An Assessment of Belize's Agricultural Sector

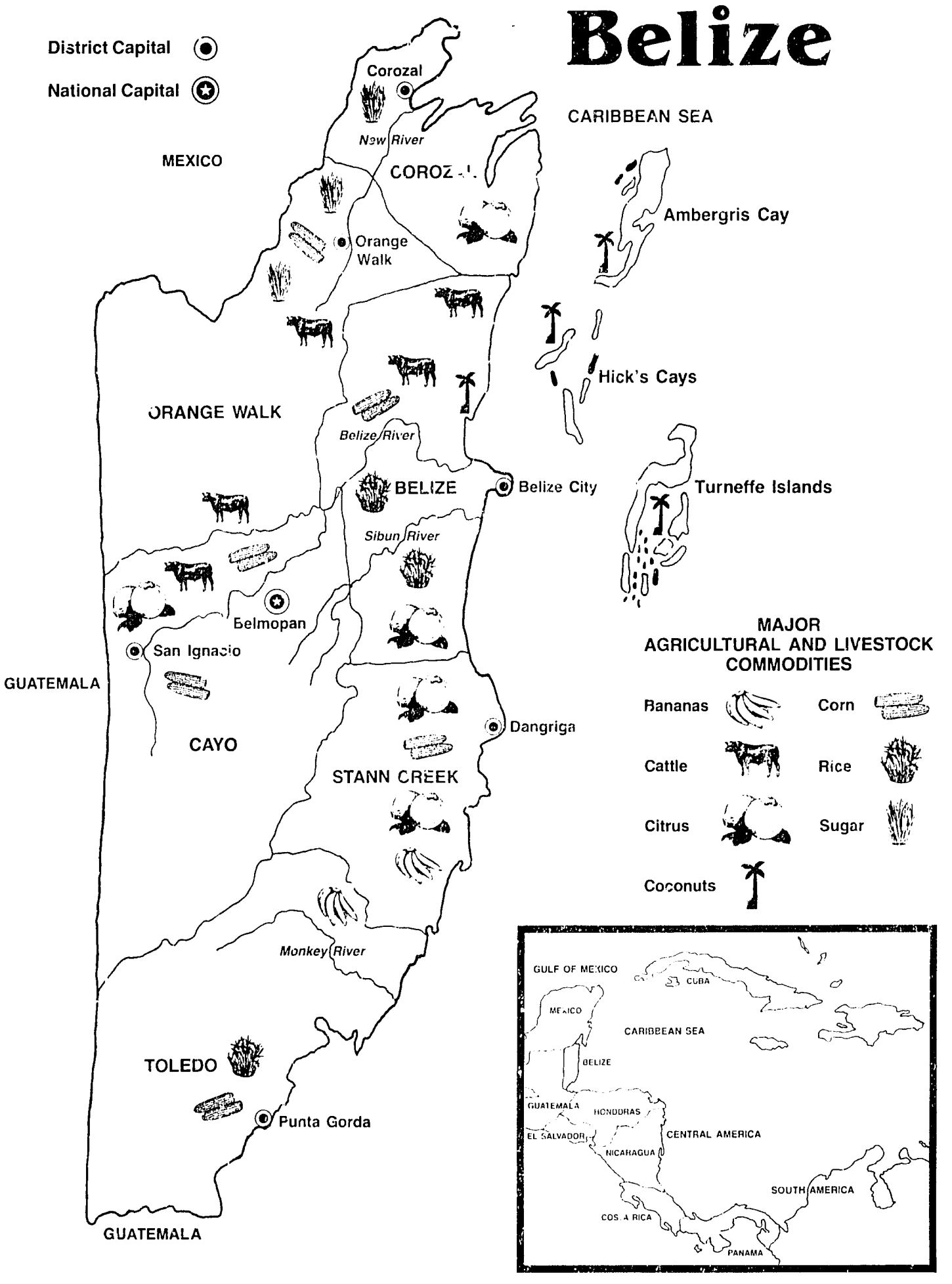
MIDWEST UNIVERSITIES
CONSORTIUM FOR INTERNATIONAL
ACTIVITIES, INC.

UNITED STATES AGENCY FOR
INTERNATIONAL DEVELOPMENT

AND

MINISTRY OF AGRICULTURE
GOVERNMENT OF BELIZE

March 1988


Belize
District Capital
National Capital
Corozal
New River
MEXICO
COROZAL
CARIBBEAN SEA
Ambergris Cay
Orange Walk
Hick's Cays
ORANGE WALK
Belize River
BELIZE
Belize City
Turneffe Islands
Sibun River
Belmopan
San Ignacio
GUATEMALA
CAYO
Dangriga
STANN CREEK
Monkey River
TOLEDO
Punta Gorda
GUATEMALA
MAJOR
AGRICULTURAL AND LIVESTOCK
COMMODITIES
Bananas
Corn
Cattle
Rice
Citrus
Sugar
Coconuts
GULF OF MEXICO
CUBA
MEXICO
CARIBBEAN SEA
BELIZE
GUATEMALA
HONDURAS
EL SALVADOR
CENTRAL AMERICA
NICARAGUA
SOUTH AMERICA
COSTA RICA
PANAMA

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Technical Support to Mission (TSM) Contract No. LAC-0000-1-00-23,
Work Order No. 9

TABLE OF CONTENTS

INDEX OF TABLES, GRAPHS AND FIGURES

EXECUTIVE SUMMARY

This agriculture sector assessment of Belize, financed by USAID, was initiated 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, agriculture inputs, marketing, credit, and research and extension services. In mid-1987, MUCIA was again requested to update the original assessment giving particular attention to the livestock, fisheries and forestry subsectors.

A summary of the consultants' studies, as well as the physical and infrastructural environment for agriculture in Belize are described in Chapter I. Chapter II summarizes the major limitations and opportunities to Belize's agricultural development, and Chapter III sets forth specific interventions appropriate for donor or GOB involvement.

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 as much as 20-30 percent of GDP and approximately 40 percent of national employment. More than three-quarters of its export earnings come from farm products, especially sugar, citrus, and bananas. However, domestic food supplies depend to a substantial extent on imports, and food accounts for over one-quarter of Belize's import bill. Petroleum products and manufactured goods are other major import items.

The economy of the country is highly susceptible to outside forces due to its almost total dependency on exterior markets and sources of supply. For example, between 1980 and 1986 increases in the Gross Domestic Product went from a negative -3.5 percent in 1982, a year of world recession, to a high of 8.9 percent in 1984, and again dropped precipitously in 1985 to 0.4 percent.

Per capita income has remained almost constant for the past decade at approximately U.S. $1,000. Literacy exceeds 90 percent and other socio-economic indicators are equally high relative to surrounding countries in the region.

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

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 the expansion of cultivated lands. Only about 15 percent of potential farm and range lands are now in production.

Heavy rains and the flooding they cause 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 percent of Belize, although this figure includes extensive areas of "milpa", or slash and burn, cultivation in some districts. Only 2.1 million acres of the total land area are privately owned with the remainder being held by government, principally as preserves. On the private land ownership is highly skewed with 2 percent of the holdings corresponding to 85 percent of the private acreage. Nevertheless, land availability does not appear to be a major constraint on agricultural production. Under a land reform program begun in 1960, the national government now acquires, sells, and titles land suitable for farming; some 2.2 million acres are potentially available for private settlement under this program.

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.

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, or other sources of farm market news are rare in most rural areas. Electricity is also unavailable to many rural inhabitants, and its cost is high due to the cost of the imported fuel used to produce it. Consequently, cold storage and transport services are limited.

Belize's population is evenly divided between urban 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. Out-migration holds the high rate of natural population growth to about 2 percent per annum in real terms. Perhaps more important than the population's geographic distribution is its ethnic composition. Three groups with Mayan Indian heritage reside in the country; the Yucatec in the north, and the Kekchi and Mopan in the south. In addition, there are black Caribs (Garifuna), Mennonites, East Indians, Orientals, Creoles and Mestizos (called "Spanish"), who also greatly affect the agricultural situation in the country.

In 1983, about 38 percent of the male labor force worked in agriculture. Official female employment in agriculture is less, at ten percent, because farm women (and the young, as well) are typically involved as unpaid family labor and are therefore often not counted. National unemployment was approximately 14 percent in 1983 but joblessness is concentrated in urban areas where more than half of the labor force lives. Correspondingly, only 8 percent of rural males were officially unemployed in that same year. While there seem to be many opportunitites for additional jobs in agriculture as cultivation expands, unemployed urban people are not generally attracted to farming. In fact, local labor shortages occur in rural areas at harvest times, and many workers enter Belize from surrounding countries during this season. Agro-processing and mechanized agriculture may therefore offer the best chances for higher employment in the sector.

Although primary (95 percent) and secondary (60 percent) school enrollments are high, agricultural education and training within Belize is limited. One institution, the Belize College of Agriculture, has offered a two-year course since 1977. This was upgraded to a three-year program in 1985. Non-formal training by the extension service is inadequate and agricultural research lacks appropriate funding.

Until several decades ago the forestry industry dominated the economy. Commercial food production and non-lumber exports did not become important until this century. For the past several decades sugar exports have provided a large part of the foreign exchange earnings, and have 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 sector, there is a sizable small-farm sector, the milpa farmers, which practice slash-and-burn cultivation methods and constitute nearly three-fourths of the country's agricultural producers. They grow such crops as rice, corn, beans, fruit and vegetables, and raise some livestock, principally pigs.

Given the short period of time that Belize has been an independent country, and especially its brief experience with commercial agriculture, it has made measurable progress in recent years. 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 in the past decade. Belize is also blessed with ample land, a relatively educated population, a favorable location near major export markets, and has benefactors that offer assistance and export markets on preferential terms. It is also able to grow a broad range of tropical and subtropical crops and has a large reservoir of farming experience among its smaller farmers.

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 it is also important for the country to boost its agricultural yields and to sharply reduce its costs of production in an attempt to become more competitive. With current exchange rates, yields, and production costs, Belize can compete in export markets with only a 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 these imports without having to push additional agricultural products into highly competitive international markets.

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. 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 depending on secure export markets. The lack of a larger manpower pool of people who are well trained in forestry, agribusiness, and the agricultural sciences limits the ability of government, as well as the private sector to support agricultural development activities.

International development donors also face major challenges in developing programs to promote agriculture in Belize. Many of Belize's problems are so pervasive and varied that a donor could be easily overwhelmed in trying to manage a large number of small development projects. As such, aside from the sugar industry and

possibly forestry, it will likely be unwise for donors to develop projects that heavily focus on single commodities. Rather, they must focus their efforts on projects that help a variety of agricultural crops and enterprises, while creating a more efficient production/marketing system for farmers.

The assessment team concluded that ten potential projects merit consideration on the part of the GOB and the donor community. Of the many needs identified in the agricultural sector, these were selected based on the following criteria: urgency, involvement with ongoing activities, potential spread effects throughout the sector, and appropriateness for an outside donor. Additionally, the goals of export promotion, import substitution, foreign exchange generation and private sector involvement are threads running through all of the proposed projects. The projects as proposed are:

Support to the sugar industry through reorganization and diversification. The sugar industry is in serious economic difficulty. This project would encourage the industry to become as efficient as possible through a reduction in cane hauling permits more in line with quotas assigned to Belize in international concessionary markets, the introduction of a differential price mechanism to reward quality considerations, a reorganization of cane delivery methods, and increased lines of credit to farmers for field rejuvenation. Additionally, this project would emphasize diversification away from the current dependency on sugar cane. This would be attempted though a strengthening of present research efforts on oilseeds and other potential crops, a retooling of the extension services in the two northern sugar districts to complement the research activities, and the provision of additional credit lines through the DFC to farmers interested in diversification.

- *The implementation of a land use survey.* Belize does not have an adequate land survey in order to carry out rational land use planning. This project would fund such a survey for selected areas of the country using remote sensing capabilities developed in the U.S. and implemented in many developing countries.

- *Assistance to the Belize Marketing Board (BMB) in establishing and implementing a system of grades and standards for domestic and export markets.* This project activity would provide technical assistance to the BMB and selected commodity groups (i.e., Grain Growers' Association, Citrus Growers' Association, Livestock Producers' Association, etc.), to establish, implement and enforce grading and quality standards for a wide variety of domestic and export commodities.

Assistance to the Belize Livestock Producers' Association. This project would stimulate the country's livestock markets through the establishment of a live auction facility and the provision of production credit to producers.

The establishment of a farmer/extension agent training center in Toledo District. This project would build on the accomplishments of the Toledo Research and Development Project which recently concluded after five years of research and extension activity. Such a center would be based on a practical, 'hands-on' approach towards involving local farmers and extension agents in classroom activities which would then be followed up by on-farm, practical workshops.

Support to the Development Finance Corporation. This project would assist the DFC in becoming a full-service bank for its rural borrowers through technical and financial assistance. It would also assist the organization in the establishment of a rural savings mobilization program to increase its liquidity and to provide this much needed service to rural residents.

- *Assistance to the Forestry Department to promote the export of secondary hardwoods.* This project would assist the forestry department in the assessment of the vital charac-

teristics of selected species of secondary hardwoods (as opposed to primary hardwoods such as mahogany and cedar), which could potentially be used for commercial export. Additionally, this project would also seek to develop export markets for these secondary species.

Rural infrastructure improvement. This project would be a follow-on to USAID's current projects in the construction of rural access roads and bridges. In spite of recent project activity, Belize continues to have a substantial deficit in its road and bridge network. This deficit makes expanded agricultural production difficult, greatly raising costs and limiting the potential for development.

