, Cayo District  
 Cayo  
 Toledo  
 Toledo, Cayo, Orange Walk, Belize, Stann  
 Creek, Corozal

POST/INSTITUTION

NAME

Secretary, Sugar Board  
 Belize Sugar Industries  
 Belize Sugar Industries  
 Cane Farmers Association  
 Cane Farmers Association  
 Mennonite Community (Blue Creek)  
 Mennonite Community

Mr. Liborio Ayuso  
 Mr. Agripino Cawich  
 Mr. Hugh Fuller  
 Corozal  
 Orange Walk  
 Orange Walk  
 Management Committee

Belize Food Products  
Citrus Company of Belize  
Citrus Growers Association  
Technical Corporation Officer  
Banana Control Board  
Permanent Secretary, MNR  
Agriculture Development Advisor  
Chief Agricultural Officer  
Chief Forest Officer  
Principal Lands Officer  
Permanent Secretary, Trade and  
Industry  
Office of Economic Planning  
General Manager, Development  
Finance Corporation  
Agricultural Division,  
Development Finance Corporation  
Central Statistics Unit  
CARDI  
CARICOM Farms Ltd.  
Agriculture Information and  
Statistics Unit  
Agriculture Information and  
Statistics Unit  
Head of Extension  
Social Development Officer  
Hummingbird Hershey  
Resident Director, Central Farm  
Agricultural Chemist  
Agronomist  
Extension Officer  
Livestock Officer  
Extension Officer  
Extension Officer  
Agricultural Officer  
Extension Officer  
General Manager, Belize Mktg. Board  
Bureau of Standards  
James Brodie Co. Ltd.  
Prosser Fertilizer and Agrotec  
Hofius A & A  
Belize Supply Co. Ltd.  
Barclays Bank International  
Atlantic Bank  
Principal Veterinary Officer  
Minister of Works  
Permanent Secretary, Ministry of  
Trade and Industry  
Chief Agricultural Officer,  
Minister of Natural Resources

Mr. Denziel Jenkins  
Mr. Terry Sharpe  
Mr. Gustavo Buller  
Mr. Allan Chubb  
General Manager  
Mr. Jim Hyde  
Mr. Carlos Santos  
Mr. Liborio Gonzalez  
Mr. Henry Flowers  
Mr. David Aguilar

Mr. Egbert Grinage  
Mr. Clarence Borland

Mr. Cyrilo Mahung

Mr. Alvaro Bautista  
Mr. Sylvano Roberts  
Mr. A. Sinha  
Dr. J.P. Cal

Mr. Alfonso Tzul

Mr. Panjette  
Mr. Lelio Garcia  
Mr. Edwin Belisle  
Mr. Pat Scott  
Mr. Wendell Parham  
Mrs. Marla Holder  
Mr. Joe Smith  
Mr. Ismael Cal  
Mr. Luis Betancourt  
Mr. Sabino Escalante  
Mr. Allison Patten  
Mr. Stephen Serano  
Mr. Ralston Flowers  
Ms. Sandra Bedan  
Mr. Douglas Fiarweather  
Mr. Hector Lopez  
Mr. Salvador Espat  
Mr. Charles Vernon  
Mr. Ray Nisbet  
Mr. J. Auil  
Mr. Roberto Stanley  
Dr. Balmore Sliva  
Honorable Fred Hunter

Egbert Grinage  
Liborio Gonzalez

APPENDIX E

LIST OF PROJECTS FINANCED BY DONORS AND  
RELATING TO AGRICULTURAL DEVELOPMENT

Donor Agency	Fiscal Year	Commitments--U.S. \$Million (Grant/Loan)	Focus/Purpose of Development Assistance Support
United States Agency for International Development (AID)	1946-1981	11.2 (grants)	Infrastructure development, private sector and human resource development, equipping of Belize Vocational Center; PL 480 Title II
	1982	12.6	Housing Investment Guaranty; balance of payment support; creation of a rediscount credit fund
	1983	6.4	Technical assistance for housing, livestock production, rural access roads and bridges; program development and support; PVO support
British Overseas Development Assistance (ODA)	1981-1985	19 (50 percent loan; 50 percent grant) to be expended at rate of \$4.75 per year	Highway (in the North) and bridge (in the South) construction; Agriculture research and development; rural roads; small agriculture projects; social infrastructure projects; industry and police support
Caribbean Development (CDB)	1973-1982	15 loan (\$12.5 from AID- Regional) (soft loans)	Develop banana industry, electricity, Development Finance Corp., a deep water port, the Belmopan Hotel, rice marketing, feeder roads
Canadian International Development Agency (CIDA)	1971-1982	12.5 (60 percent or 7.5 no interest loan, 40 year repayment); 5 a Canadian grant; 2.5 supplied by GOB	Improve water and sewer system for Belize City
	1983	21.3 loan	Complete installation of water and sewer facilities in Belize City
		1.5 credit	Industrial development through the DFC with GOB guarantee; support of small grain storage projects near Belmopan and in the Southern districts