Assistance to support the Fishery Unit of the Ministry of Agriculture. This project would strengthen the regulatory and control functions of the Fishery Unit to enable it to better monitor and regulate this important resource which is currently in crisis.

Support for continued implementation of the Belize National Extension Improvement Plan. Under the Caribbean Agricultural Extension Project (CAEP), Belize began implementation of a national extension improvement plan. While considerable progress has been made, much remains to be done if the changes initiated under that plan are to be institutionalized and if extension is to more effectively serve Belizean farmers.

PREFACE

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

USAID/Belize requested that MUCIA (Midwest Universities Consortium for International Activities, Inc.) do the assessment. A detailed work order was provided by USAID to guide the effort. This Work Order, No. 9 under contract LAC-0000-I-00-2-33, specified the following country needs:

a) "To provide the basis for identification and selection of projects that are most effective in meeting AID and national objectives for agricultural and rural resource development."

b) "To constitute a major source of information and data needed by AID for the development of Project Identification Documents and Project Papers, thus reducing the resources and time required to bring new projects on stream."

c) "To provide an information base and perspective for the Ministry of Agriculture and other elements of the Government of Belize that will contribute to the capacity for national growth and development planning, facilitate the development of effective policies for agriculture and other sectors of the economy, and result in programs that are more effective in meeting national needs and which are consistent with country resource capabilities."

The Work Order further stipulates that:

"...the assessment shall provide a comprehensive and integrated description of the component elements of the agricultural and rural resource sector. This description shall present a clear working image of the participants in each component, the vertical linkages within components, and the horizontal relationships among components." Furthermore, "...the assessment shall provide an interpretive analysis of the agricultural and rural resource sector as a whole and of its component parts. This analysis shall be integrated with the descriptive activity and shall concentrate on insights regarding the performance of the system in terms of efficiency, the implications of structural organization, and inferences regarding the conduct of firms and firm groups."

The Work Order then goes on to specify a detailed outline of the individual topics to be covered by the team and which we have attempted to address in the following document.

In June 1987, MUCIA was again retained by the Mission to field a second team to update the 1985 version of the survey and to specifically examine the livestock, forestry and fisheries sub-sectors of the country.

This report therefore combines the work of both teams in an attempt to accurately portray the country's agricultural sector and to make viable recommendations for its development.

Inputs to the 1985 edition of the survey were provided by thirteen MUCIA consultants over a four-month period in 1984 (40 person weeks). In order to guide and supervise the work of the team, the Government of Belize (GOB) established a Coordinating Committee of key leaders in the Ministry of Natural Resources (This Ministry was reorganized and the Ministry of Agriculture was created in 1986.), as well as several related ministries and support agencies. The committee met six times during the period of the initial field work to respond to the individual consultant reports and to provide feedback and guidance. Additionally, the Ministry provided Mr. Rodney Neal, Principal Agricultural Officer for Research and Development (now the Permanent Secretary for Agriculture), to serve as co/leader of the assessment team.

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 presented to the Coordinating Committee for their approval.

For the updated version of the report, MUCIA provided five consultants for a two-week period in June 1987. Mr. Efrain Aldana, Principal Agricultural Officer for Extension of the Ministry of Agriculture was assigned to be the team's liason officer. The methodology for this consultancy included a reading of available documentation, interviews with many prominent representatives from the public and private sectors, and debriefing sessions with both the Ministry of Agriculture and USAID/Belize.

The team, in concert with the USAID staff and the original GOB Coordinating Committee, decided to organize the assessment into three sections. First, a descriptive analysis of the agricultural sector is presented. Second, limitations, constraints, and opportunities associated with agricultural development are identified. Third, suggestions are made concerning appropriate actions for donor and GOB programs to alieviate major limitations and to develop opportunities in agriculture.

Readers should be cautioned that although USAID financed, and the GOB authorized and condoned this survey, it in no way represents an obligation on the part of either institution to implement or otherwise carry out the specific recommendations or project proposals made by the MUCIA team. Rather, it is the expressed purpose of all those involved that this document serve as a source of data concerning the general agricultural sector, as well as providing the GOB and the donor community at large with suggestions for further project development.

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 pleasurable experience. We also wish to acknowledge the support of Professor Michael S. Chibnik, University of Iowa, a noted authority on Belize, for his comments on the original manuscript.

The initial draft to the first report, dated October, 1984, was written in Belize by Gene Pilgrim and Kenneth Egertson. A second draft, dated December, 1984, was revised by Dale Adams. The final report was prepared by Donald R. Jackson. The updated 1987 version was also written by Donald R. Jackson with assistance from Lynn Forster.

MUCIA'S AGRICULTURAL SECTOR ASSESSMENT TEAMS

1984

Gene Pilgrim	University of Minnesota Team Leader and Gen ral Agriculturalist
Fritz Fliegel	University of Illinois Sociologist/Anthropologist
Donald Jackson	University of Wisconsin Agricultural Production Economist
Kenneth Egertson	University of Minnesota Agricultural Marketing Economist
David Hahn	Ohio State University Agribusiness Specialist
John Haygreen	University of Minnesota Forestry/Forest Products
Dale Adams	Ohio State University Credit Specialist
Mike Giamalva	Louisiana State University Sugar Specialist
Garth Cahoon	Ohio State University Citrus Specialist
Gary Pepper	University of Illinois Oilseeds Specialist
Glenn Trout	Hershey Food Corporation Cacao Specialist
Earl Kellogg	University of Illinois Marketing Economist
Kim Wilson	Michigan State University Livestock Specialist

1987

Donald Jackson	University of Wisconsin Team Leader and Agricultural Economist
Lynn Forster	Ohio State University Livestock Economist
Robert Deans	Michigan State University Feeding Systems Specialist
Lee M. James	Michigan State University (ret.) Forestry Specialist
Clarence Idyll	University of Miami (ret.) Fisheries Expert

ACRONYMS

BCB	Banana Control Board
BDD	British Development Division
BEIPU	Belize Export and Investment Promotion Unit
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
BCA	Belize College 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 & Development Institute
CARICOM	Caribbean Common Market
CATIE	Tropical Agriculture Research & Training Center
CBB	Central Bank of Belize
CBI	Caribbean Basin Initiative
CDB	Caribbean Development Bank
CDC	Commonwealth Development Corporation
CFA	Cane Farmers Association
CGA	Citrus Growers Association
CIDA	Canadian International Development Agency
CIMMYT	Centro Internacional de Mejormiemento de Maiz y Trigo
DAO	District Agriculture Officer
DFC	Development Finance Corporation
EEC	European Economic Community
FTE	Full Time Equivalent (personnel)
GDP	Gross Domestic Product
GGA	Grain Growers Association
GOB	Government of Belize
IMF	International Monetary Fund
MNR	Ministry of Natural Resources
MOA	Ministry of Agriculture
ODA	Overseas Development Administration (UK)
PAO	Principal Agriculture Officer
TRDP	Toledo Research and Development Project
UK	United Kingdom
US	United States
USAID	United States Agency for International Development

I. The Analytic Description

Belize is a newly independent Central American/Caribbean nation. It is also the smallest country on the Central American isthmus. With 8,866 square miles and approximately 170,000 inhabitants, it has one of the lowest population densities in the world. The people of Belize are of diverse ethnic backgrounds, about 40 percent are Creole, 33 percent are Mestizo (also called "Spanish"), 10 percent are descendants of original Mayan stock and 8 percent are descendents of Carib Indians who migrated from elsewhere in the Caribbean. The remainder of the population is of East Indian, European and Oriental heritage.

Population growth, at 3.4 percent overall (1983-84) is effectively reduced to about 2 percent per year by outmigration, primarily to the U.S. It is estimated that between 20,000 and 50,000 Belizeans currently reside in the U.S. The adult literacy rate is 92 percent, and presently 85-90 percent of all children complete primary education. Civil strife in Central America has brought numerous refugees to the country. Estimates of the number of Salvadorans alone cluster around 15,000. Other Central Americans, as well as Mexicans, also regularly enter the Belizean labor force. About one-half of Belize's population is urban. Although national unemployment is officially 14 percent, urban jobless figures are thought to be far higher, especially among the young.

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

The Economy

The economy of Belize is highly susceptible to outside forces due to its almost total dependency on exterior markets and sources of supply. As such, behavior of its major economic indicators, most notably the Gross Domestic Product, demonstrate high levels of fluctuation from year to year. For example, between 1980 and 1986 increases in the Real Gross Domestic Product went from a negative -3.5 percent in 1982 to a high of 8.9 percent in 1984 and again dropped precipitously in 1985 to 0.4 percent. Likewise, Real National Income increased by 14.9 percent in 1980 only to fall by -18.5 percent in 1982. A breakdown of GDP by sector is given in Table 1 for the period 1980-1986.

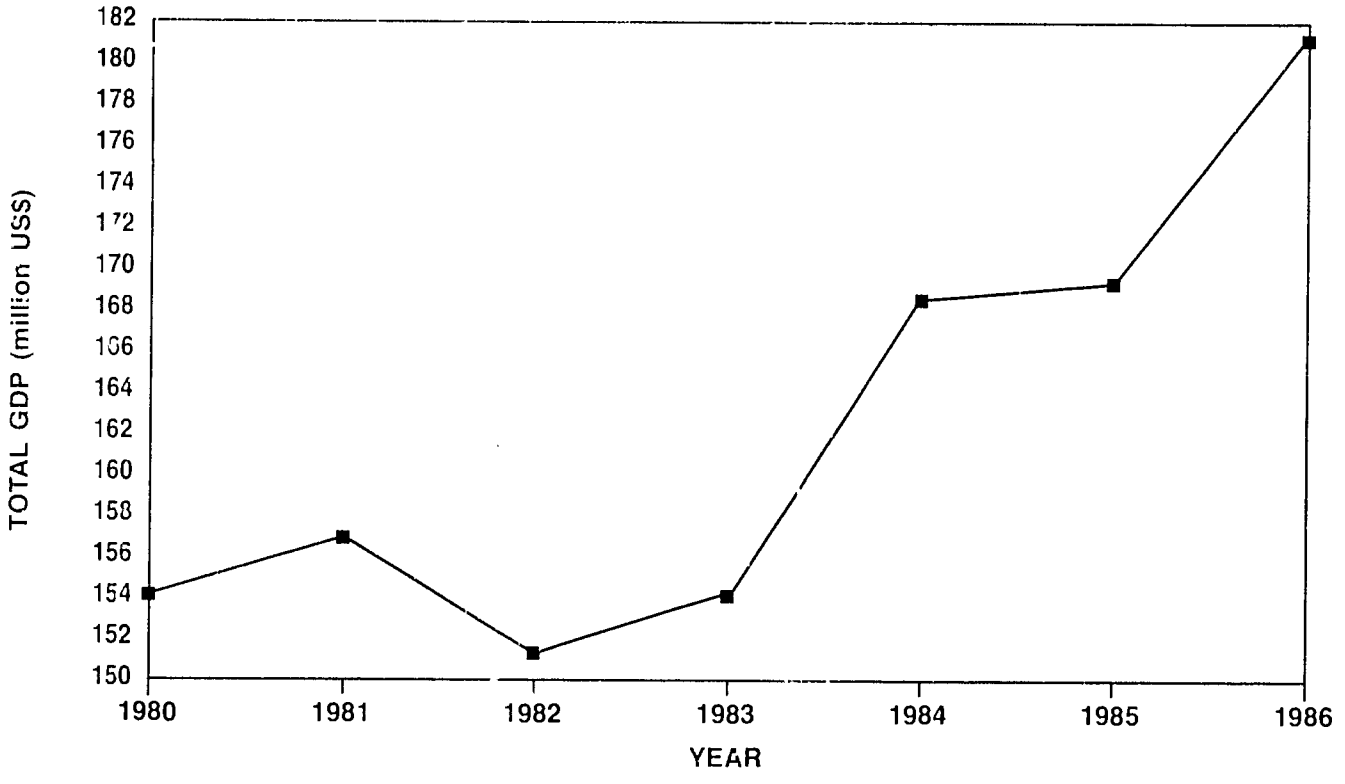
Annual inflation has been as high as 15-20 percent throughout the seventies and early eighties, but this has declined in recent years following world trends. In 1985, inflation stood at 3.2 percent, similar to that in

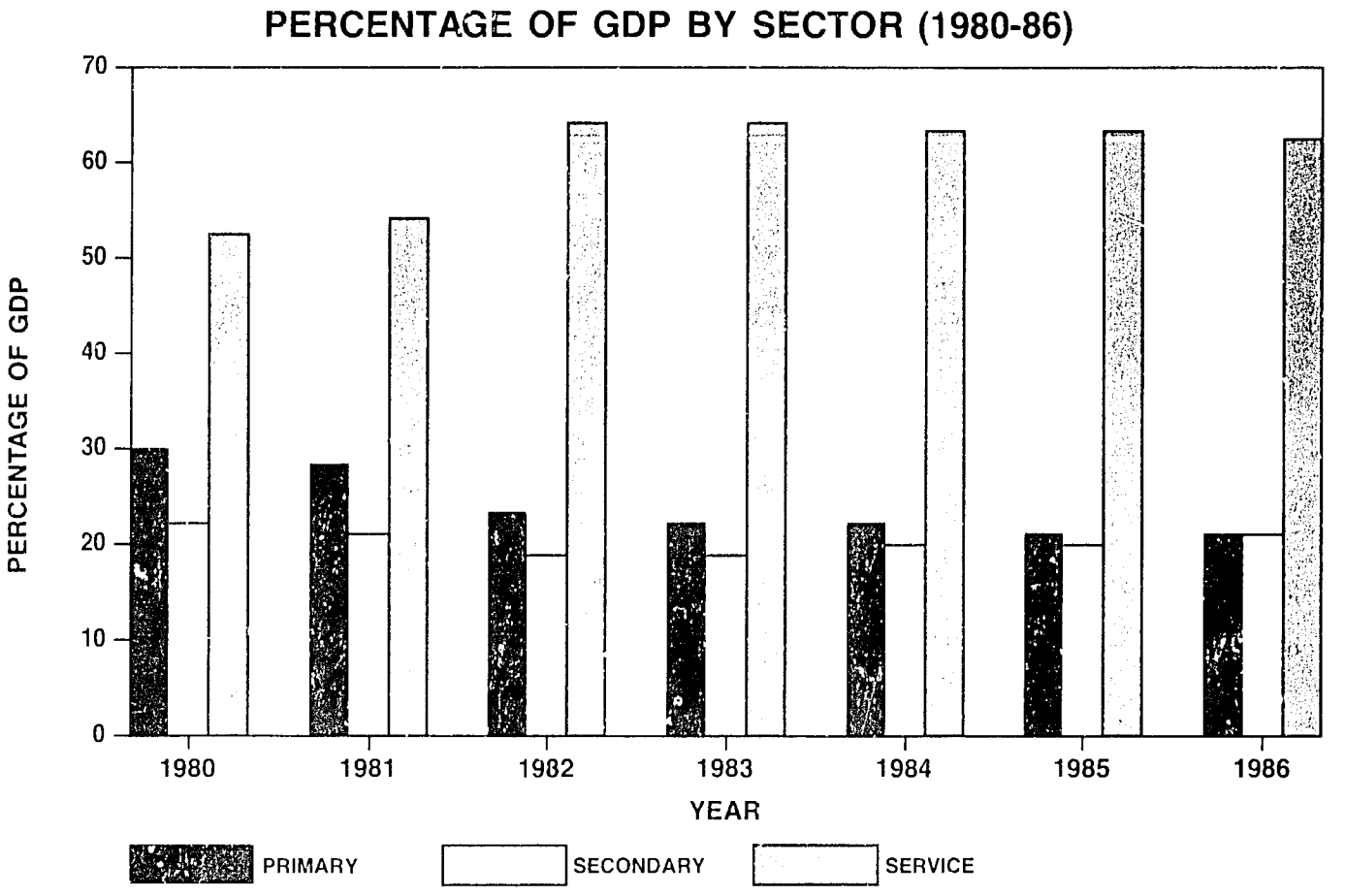
TABLE 1
GROSS DOMESTIC PRODUCT BY SECTOR, 1980-86
(Million $US) in Current Prices

	1980	1981	1982	1983	1984	1985	1986
TOTAL GDP (Million US$ in Current Prices)	154	157	151	154	168	169	181
SECTOR				**PERCENTAGES**			
PRIMARY	**30**	**28**	**23**	**22**	**22**	**21**	**21**
Agriculture	25	22	17	16	17	15	16
Forestry, Fishing and Mining	5	6	6	6	5	6	5
SECONDARY	**22**	**20**	**18**	**18**	**19**	**19**	**21**
Manufacturing	15	13	10	12	11	10	11
Construction	6	7	6	5	6	6	6
Electricity and Water	1	1	2	1	2	3	4
SERVICE	**52**	**57**	**64**	**64**	**63**	**63**	**62**
Trade, Rest./Hotel	18	18	18	15	16	15	15
Public Administration	8	9	12	13	12	12	13
Other Services	26	27	34	36	35	36	34
Per Capita GDP	**1,060**	**1,005**	**986**	**978**	**1,035**	**1,014**	**1,060**

Source: *Central Statistical Office, 1987, plus author calculations.*

GROSS DOMESTIC PRODUCT BY YEAR (1980-86)





the U.S. Trade deficits averaged $US 41 million between 1977 and 1985. The country's 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 the country's export earnings come from primary products: sugar, citrus, bananas and timber.

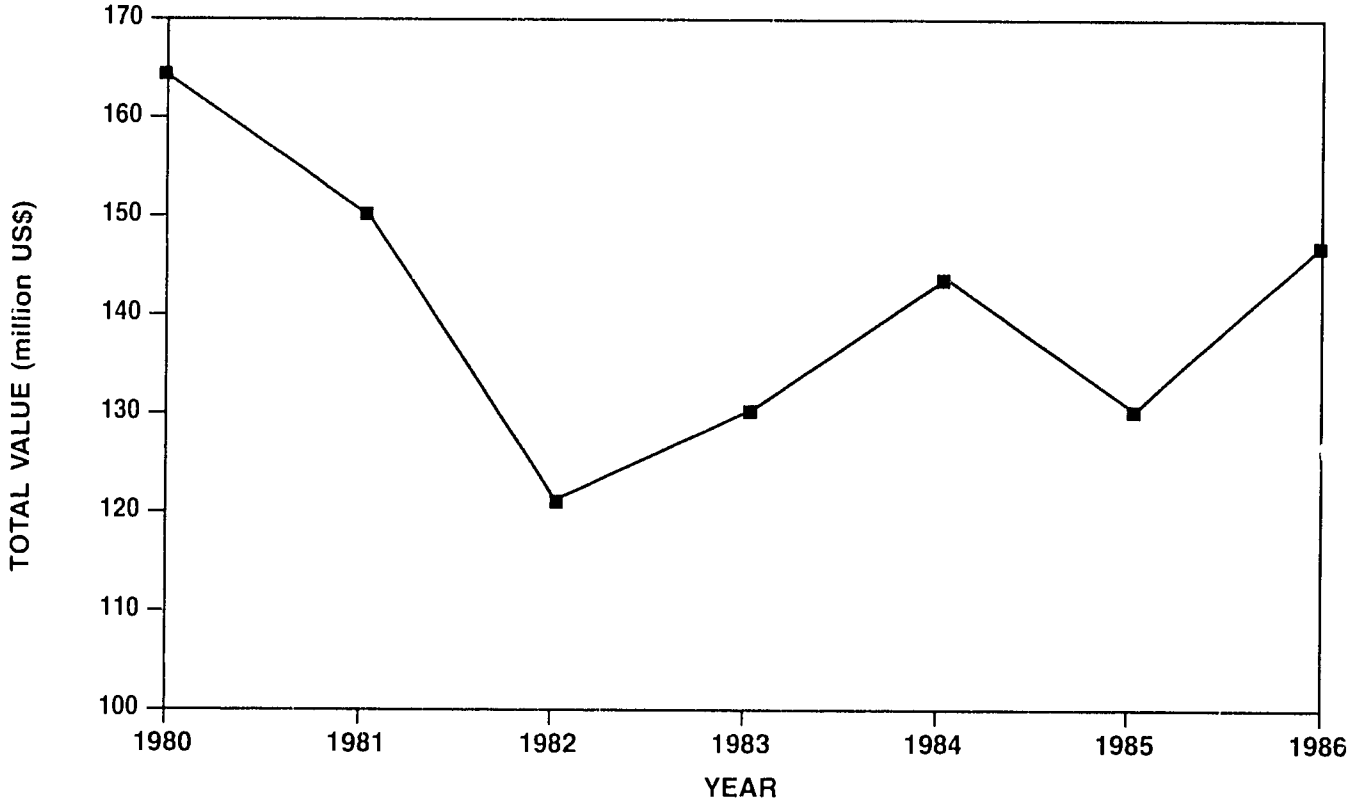
In recent years, about 85 to 90 percent of Belize's exports have gone to the U.S. and the U.K., as shown in Table 3, and over 60

TABLE 2
MAJOR EXPORTS, 1980-1986

	1980	1981	1982	1983	1984	1985	1986
TOTAL VALUE (Million US$ in Current Prices)	**164**	**150**	**120**	**130**	**142**	**129**	**146**
CATEGORY			**PERCENTAGES**				
Sugar and Molasses	61	59	56	54	48	37	44
Citrus Products	8	9	12	11	14	19	16
Fish Products	5	10	11	11	8	12	7
Timber	2	2	3	2	1	1	1
Garments	18	15	11	13	21	24	22
Other	6	5	7	9	8	9	10
TOTAL	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Source: *Central Statistical Office, 1987.*

MAJOR EXPORTS (1980-86)



MAJOR EXPORTS (1980-86)

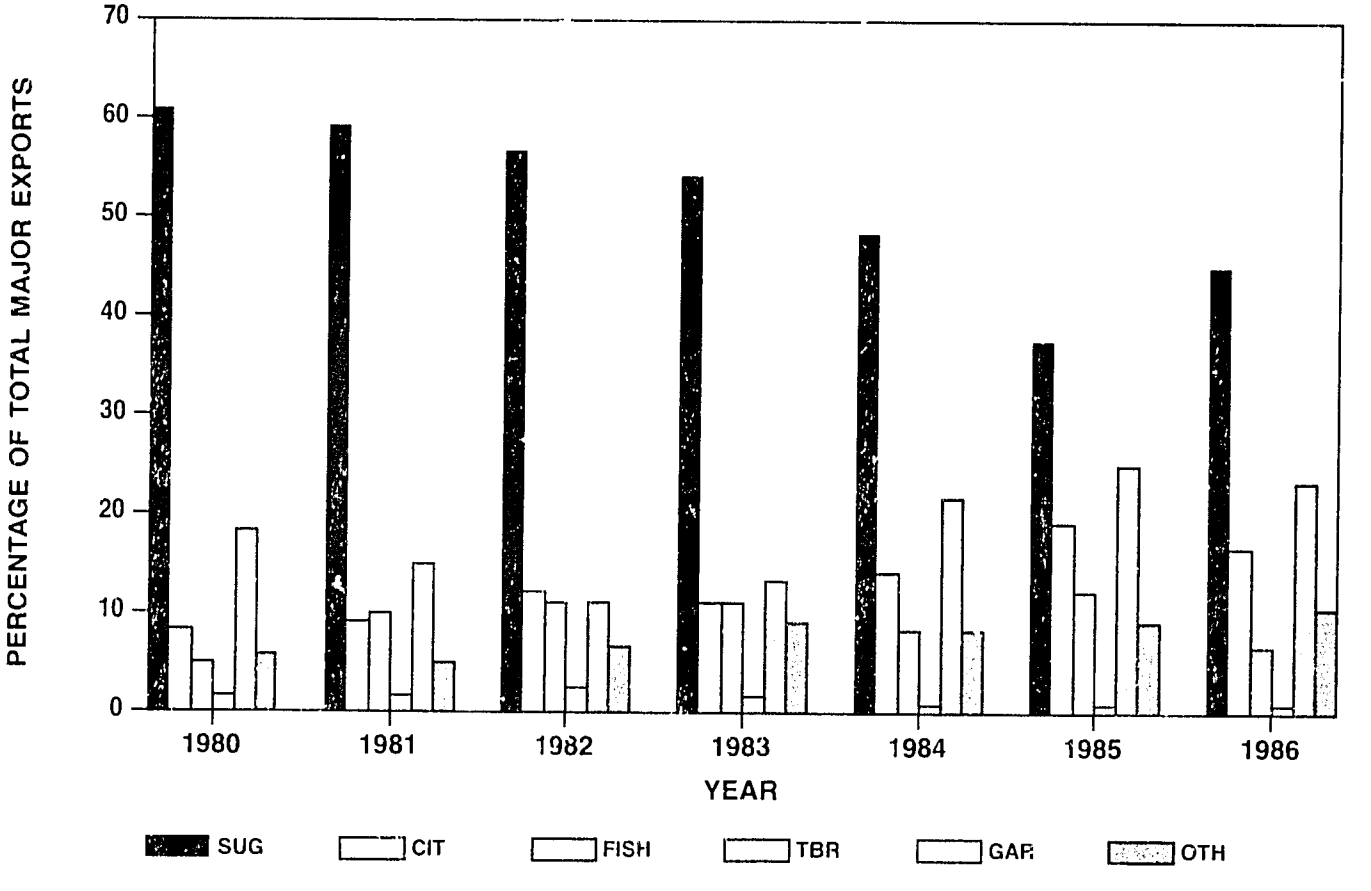


TABLE 3
DESTINATION OF EXPORTS BY PRINCIPAL TRADING ZONES
(Percent of Total Exports, Selected Years, 1970-1986)

COUNTRY	1970	1975	1980	1985	1986
USA	37.8	51.6	58.5	59.4	60.9
UK	31.0	41.9	32.1	27.9	34.3
CARICOM	5.7	3.4	6.1	5.1	1.9
OTHER	25.5	3.1	3.3	7.6	2.8
TOTAL	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: *1970, 1975: Development Associates, 1984. 1980, 1985, 1986: Central Statistical Office, 1987.*

percent of its exports currently go to the U.S. compared to 38 percent in 1970. Of additional note is Belize's trade with its CARICOM neighbors. Between 1970 and 1985 trade with CARICOM countries averaged 5 percent and in 1986 dropped to 1.9 percent. From this it appears that the country has not benefited substantially from attempts at economic integration.

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.