Donor Agency	Year	Commitments - U.S. \$Million (Grant/Loan)	Focus/Purpose of Development Assistance Support
European Development Fund (EDF)	1983	4.5	Small farmer development
		0.5 low-interest 30 year credit	
	1984	0.65 grant	Establishment of a veterinary laboratory Construction of an apron at Belize International Airport Secondary school construction
		0.70 long-term loan	
		0.81 loan	
	0.72	Establishment of a nationwide broad- casting network	
	1.0 (projected)	Closed circuit educational television development	
	8.0 allocation	Construction of new BELCAST campus at Belmopan.	
World Bank	1983	5.3 (loan)	Road maintenance and rehabilitation
IMF	1982-1983		Technical assistance to develop program budgeting systems and advice on reorganization of Ministry of Finance
UNDP	1972-1981	2.7	Technical assistance (foreign advisors to several ministries, including energy analyst/petroleum geologist for the Ministry of Natural Resources)
	1982-1986	1.7 (projected)	Technical assistance
UNICEF	1978-1982	0.07 (grant)	Social and community development services, village water supply, sanitation, pre- school, and childcare programs
	1983	0.05 (grant)	
	1983-1987	0.65 (projected)	

Donor Agency	Year	Commitments - U.S. \$Million (Grant/Loan)	Focus/Purpose of Development Assistance Support
PRIVATE AND VOLUNTARY ORGANIZATIONS (PVOs)	1983		(CARE) - Rural education and Agricultural projects
			(PROJECT HOPE) - Upgrading lab facilities at hospitals
			(PROJECT CONCERN) - Training and development of basic rural health service delivery
			(PAN AMERICAN DEVELOPMENT FOUNDATION) - Credit support and technical assistance to macro enterprise creation and development

\* Source - USAID - Country Development Strategy Statement FY 1985.

AGENCY FOR INTERNATIONAL DEVELOPMENT  
UNITED STATES A. I. D. MISSION TO BELIZE  
EMBASSY OF THE UNITED STATES OF AMERICA  
BELIZE CITY, BELIZE, CENTRAL AMERICA

January 3, 1986

Dr. Hernan Sanhueza  
Regional Director  
International Planned Parenthood Federation  
Western Hemisphere Region, Inc.  
105 Madison Avenue  
New York, NY 10016

Subject: Belize Family Life Education  
Project No. 505-0000-04-G-12-00  
Amendment No. 1

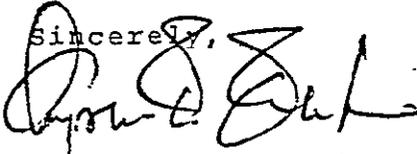
Dear Dr. Sanhueza:

Pursuant to the authority contained in Section 104 of the Foreign Assistance Act of 1961, as amended, the Agency for International Development (hereinafter referred to as "A.I.D." or the "Grantor") hereby amends the Grant dated September 24, 1985 to the International Planned Parenthood Association, Western Hemisphere Region, Inc. (hereinafter referred to as "IPPF/WHR" or "Grantee") in order to obligate the additional sum of US\$30,000, to provide support for a program in Family Life Education in Belize as described in Attachment II entitled, "Project Description" of the original Grant Agreement.

This Amendment is effective and obligation is made as of the date of this letter, and shall apply to commitments made by the Grantee in furtherance of program objectives during the period September 30, 1985 to January 31, 1988. Funds under this additional obligation shall conform to the budget contained in D. Financial Plan in Attachment 1, the Schedule of the original Grant letter.

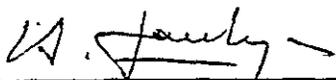
All other terms and conditions of the original Grant letter and its attachments remain in full force and effect.

Please sign the original and three copies of this Amendment to acknowledge your acceptance and return the original and two copies to A.I.D.

Sincerely,  
  
Neboysa R. Brashich  
A.I.D. Representative

Fiscal Data for this Amendment:

Appropriation:	72-1161021
Budget Plan Code:	LDAA-86-25505-BG13
Project No.:	505-0000-04-G-12-00
Total Estimated Amount:	\$78,000
This Obligation:	\$30,000
Total Obligated Amount:	\$77,500
IRS Employer Identification Number:	
Funding Source:	USAID/Belize

  
\_\_\_\_\_  
Dr. Hernan Sanhueza  
Regional Director

Date: 2/5/86