In terms of labor force utilization, agriculture is by far the dominant sector. Table 5 shows the division of the labor force by sector in 1982. Per capita yearly income

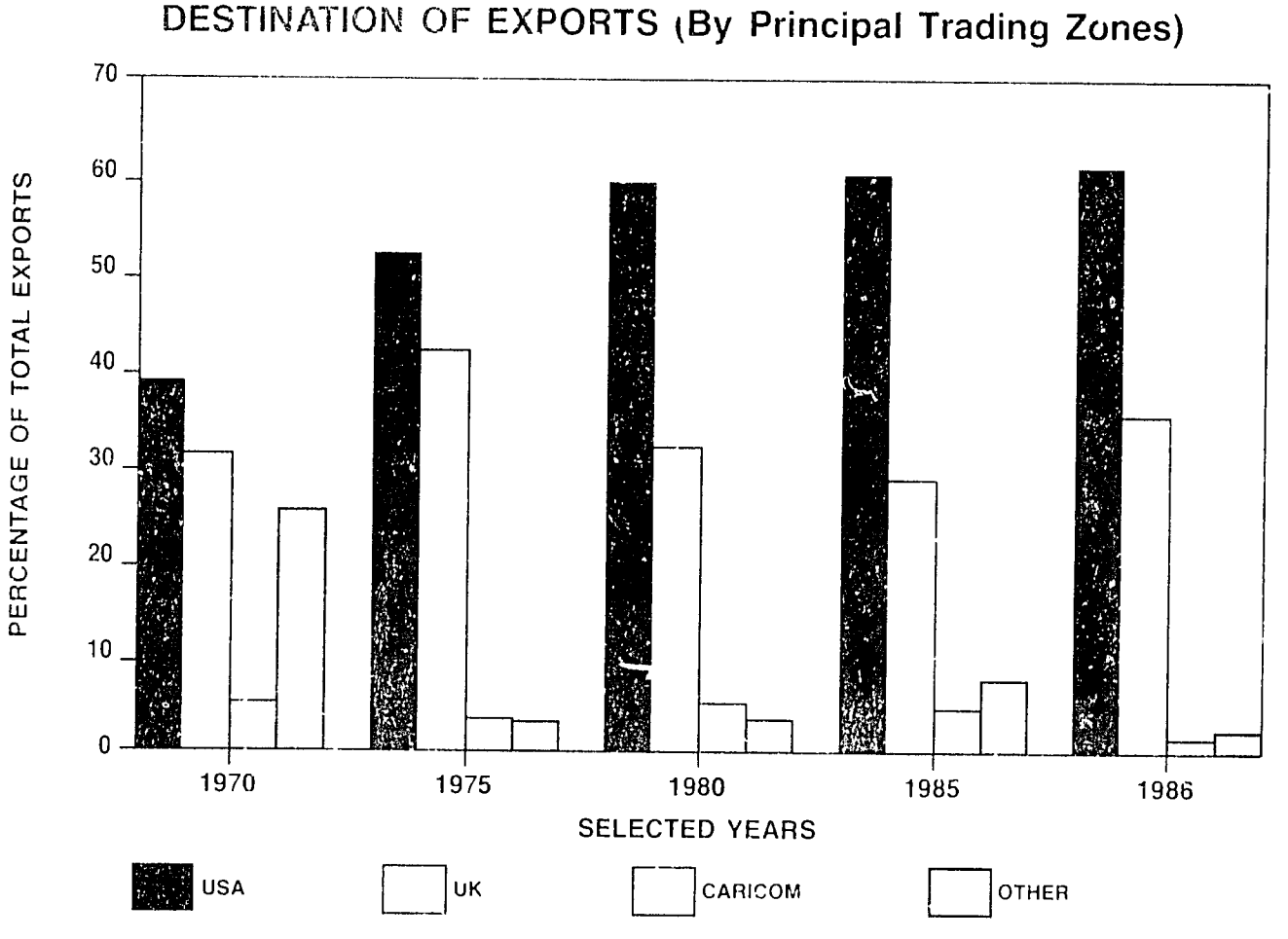


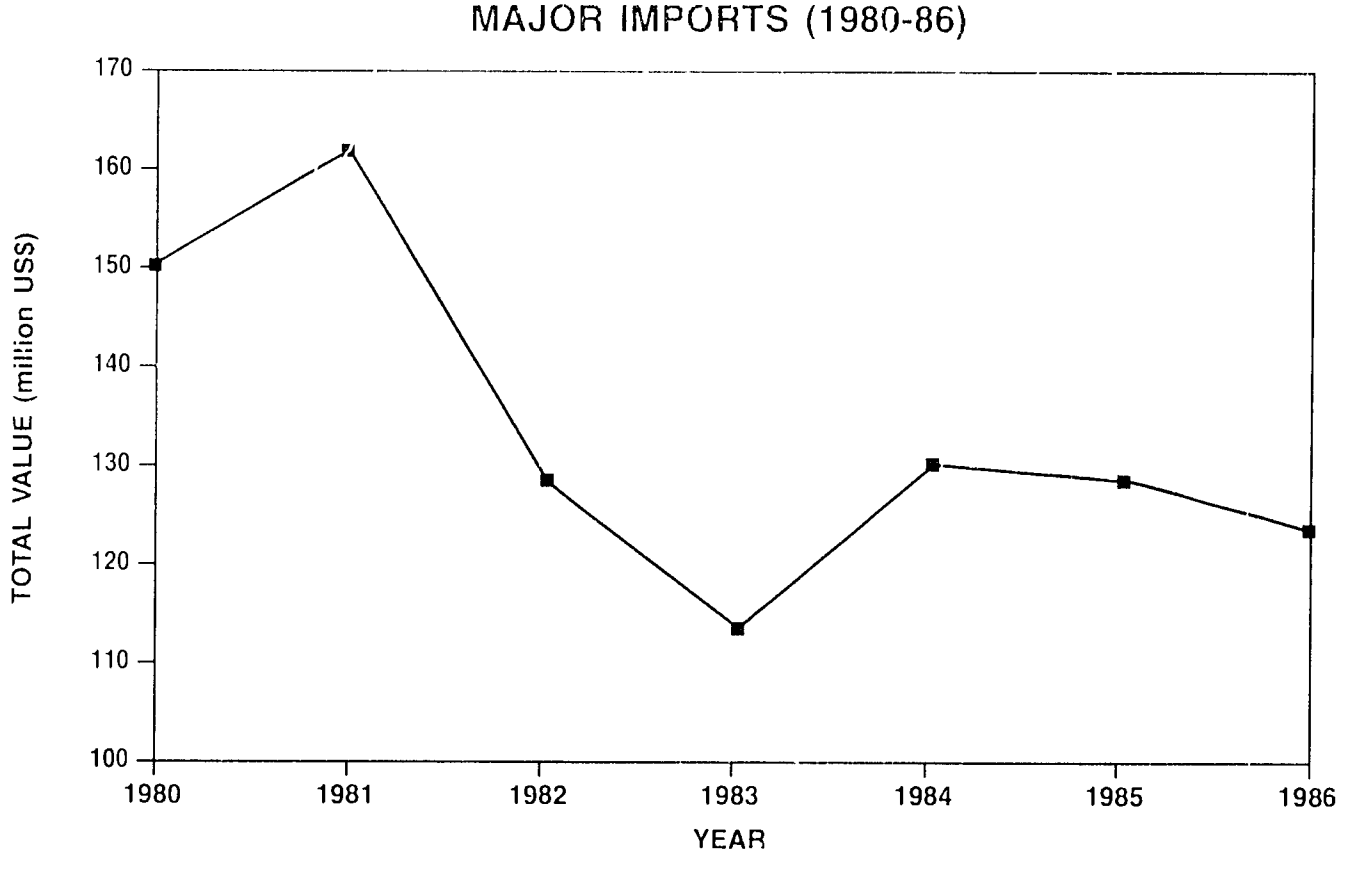
TABLE 4
MAJOR IMPORTS BY COMMODITY GROUPING, 1980-86

	1980	1981	1982	1983	1984	1985	1986
TOTAL VALUE (Million US$ in Current Prices)	150	162	128	112	130	128	122
CATEGORY	PERCENTAGES						
Food, Beverages, Tobacco	24	27	35	26	24	27	27
Manufacturing	30	30	26	26	30	30	31
Machinery	19	18	18	17	20	18	18
Fuel, Minerals, Lub.	18	16	18	20	17	17	14
Chemicals	7	7	9	9	8	8	8
Other	2	2	2	2	1	1	2
TOTAL	100	100	100	100	100	100	100

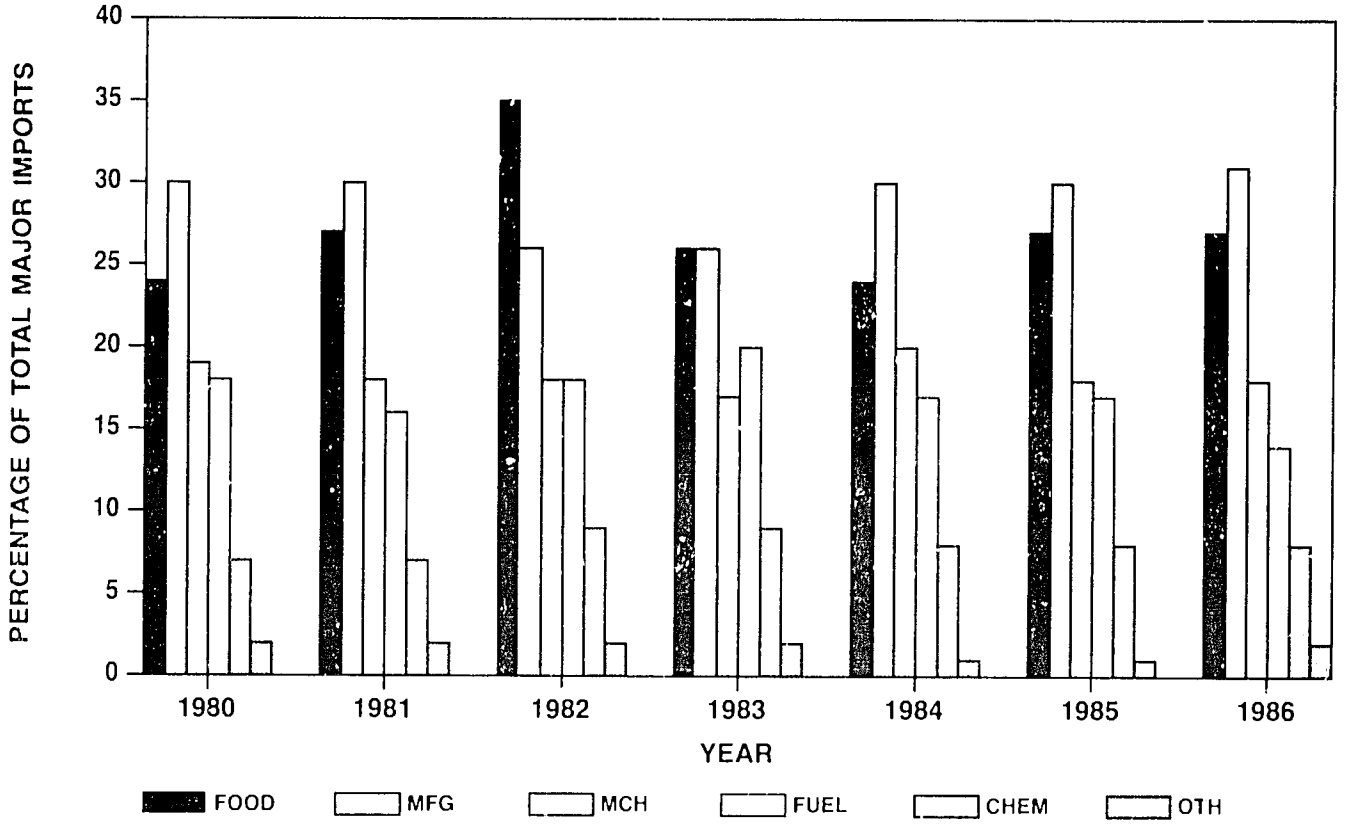
Source: *Central Statistical Office, 1987.*

reached US$ 1,060 in 1986. This is in sharp contrast to its neighbors with per capita incomes of less than half of this figure.

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 to substitute for imports. Second, the near to medium-term outlook for the sugar industry, which has in the past supplied a large part of Belize's foreign exchange, is not promising. Prices and preferential export quotas have both declined drastically in recent years and are predicted to remain low for the foreseeable future. Belize must



MAJOR IMPORTS BY COMMODITY GROUPING (1980-86)



therefore 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 value of the U.S. currency. The strength of the U.S. dollar, especially in the early 1980's, hampered the export competitiveness of some of Belize's exports to non-U.S. markets. Additionally, an overvalued currency tends to promote the importation of commodities which compete with those locally produced, especially in the case of the agricultural sector. This impedes the development of local sources of production making many activities uneconomic. While this situation has been reversed somewhat in recent years, it nevertheless has had its effect on the development process.

On the positive side, Belize has several other attributes which will serve to support

LABOR FORCE UTILIZATION (1982)

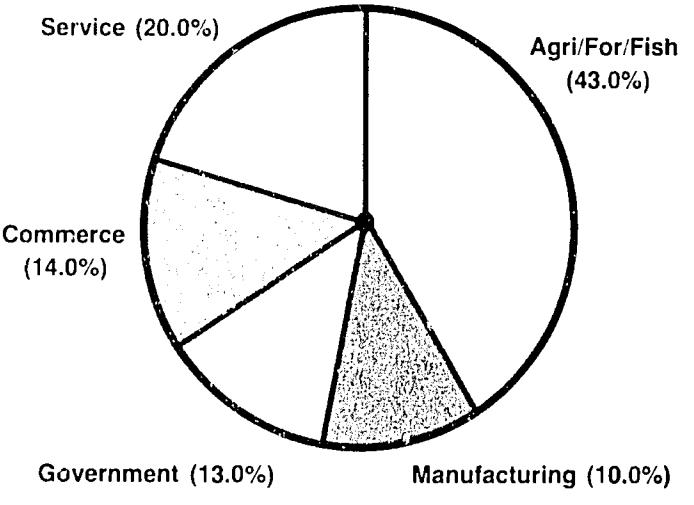


TABLE 5
LABOR FORCE UTILIZATION, 1982

Agriculture, Forestry and Fisheries	43%
Manufacturing	10%
Government	13%
Commerce	14%
Service	20%
	100%

Source: *Ministry of Finance and Economic Planning, 1982.*

its development efforts. First, the country benefits from a series of concessions and other trade agreements which favor its exports to specific markets. The Caribbean Basin Initiative (CBI) allows for many commodities to be imported into the U.S. under reduced tariff barriers, or with no tariffs at all. The Lome II agreements among members of the British Commonwealth allow for the duty-free importation into the U.K. of several Belizean commodities at concessionary prices. Additionally, the Caribbean Common Market (CARICOM) allows for the duty-free exchange of many commodities at higher than world market prices among member nations, although in practice it does not appear that the country has benefited greatly from this association.

Secondly, the country's proximity to its largest trading partner, the U.S., reduces transportation costs for its exports and makes market access easier. Recent achievements in negotiations with Mexico will also make land transportation easier through that country to U.S. markets. There are also initial indications that bottlenecks in the airline cargo industry are being rectified.

Lastly, Belize's people are literate, English-speaking, and easily trained. These characteristics serve to make Belize relatively attractive to foreign investors looking to employ local labor.

Agriculture

Agriculture in Belize ranges from traditional, subsistence, slash and burn cultivation

TABLE 6
PRODUCTION OF PRINCIPAL AGRICULTURAL COMMODITIES, 1978-86

PRODUCT	1978	1979	1980	1981	1982	1983	1984	1985	1986
Sugar Industry:									
Cane[2]	1,123	989	1,014	970	1,096	1,132	1,022	962	854
Sugar[2]	na	na	103	98	106	114	102	102	93
Est. Acres ('000)	na	na	60	60	61	59	59	58	55
Crops:									
Oranges[1]	686	568	1,109	1,063	1,063	750	1,124	1,043	1,265
Grapefruit[1]	303	188	408	586	703	178	312	476	650
Bananas[1]	na	na	785	549	524	531	555	507	672
Corn[2]	19.2	15.2	18.5	21.0	21.0	15.1	15.4	19.3	18.2
Rice[2]	6.3	6.6	8.4	10.6	7.8	6.0	5.6	5.5	4.3
Beans[2]	0.9	1.0	1.4	1.7	1.7	1.8	1.3	1.0	1.8
Honey[3]	0.2	0.2	0.2	0.2	0.2	na	na	na	na
Livestock: (Dressed Weight, Reported Through Official Slaughterhouses.)									
Beef[3]	2,577	2,562	2,310	2,216	1,933	2,127	2,238	2,300	2,441
Pork[3]	764	659	487	365	332	506	595	635	660
Poultry[3]	3,600	4,500	4,300	5,216	6,060	6,477	6,672	6,757	5,626
Fresh Milk[3]	na	na	535	616	649	701	975	1,169	1,244

na — not available.

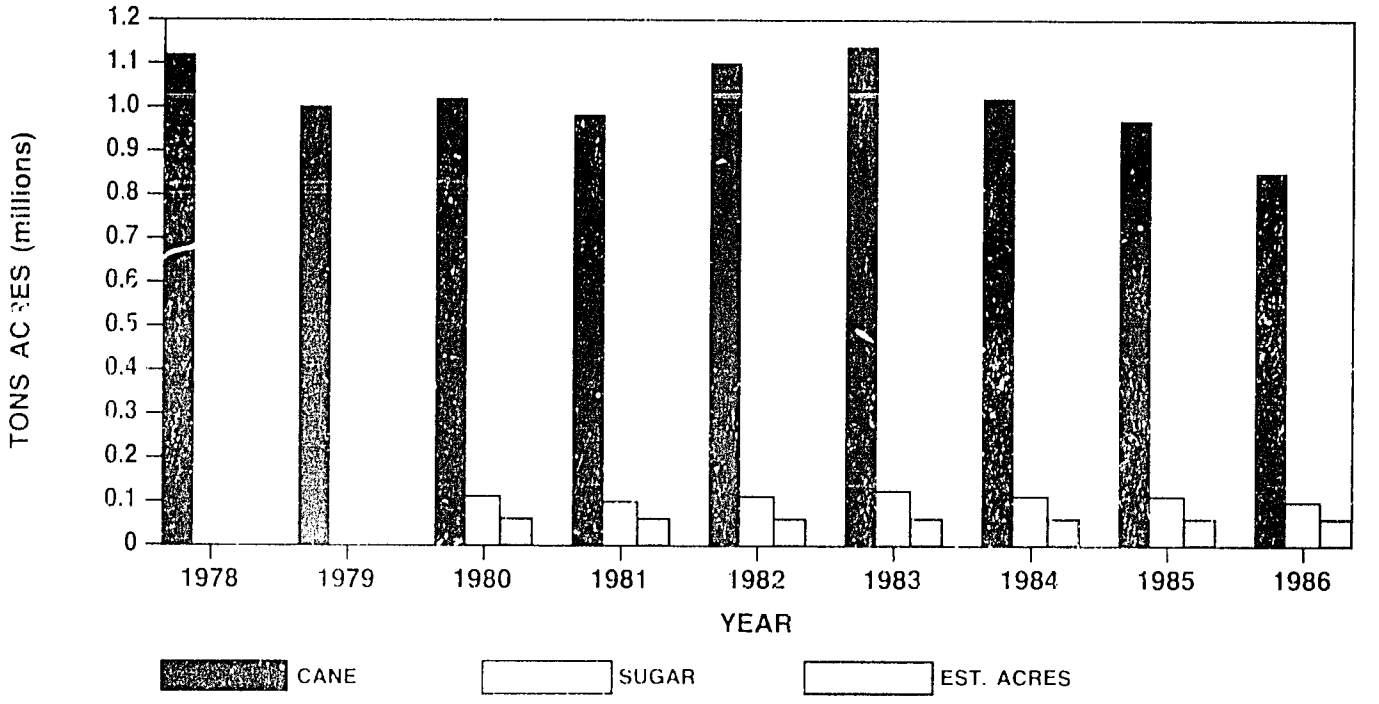
[1] '000 boxes: oranges, 90lbs; grapefruit, 80 lbs; bananas, 42 lbs.

[2] '000 long tons at 2,240 lbs. each.

[3] '000 lbs.

Source: *Ministry of Natural Resources, 1982; Ministry of Finance and Economic Planning, 1982., Central Statistical Office, 1987.*

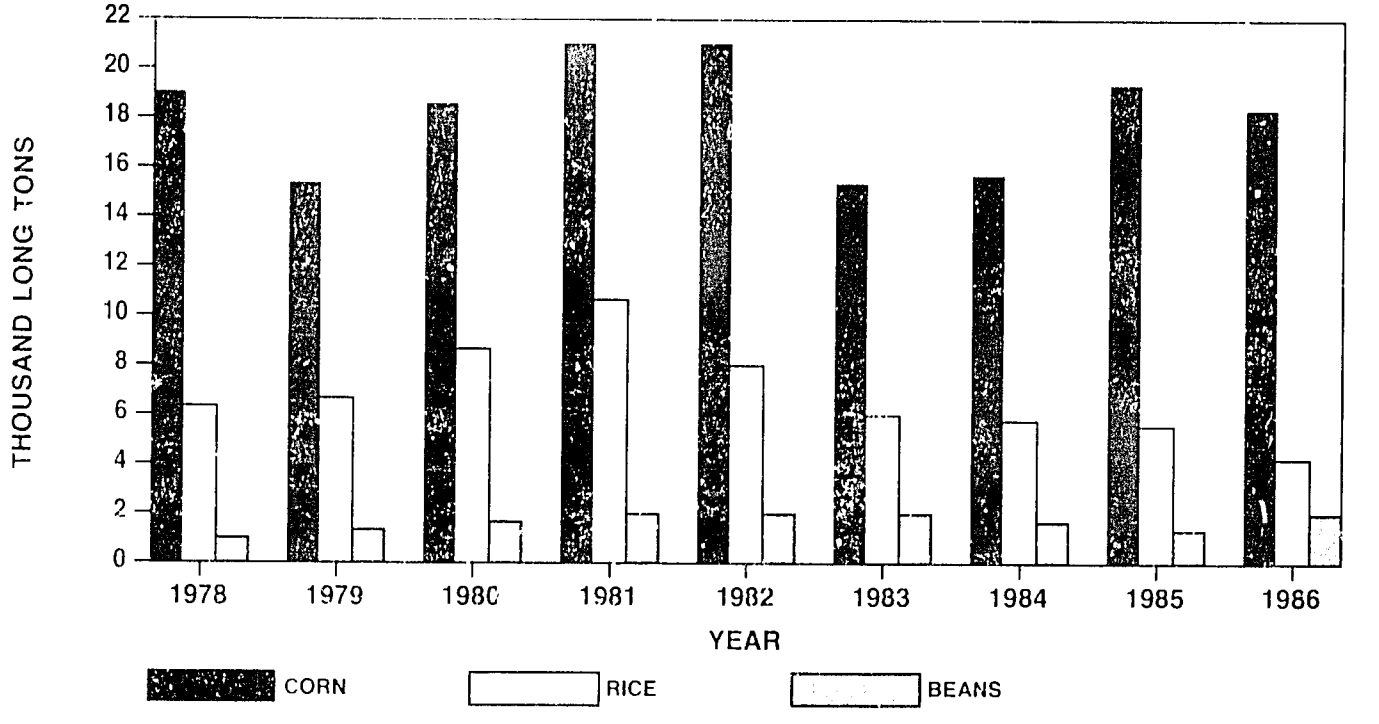
SUGAR INDUSTRY PRODUCTION (1978-86)

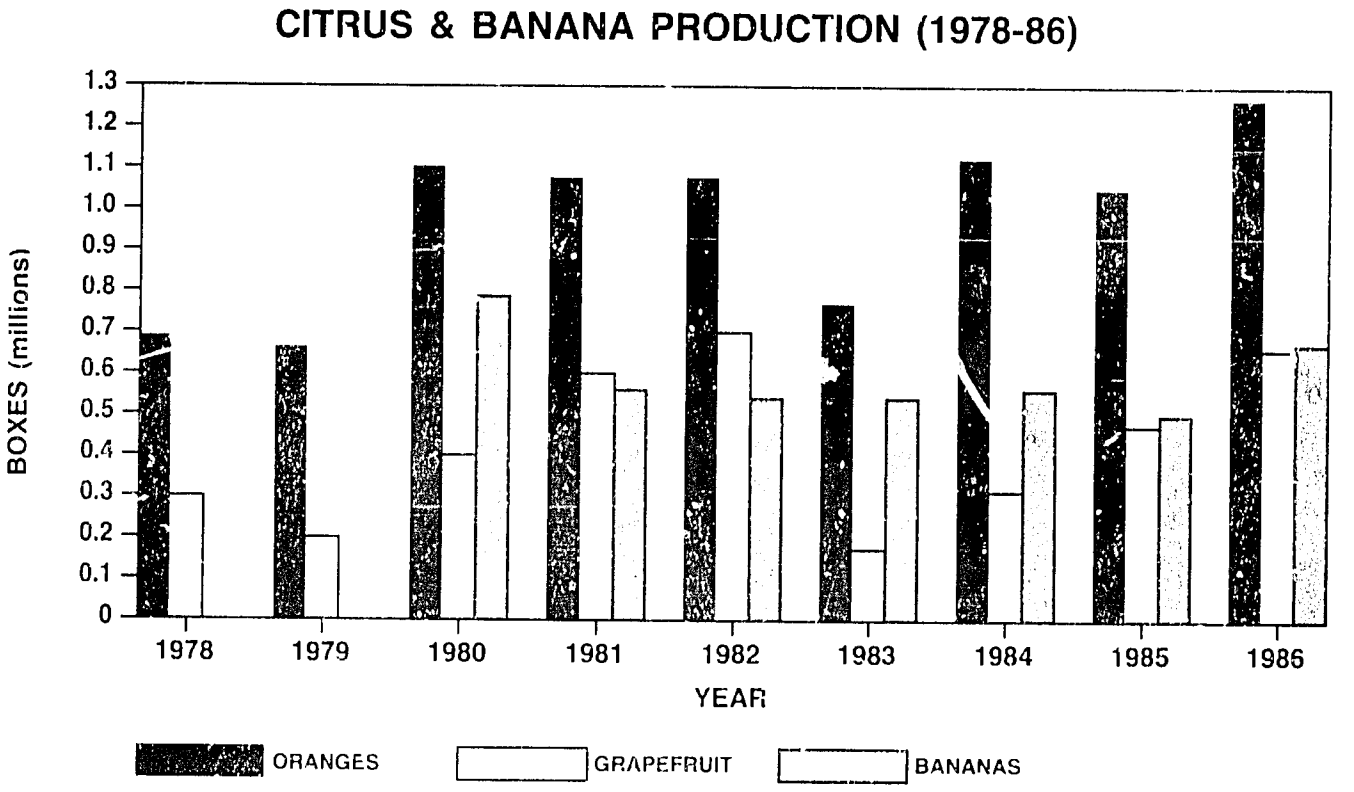


(milpa) to large mechanized farms producing sugar cane, citrus, mangoes, cacao, bananas, corn and cattle. Capital formation in agriculture has stagnated except in certain specialized export enterprises. Table 6 shows recent production trends for the principal agricultural commodities. An analysis of individual commodity performance can be found below.

Agriculture employs over 40 percent of the work force and generated 16 percent of GDP in 1986. This is down from 25 percent at the beginning of the decade as workers leave agriculture for the service sector. Agri-

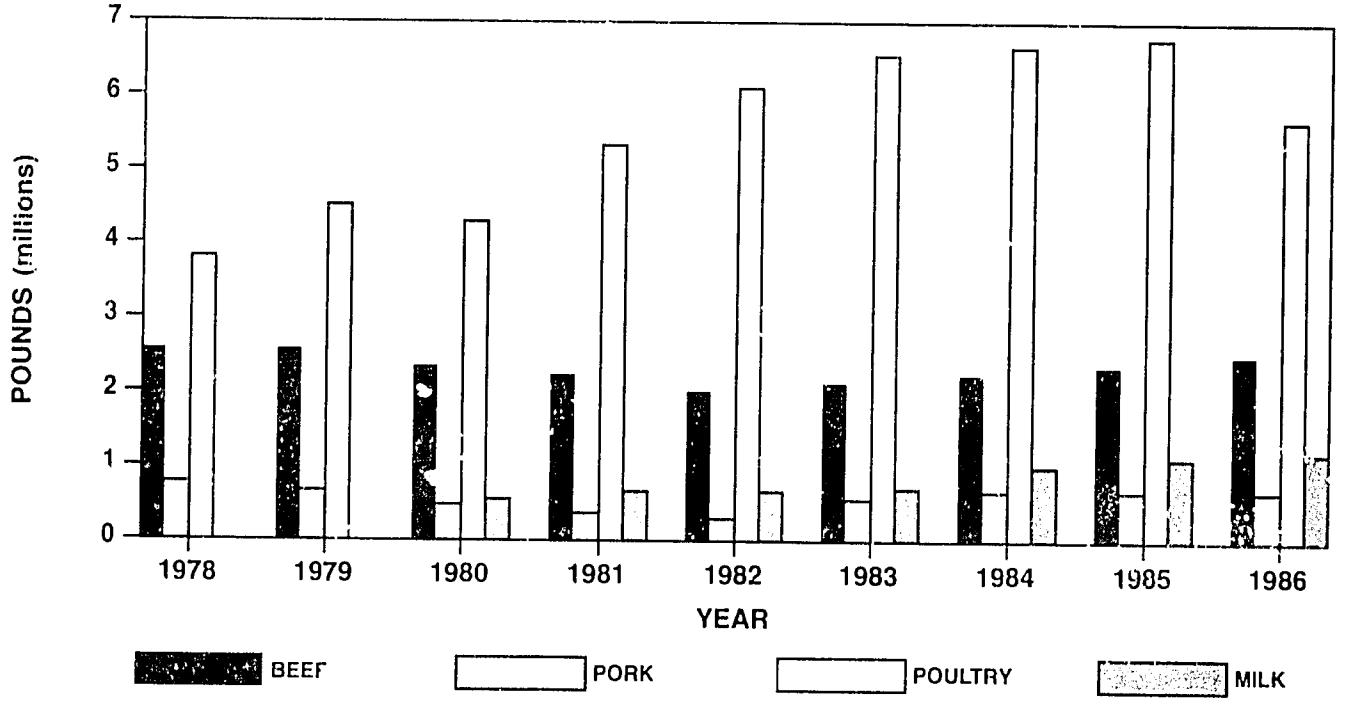
BASIC GRAINS PRODUCTION (1978-86)





cultural exports are an important part of Belize's economy representing about 70 percent of total exports, although this figure has also been declining over the decade. Sugar has accounted for more than half of total exports for the past 30 years and the impact of recent declines in world market prices, as well as the reduction of certain concessionary markets, has adversely affected the sector. Citrus and bananas are other important export crops. Less significant agricultural exports have been beef, rice, mangoes, and honey.

Imports play a major role in furnishing



domestic food supplies and represent an average 25 percent of total 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 towards export crops.

The Government of Belize has recently prepared a Food and Agricultural Policy Statement which sets forth current policy objectives and priorities. In summary form, these objectives are:

to provide consumers with a stable, secure food supply at reasonable prices;

to encourage the growth of the small, independent farm as an efficient and stable provider of food needs;

to encourage the growth and improved quality of life on subsistence farms to insure long term competitiveness;

to develop agriculture with a minimum of restrictions on the free play of market forces;

to stress development of those commodities which have identified markets, either domestic or foreign;

to stress development of those commodities consistent with the country's endowed resource capabilities;

to encourage the establishment of small scale, high technology food processing operations to supply domestic market needs, insure product quality and increase employment;

to fully develop human resources in agriculture to contribute to national development;

to develop agriculture consistent with national conservation and environmental goals;

to develop a diversified agriculture to spread the risks that are an inherent part of production;

to protect the public health and welfare by ensuring a safe, wholesome food supply; and,

to recognize the close linkage between agricultural and trade policies to assure free access on world markets for exports and to protect the growth of home industries when imports unfairly threaten their development.

The 8,866 square miles of land surface in Belize include 266 square miles of offshore cayes. The country averages 174 miles in length and 68 miles in width. Rainfall extremes range from 60 inches annually in the north to 180 inches in the south; January to April are the drier months. The mean annual temperature is 80°F. with a relative humidity of 82 percent.

Geographically, the low Maya mountain range dominates the south of the country. The siliceous soils of these mountains are not well-suited for agriculture. Calcareous soils in the northern lowlands cover 35 percent of the country, but conditions of topography and rainfall are highly variable and these soils, while fertile, often have excess or insufficient moisture. The lowland soils of the Toledo district are fertile but are beginning to show some signs of decreased productivity due to a gradual reduction in the fallow period allowed by the traditional slash and burn methods practiced there. Additionally, the 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 classified as suitable for agriculture. An additional 3.0 million acres are classified as suitable for forestry. It is estimated that less than 15 percent 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 the 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 and sur-

face waters are used for domestic purposes by 70 percent of the population. High precipitation causes production problems in many agricultural areas during peak rainfall periods; drainage measures are needed in some areas. Due to the level and low-lying topography of much of the coastal areas, heavy rains and the periodic flooding of rivers and streams bring many problems in the southern part of the country. At these times, roads are often impassable, bridges are flooded, and the transportation of both products and people can be at the mercy of water levels for prolonged periods. While this situation has improved recently with the completion of several main bridges along the Southern Highway, further investment remains to be made.

Historically, land settlement and use in Belize have been related to its forest resources. Absentee landlords held large tracts of land under freehold title, principally for logging, during almost three centuries of extensive exploitation of the native forests. According to official statistics, 93 percent 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. Fifteen forest reserves have legal status and cover 28 percent of the country. Some of these reserves are under pressure for agricultural use. In contrast, only about 8,700 acres have been reforested during the past 35 years. Table 7 shows the basic categories of land tenure in Belize.

Private lands are held in either fee simple, or under what is called a "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 privately owned, leased, or held in forest reserves. Forest reserves have been

FORMS OF LAND TENURE (1984)

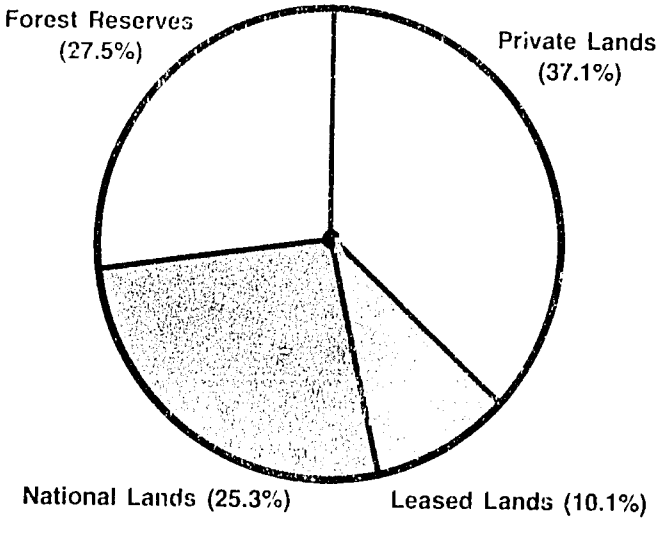


TABLE 7
FORMS OF LAND TENURE, 1984

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

Source: *Unpublished data from the Lands and Surveys Records, Ministry of Natural Resources, October, 1984.*

TABLE 8
DISTRIBUTION OF PRIVATE LANDS BY SIZE, 1984

Range in Acres	Number of Parcels	Percentage	Number of Acres	Percentage
-2	2,464	29%	na	na
2–10	2,237	27%	15,007	1%
11–35	2,479	30%	54,491	3%
36–100	640	7%	42,319	2%
101–500	368	4%	78,836	4%
501–1500	116	1%	99,253	5%
-1500	158	2%	1,809,920	85%
TOTAL	**8,462**	**100%**	**2,104,832**	**100%**

Source: *Unpublished data from the Lands and Surveys Records, Ministry of Natural Resources, October 1984.*

set aside either for future use, or as reservations for the Mopan and Kekchi ethnic groups. Logging is permitted on some of these reserves.

Table 8 shows that the ownership of private land is strongly skewed: 2 percent of the holdings comprise 85 percent of the acreage in this category. 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 for the work to be completed. Belize, however has abundant land, relative to its population, and its availability is generally not a constraint on national agricultural production goals.

The availability of agricultural infrastructure and farmer access to it are, and will continue to be, major constraints to increased agricultural development. The GOB, as well as several donors assisting the country, are addressing these constraints but much remains to be done. One particularly nagging difficulty in providing certain types of infrastructure, either through the public or private sectors, derives from the very smallness of the country. In terms of agricultural development, this translates into the number of farmers and volumes of agricultural production not being sufficient to merit costly investments in many types of infrastructure. Examples of this are the lack of a sufficient deep-water port for the export of agricultural commodities, and the provision of all-weather roads in the southern part of the country.

The ports of Belize cannot accommodate ships with a draw greater than 17 feet, and there are consequent limitations, delays, and expenses in the offshore reloading of cargo to larger ships, either for imports or exports. Belize has an international airport, but the number of daily flights is limited, although these have been increasing recently. 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 the delivery of information and education for agricultural development. Telephones are rare in rural areas as are television and daily newspapers.

Because of the small size of the domestic market, several services and facilities that could help to promote agricultural development are not readily available. Examples include local input supply stores; local facilities to purchase, store, handle or process products; post-secondary education or

agriculturally-oriented trade schools; and the necessary number of local extension offices and staff.

Electricity is not available to most rural residents. High fuel costs in generating electricity result in high electricity costs—more than US$ 0.20/KWH (more than twice the rate for most parts of the U.S.)—and cold storage facilities, refrigerated transport, and home refrigeration are often unavailable.

Formal agricultural credit, while thought to be adequate in terms of overall amounts, is not always available to individual small farmers who lack collateral, or who find the credit available to be too expensive due to high transactions costs. Additionally, rural people have very limited access to deposit services.

In the area of agricultural infrastructure, special mention must be made of the GOB's research and extension services. While these are vital to the agricultural development of the country, they have serious limitations in their staffing, organizational structure and budgetary allocations. Both of these activities will be treated in depth below in the section concerning public support to agriculture.

Agricultural development is largely a product of the people in agriculture and its related industries. An analysis of the Belizean population in 1984, showed 46 percent below 15 years old, 27 percent between 15 and 30 years old, 12 percent between 30 and 45 years old, 8 percent between 45 and 60 years old, and 7 percent over age 60. The drop between the first two categories stems from the fact that Belizeans tend to migrate to other countries in large numbers beginning in their late teen years and continuing into their early thirties. This outmigration appears to be permanent because there are no bulges of population at higher levels which might demonstrate return migration.

Belize's population is almost 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, however, is the ethnic composition of the society—a feature which distinguishes Belize from the rest of Central America. Creoles, the descendants of black slaves from other parts of the Caribbean, and whose language and culture dominates Belizean society, comprise about 40 percent of the population. Mestizos (also called Spanish) account for an additional 33 percent. Another 10 percent of the population are Mayan Indians (Yucatec, Kekchi, and Mopan). Other important ethnic groups are Garifuna (descendants of indigenous peoples of the Caribbean), comprising 8 percent; and the Mennonites, 3 percent. Other minorities include people of Chinese, Middle Eastern and East Indian descent. These various groups play differing roles in the agriculture, foresty and fisheries sectors.

A labor force survey for late 1983 shows that 38 percent of the male population over 14 years of age was employed in agriculture, while 10 percent of the corresponding female population also worked there. Never-

TABLE 9
PERCENT UNEMPLOYMENT, 1980 AND 1983, BY SEX AND PLACE OF RESIDENCE

	1980			1983		
	Male	Female	Total	Male	Female	Total
Urban	17.7	24.8	19.9	10.2	22.8	15.4
Rural	5.4	23.4	7.7	8.0	26.9	12.2
Average	11.3	24.4	14.3	9.1	24.1	14.0

Source: *Ministry of Economic Development, 1984b.*

theless, this latter figure is no doubt underestimated. Farm women are typically involved, along with younger children, as unpaid family labor on farms.

Overall unemployment in Belize averaged 14 percent during the early 1980's and is thought to have worsened in recent years due to the loss of jobs in the sugar industry. Paradoxically, and relative to surrounding countries, the agricultural sector is thought to be labor scarce. This can be seen in the discrepancy between the respective unemployment rates for urban and rural areas as Table 9 shows.

In the case of male unemployment, the rates appear to be significantly lower for rural residents than for those living in cities and towns, although there appears to have been a decrease in this difference between 1980 and 1983. It is thought that this is mainly due to the hard physical nature of agricultural work, as well as the "bright lights syndrome" which attracts the rural young to urban areas. It cannot therefore be assumed that expanded employment opportunities in agriculture would greatly influence the country's overall unemployment rate. This, however, applies to traditional physical agricultural work. More capital intensive employment opportunities (tractor drivers, for example), or increased opportunities in agricultural processing would more likely attract workers.

For women, the rates of both urban and rural unemployment are substantially higher than for men and do not demonstrate the same rural/urban dichotomy. In rural areas these higher rates can possibly be explained by the physical requirements of agriculture resulting in women not being able to compete with men for the jobs available. On the other hand, however, they might be explained by a statistical bias which counts women fully employed in household chores, but not earning an income, as being unemployed.

Data concerning underemployment or disguised unemployment are not available, although seasonal underemployment in rural areas is thought to be high. Local differences are also important. In Toledo, Stann Creek, and Belize districts, male unemployment ranges from 13 percent to 20 percent, while in Cayo, Corozal, and Orange Walk it is 4 percent, 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, it is estimated that at least 30 percent of the labor for the sugar harvests comes from other countries, mainly Mexico and Guatemala.

Primary school enrollment is quite high, currently standing at 95 percent. Over the years, this has resulted in a literacy rate of more than 90 percent. Sixty percent of primary graduates attend high school. The rate of secondary school completion is lower, and obstacles such as the 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 providing technical knowledge.

The Belize School of Agriculture in Cayo District was established in 1977 to provide a two-year course to train agriculturalists. This facility was renamed and upgraded in 1985 becoming the Belize College of Agriculture. Graduates mostly go into farming or the government Extension Service. Training abroad is difficult to acquire. Non-formal education in agriculture is provided mainly by the Extension Service of the Ministry of Agriculture. Youth education and adult education for farm women are most directly served by the Ministry of Labor, Social Services and Community Development. This ministry, like that of Agriculture, 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 role of women in farm decision making, and the dominance 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.

The agricultural production systems of Belize are diverse and often complex. From non-mechanized 'milpa' farming (slash and

district, citrus orchards in Stann Creek, and the Mennonites' mechanized grain production in Cayo, each has differing characteristics in the use of land, labor, capital and management resources.

Farming Systems

There are 6,000 to 8,000 households practicing milpa farming (many of whom combine part-time farming with off-farm work). While more prominent in the south, milpa cropping may be found in all districts and among all ethnic groups. Farming methods include the basic slash and burn preparation and planting of corn, rice, beans, plantains, and root crops, primarily for home consumption. Average milpa corn farmers will have 4 to 10 acres cultivated annually out of an area of 30 to 50 acres. Since the actual tenure arrangements of milpa farmers are often clouded, it is not always appropriate to use the term "farm" in its traditional sense. For the purposes of this report, a milpa farm means a certain area of land that a farmer traditionally cultivates in a rotational sequence. Few imported inputs are used, and yields of corn range from 1,000 to 1,200 pounds (18 to 21 bushels) per acre. A variation of this is where rice is grown in pure stands of one to three acres on a total farm of 5 to 15 acres. In this case, the rice is generally considered to be a cash crop with yields ranging from 1,000 to 2,000 pounds per acre. Milpa farming in the Cayo, Belize, and Stann Creek districts also frequently includes fruit trees, vegetables, or some livestock, but these are primarily used for subsistence family food needs.

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

Mechanized mixed farming is found on an additional 200 to 300 farms providing specialized crops for the commercial market. These farms, usually 20 acres or less, raise commercial 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 and using the government's mechanization services. Income is usually supplemented by part-time off-farm work. There are 300 to 400 of these farms producing 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 Belize district. Swine are produced on family units, primarily in Toledo district, usually with 5 to 10 head per farm.

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

Estate agriculture serves to describe relatively large scale farms found throughout Belize. Bananas, citrus, sugar cane, mangoes and cattle are raised on these farms with extensions of more than 50 acres. Varying levels of capital, technology and management are applied. Some of these estates are integrated units operated in whole or in part by processors, especially for cacao, citrus, and mango production. Many of these also suffer from low levels of technology, and the vagaries of external markets.

A final class of farms includes the so called "integrated communities." These are comprised of the Mennonite farmers who practice integrated, diversified, and mechanized agriculture. On many of these farms the land is owned by the community although farmed individually. Located in Cayo, Orange Walk and Toledo, they have a strong impact on the production of such items as grains, beans, broilers and eggs, and dairy products.

Sugar

Sugar cane has been the base of the Belizean agricultural economy for several

decades. In the past it has provided more than 50 percent of export earnings and accounted for as much as 70 percent of agricultural exports. In 1986, there were approximately 55,000 acres of cane being farmed by 4,400 farmers in the Orange Walk and Corozal districts. Nevertheless, this industry is currently in serious difficulty because of reductions in the preferential export quota to the U.S., low world sugar prices, inefficient processing and transport facilities, relatively low yields, and inadequate technology.

Most cane is grown by small farmers who work an average of twelve acres, although a few farms have more than 1,000 acres each. With favorable sugar prices in the 1970's farmers mechanized their operations, acquired debt and prospered. Nevertheless, faced with a drastically reduced market, many of these farms have apparently became over-capitalized. This in turn, has caused per unit production costs to rise and profitability to become negative. Average yields of cane declined over the past decade to approximately 19.5 long tons per acre, which compares to yields of 30 tons per acre attained in other regions of the world under the best management practices. Nevertheless, recent reductions in the price of fertilizer to cane growers have resulted in increased farmer utilization and reported average yield increases of up to 25 percent.

The yearly sugar crop is disposed of through various channels. Both the U.S. and U.K. concessionary markets have been relied upon heavily in the past, although the former has heavily eroded in recent years. A relatively minor percentage is reserved for local consumption and the remainder of the crop is sold in the world market.

Prior to 1985 there were two sugar mills for the grinding and processing of cane: an efficient, modern one in Orange Walk and an inefficient, antiquated one in Corozal. In that year, the negative outlook for the sugar industry led the foreign owners of these two mills to a restructuring of the sector. As a result of this, the Corozal mill was closed with the loss of over 700 jobs, and the Orange Walk mill was sold to a consortium comprised of its workers, the members of the Cane Growers' Association and the GOB. The management expertise of the foreign firm has been retained under a management contract.

Corn

Corn is grown on approximately 28,000 acres distributed on about 9,000 farms throughout the country (1983). It is principally used for human consumption. Nevertheless, there has been a slow but steady growth in both acreage and total production as more corn is being fed to poultry and other livestock. Cayo district produces nearly half the country's corn with Orange Walk and Corozal being a second and third place respectively. Belize is normally self-sufficient in corn but yields are low resulting in a national average of less than 1,500 pounds (27 bushels) per acre (yields on mechanized farms are higher at approximately 2,500 pounds per acre). Post-harvest losses are high and further reduce the amount of corn available to the marketplace. This is especially true in the case of short and medium term storage facilities.

Corn producers appear to be very responsive to price. When the Belize Marketing Board increased the price per pound from US $ 0.08 in 1979 to US $ 0.10 in 1980 and to US $ 0.12 in 1981, acreage increased accordingly. Nevertheless, this was taking place when the world market price was approximately US $ 0.06 per pound.

Milpa corn production as a percentage of total corn production has been steady or slightly decreasing over the past decade and currently stands at approximately 60 percent. Declining productivity on some milpa lands, as well as a tendency toward mechanized corn production, explain this trend. It appears that Belizean farmers could produce much more corn given improved technology and the increased use of inputs. This production, however, must be made at reduced cost if Belize is to become an efficient corn producer.

In the basic milpa system, an estimated 24 to 40 days of labor can be expected to be expended per acre of corn. This is the overriding input and if costed at the farmer's opportunity cost (assuming that the legal

minimum agricultural wage of US $ 6.00 per day is not overstated) has resulted in an average yearly loss of US $ 45.00 acre over the past several years.

However, since the milpa farmer normally does not pay for hired labor, but rather provides his own or that of his family, this "loss" takes the form of a subsidization of the price of corn to the final purchaser through lowered daily returns. In essence many of these farmers would be economically better off if they could hire out their labor and purchase corn in the market place. This analysis, nevertheless, does not consider other important elements of milpa corn production such as its religious/cultural value or the safeguarding of the farm family's subsistence food needs.

Mechanized corn production on the other hand, does appear to be profitable at current prices, although this profitability is highly variable. This variability relates directly to the past establishment of floor prices by the BMB, as well as to quality discounts for moisture and foreign matter content.

About 30 percent of the corn produced in Belize is marketed commercially. Until recently, the two major purchasers of corn were the Belize Marketing Board (BMB) and commercial millers in the Mennonite communities; each purchasing about equal amounts. Nevertheless, in 1986 the BMB ceased its purchasing of corn and is limiting its activities to the establishment of floor prices for this and other basic commodities.

Exports of corn have not been possible because of high domestic prices relative to those in surrounding countries. Any export opportunities will depend on competitive prices, achievable only through lowered unit costs of production, or under possible protection in the Caribbean Common Market (CARICOM) which is not thought to be likely. Potential for an increased domestic market for corn lies in its use for livestock feed. Farmers who feed poultry, swine or cattle see corn as a major input, and its price must be favorable in comparison to livestock prices.

Rice

Rice, while grown throughout the country, is most important in Toledo and Belize districts. Total domestic rice consumption is high, averaging 6,500 tons of milled rice per year, or 87 pounds per person in 1983. In 1981 there were 7,400 acres planted to rice. Of this, 4,000 acres were in Toledo, 600 were in Stann Creek, and 2,800 were in Belize district. Included in the figure for Belize district are 2,500 acres at Big Falls Ranch which is a large commercial producer owned in part by the GOB. It has not been producing at a profit in recent years and as of this writing was not producing any rice at all.

In a year of average rainfall, more than 25 percent of rice production is under the milpa system utilizing mainly upland varieties. Milpa production accounts for 60 percent of the rice grown in Toledo district, where both upland and paddy 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 the 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 national crop. Its production is critical to the self-sufficiency of the country in this important foodstuff, and the GOB is currently attempting to reestablish a joint venture for its efficient management.

Results from the recently concluded Toledo Research and Development Project (TRDP) appear to hold promise for increasing rice production. Over the years, this project's focus has changed from lowland mechanized rice production to farming systems research directed at small farmers planting upland rice varieties under the milpa system. Experiments appear to indicate that yields can be increased to between 3,000 and 4,000 pounds per acre compared to pre-project averages of 1,000 pounds per acre. Of critical importance is the fact that these yield increases have been obtained on farmers' plots using minimal amounts of imported inputs. It is hoped that these yield increases, while improving farmer income, will also serve to reduce farmer pressure on some of the lands in the Toledo district. Increased population pressure in recent years has shortened the traditional fallow periods essential to milpa farming, resulting in the

initial symptoms of environmental degradation.

Milpa rice production depends on family labor availability. The elasticity of supply of labor is relatively high and milpa farmers are quick to respond to price changes. Labor requirements for milpa rice, as reported by TRDP staff, are approximately 26 person-days per acre.

As in the case with milpa corn production, milpa rice also appears to be an uneconomic venture if the farmer's labor (or that of his family) is costed at the minimum agricultural wage. Again it appears as though the milpa farmer is subsidizing the rice consumer through an undervaluing of his, her labor. In contrast to milpa corn rice is grown by milpa farmers primarily as a cash crop. The significance of this undervaluing of labor is therefore more important since the socio/cultural issues which would ameliorate its impact in corn production are not thought to be present in the case of rice.

In contrast, mechanized rice production at Big Falls Ranch and elsewhere, appears to be potentially profitable on an actual cost basis. Nevertheless, it appears that if the full costs for land and land clearing (now heavily subsidized by the government) were to be included in the calculations, profits would fall significantly.

The price paid for rice to farmers at the mills, plus the Belize Marketing Board's costs of milling, transportation, and storage reached US $ 0.26 per pound in 1983. This, compared to a world market price of US $ 0.11 (F.O.B. Bangkok) for that year, demonstrates the difficulty the country will have in developing an export market for rice.

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

In recent years, almost all the rice produced in Belize has been consumed domestically because of a shortfall in production resulting from cutbacks in production at the Big Falls Ranch and country-wide production problems in 1984. Given Belize's high costs of production, rice exports would likely be feasible only within CARICOM. The domestic market will therefore continue to be the major outlet in the near future.

Edible Beans

Dry beans are another very important item in the Belizean diet. Red kidney, a variety introduced in the 1930's, made up 90 percent of the 1981 production and is preferred by most ethnic and social groups. This presents a problem since present high-yielding red kidney varieties are not well adapted to the country's conditions making them susceptible to severe disease problems. Efforts to expand the use of other non-kidney varieties have met with consumer resistance.

Belize is normally self-sufficient in dry edible beans. In 1978-1982, average production of edible beans was 3 million pounds on 6,200 acres, or 484 pounds per acre. During this period the land planted to beans ranged from 4,800 to 7,000 acres, production varied from 2.2 to 4.0 million pounds, and yields varied from 300 to 600 pounds per acre.

Beans are produced country-wide under both milpa and mechanized systems. Fifty-five percent of the production is in Cayo District, and another twenty-five percent is in Orange Walk. The Cayo share is largely produced under mechanization by the Mennonites. Producers are price-responsive and the high prices set by the BMB have increased both acreage and the per acre yields.

Milpa beans are planted as a main annual crop, or can be planted in succession with other crops. This can include interplanting with, or following, a corn crop. Beans require an average of 46 to 52 mandays of labor per acre—more than the other field crops.

In the case of milpa production, profitability can be both positive and negative depending on the actual labor input employed. This, in turn, appears to be dependent on local topography. For example, it was calculated that in 1984 bean producers in Toledo, facing far more difficult terrain, produced at a loss, while those in

Cayo district, with more level terrain and lower costs, were able to achieve a small degree of profit.

In the case of mechanized bean production, per acre costs are substantially higher than under the milpa system. Nevertheless, these higher costs result in far greater yields making mechanized bean production potentially profitable. Again, however, it must be mentioned that this profitability is also dependent on the price for beans which is established by the BMB as one of its regulatory functions.

The domestic demand for edible beans has generally been strong enough to preclude exports, and it appears that about 4 million pounds of dried beans per year are needed to satisfy the domestic market. Improved methods and reduced costs on milpa farms plus expanded mechanization in bean production could result in opportunities for self-sufficiency in bean production as well as having a surplus for export; particularly to the CARICOM market. (The CARICOM price for red kidney beans in 1980 was US $ 0.90 per pound, while the domestic price at that time was US $ 0.30 per pound.)

Oilseeds

Oilseed production in Belize has not been significant in the past. In contrast, an annual expenditure of US $ 2.5 million on imported fats and oils (1983) has focused attention on the potential for an oilseed industry in the country. In addition to import substitution and the 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 the production, 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 consumption 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 as well. A recent projection indicates that CARICOM countries will have a deficit of over 30,000 metric tons of edible vegetable oils by 1990 with little hope of increased local production. This prediction strengthens arguments for considering a Belizean oilseed industry.

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

This quantity of soybeans would also result in almost 21 million pounds of 38 percent protein meal for livestock feed. In comparison, ten million pounds of soybean meal were imported in 1983, a typical year. However, since this would be double the present needs, higher meat consumption per capita, and/or livestock exports would be needed to absorb these feed products if a soybean industry were to be established.

New varieties of soybeans have shown experimental yields above 2,500 pounds per acre, and farm field trials are being undertaken by CARDI. Other possible crops have variable and often untested potential. Sunflowers have not been grown or researched to a significant degree in the country. CARDI is presently testing varieties but diseases limit optimism about their potential. Sesame has a 50 percent oil content, but current yields are quite low. CARDI is testing varieties and many believe it has some potential, particularly among small farmers. There are 9,000 acres of coconut in Belize, but 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 necessary as a prerequisite to expanded coconut production.

Peanuts allow both mechanized and labor intensive cropping, and the production of peanuts for human consumption and processing into peanut butter has expanded in recent years. Production in 1982 was 400,000 pounds, mostly in the Cayo district.

Marketing has been a problem because demand by intermediaries has never been strong. A peanut processing plant was opened in 1983 near 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, and the potential for the production of oil.

There does seem to be potential for oilseed crop development and for the concomitant national goal of import substitution. Yet, before large investments are made in this crop, an accelerated national production research program is needed as is a continued analysis of processing, handling, pricing, and marketing issues. If an oilseed industry is to be launched, both internal and external funding should be sought.

An oilseed development task force could be organized to oversee an integrated approach to all aspects of oilseed development. It could bring experienced oilseeds personnel from the international research facilities to advise on procurement, processing, management, organization, utilization, and marketing of oilseed products. Furthermore, it could develop production technology packages for appropriate oilseed crops and farming systems, and it could accompany technological aid with economic and market analysis by extension specialists, CARDI researchers, and external oilseed specialists. In any event, an oilseed production specialist should be posted within the Ministry of Agriculture.

Citrus

The citrus industry is based on oranges and grapefruit. The smaller farms, however, predominate in the growing of grapefruit. Over 90 percent of the production is in the Stann Creek Valley where 360 growers farm about 12,000 acres. It is estimated that 250 growers (72 percent) have less than 10 acres each 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 almost US$ 12 million in 1986, an amount second only to sugar in agriculture export earnings and approximately 16 percent of total exports.

Recently, the Coca-Cola Company obtained control of 100,000 acres of land in the Hillbank Region; 50,000 of which are to be planted to orange trees. The soils in that region are of generally poor quality but offer good drainage and relatively high acidity; both necessary for the type of oranges which the company plans to produce.

According to the recent statistics (1987), total fruit production has increased steadily over the past decade as improved cultural practices, stimulated by higher grower prices, have had their effect. Production in 1985/86 totaled 1,915,000 boxes of which about two-thirds were oranges and one-third grapefruit. (See Table 6.)

Citrus concentrate is produced by two processors, each of which has extensive acreages of trees 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 prices with processors, issues grower licenses, and furnishes supplies and services to growers. The Citrus Control Board also establishes a yearly price formula which provides growers with price information in advance. Either processor currently has the capacity to utilize all fruit produced in the country, and the recent modernization of one plant will greatly improve its efficiency. This expansion, however, is in line with forecasted production increases for the near future.

A 1970 Commonwealth Development Corporation (CDC) assessment showed that 40 percent of orange and 52 percent of grapefruit growers had 50 percent or less of the optimum number of trees per acre. This understocking of trees was the primary factor associated with low yields at the time (less than 150 boxes per acre). Other problems contributing to reduced yields include weed infestations, low soil fertility, and a general lack of proper management procedures. Additionally, many of the smaller citrus groves are owned by people nearing retirement who are reluctant to make the needed investments or changes in cultural practices. The small grower with less than 20 acres is

in a difficult position since an efficient unit needs at least 25 to 30 acres to provide a reasonable income and economies of scale in equipment use.

While citrus is well adapted to the climatic conditions of the country, care must be taken in an analysis of the soils where the groves are to be located. 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.

The deterioration of the 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 the improvement and expansion of 8,000 acres. The program is funded by the CDC and is administered by the Development Finance Corporation (DFC). The rehabilitation work has already begun to increase production, although new land planted to citrus will not come into production until approximately 1990.

The marketing channels for citrus are highly integrated and concentrated with the two large processors buying roughly 90 percent of the citrus grown. The location of most production in the Stann Creek area keeps transportation costs low and current improvements in processing facilities have kept these costs competitive. Inefficiencies in the citrus industry appear to center on 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 the case of disputes. Price negotiations are based on a pricing plan known as the Ayuso formula. This formula incorporates costs of production, costs of processing, staffing and shipping expense, and total gross revenue to arrive at the producer price.

Optimism prevailed in the citrus industry beginning in 1984 when oranges were selling at more than US $ 6.0 per 90 pound box. Many believe that the present average production of 150 boxes per acre can reach 300-400 boxes under the citrus rehabilitation program. Markets in CARICOM and the U.S. are very favorable at present and are likely to remain favorable for several years.

The potential for growth in the citrus industry 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 for citrus concentrate to enter the U.S. free of quotas or tariffs. This program has a duration of 12-years and apparently guarantees Belize's processors a protected market in the U.S. even in the unlikely event that the Trinidad market should falter.

The market for citrus concentrate in the U.K. under the Lome II protectionary market agreements has slipped in past years because of the devaluation of the British pound against the Belizean dollar in the early 1980's and the emergence of the U.S. as a buyer under the CBI. However, it should be pointed out that the U.K. market under the Lome II agreements is a potential future safety valve for citrus exports. Unrealized market opportunities could also be tapped by promotional activities via a formal citrus marketing program.

Cost/return data indicate that even at a price of US $ 2.25 per pox of oranges and with a yield of 250 boxes per acre, a return to capital and labor of US $ 443 per acre is possible. Export prospects and long term investment in citrus look very favorable, but good judgment on the location of new groves, better application of technology, and good management will be essential.

In summary, the Citrus Growers' Association and the Ministry of Agriculture could 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 could work with individual farmers planning to rehabilitate or expand groves under the existing loan scheme. Although the availability of certified, high-quality nursery stock is limited,

the GOB could establish and maintain a certified, virus-free nursery program to provide stock to farmers for a fee.

Bananas

Belize's banana industry began in earnest in the early 1970's. Areas of commercial production are in the Stann Creek and Toledo districts where there are presently about 5,300 acres, of which 1,200 have recently been planted. The industry, which began as a mixed private and public operation, is now completely privatized. The Banana Control Board, which had assumed the management function for the industry, is now using its technical staff to assist the MOA in carrying out disease control activities for farmers, establish marketing contracts, and provide certain regulatory functions for the industry. Farm management, production and packing are carried out by the producers themselves.

Shipping and marketing are currently performed under contract by Fyffes Group Ltd., a subsidiary of United Brands. All production is shipped to the United Kingdom. Quality control is stringent with a 15-20 percent rejection rate overall. Management assistance to assure quality is provided to growers, but expanded extension and consulting help is still needed. The ten year contract with Fyffes can absorb up to 5 million boxes per year, and it is estimated that 8,000 acres under current production technologies will be necessary to reach this amount.

Both the production and the export value of bananas fluctuate considerably. Nevertheless, 1987 was a record year for this crop according to both indicators. In 1987, 1,165,000 boxes were shipped for an export value of US$ 7.56 million. The previous record had been 765,862 boxes in 1980, for an export value of US$ 3.5 million. Projections for 1988 are for 1,900,000 boxes to be shipped, at a higher price than the US$ 6.49 per box that growers received in 1987. Acreage planted is also expected to increase by 1,700 acres to reach a target of 5,000 acres.

For the Belizean banana industry to fully prosper, however, more attention will have to be paid to issues of productivity. Over the past decade, productivity, as measured by the number of boxes per acre, has averaged less than half the rates for surrounding countries. (1,000 boxes per acre, or more, in Honduras and Costa Rica compared to less than 500 boxes per acre in Belize.) The relatively secure ten year time horizon provided by the Fyffes contract in the face of buoyant prices, will most likely provide the Belizean banana industry with the necessary security to make the investments in technology required to improve yields.

Cacao

Cacao, (often referred to as cocoa in Belize) is indigenous to the country. It was cultivated by the early Maya, and with the exception of a few commercial farms, is now found only in semi-wild stands in Toledo, Stann Creek and Cayo districts on about 3,000 acres. Since 1978, the Hershey Foods Corporation, through an agreement with the Belizean government, has stimulated interest in expanded cacao production. An 800 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 area farmers.

The GOB has recently initiated activites to increase cacao production. The Accelerated Cocoa Development Project, partly funded by USAID, proposes to have 600 acres planted by 60 farms 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 percent of the crop. The balance will be produced by 650 farmers with less than 15 acres each. By the next decade the development scheme will include a total of 8,500 acres producing 7 million pounds annually for a value of US $ 6.1 million. At least in terms of the Toledo district, the marketing and processing of the cacao crop will be assisted through the implementation of the Toledo Agricultural Marketing Project, also funded in part by USAID and scheduled for implementation in mid-1988.

Changes in the world cacao supply, (Africa has shown a sharp decrease in output) pro-

vide an opportunity to add cacao to those crops such as bananas and citrus which provide export earnings, diversification away from traditional crops, and employment in agriculture.

Land is available from the government at a reasonable cost for increased cacao development, and the Hershey technology and market could be made available to all producers through the GOB extension service. Although cacao plantations are a long term investment, returns to both capital and labor can be attractive under good management. Estimates of 800 pounds per acre at the 1984 Hershey guaranteed price of US $0.90 per pound would give a net return of US $ 468 per acre over operating costs. If prices drop to US $ 0.50 per pound, the lowest in the past 5 years, net income would then drop to US $ 248 per acre.

Experience to date indicates a direct cost of almost US $ 1,500 to establish an acre of cacao through the fourth year when the new trees begin to bear fruit. Yearly operational costs of approximately US $ 600 per acre should be expected to be incurred thereafter. Using sensitivity analysis, the break even equilibrium point five years after planting appears to be a yield of 800 pounds per acre at a price of US $ .70 per pound. Actual yields are expected to be between 800 and 1,000 pounds per acre, and prices over the past five years have ranged between US $ .50 and US $ 1.00 per pound. If prices hold above US $ .70 per pound and yields of over 800 pounds per acre can be achieved, cacao production appears to be a viable opportunity.

While expanded cacao production appears to be a potential option for increased income from agriculture, its relatively high per acre entry costs and technological requirements will most likely preclude the majority of small and medium farmers from taking advantage of it unless credit and technical assistance are made available. This is presently being contemplated by both the DFC and the Extension Service although funds to carry this out are lacking.

Other Crops

Coconuts were perhaps the first plantation crop in Belize and were 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 with the goals of improving the productivity of existing trees and providing high-yielding, disease-resistant, and 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 to date has been very limited. It is primarily grown as a backyard crop for home consumption. Trade statistics show the importation of 200,000 pounds of processed coffee in 1980. By assisting in providing improved nursery stock, the Ministry of Agriculture plans to stimulate the emergence of a small industry in the hope of substituting for these imports. Nevertheless, technical information packages are lacking which could stimulate the production of this crop.

A wide range of tropical fruits are also grown. With the exception of citrus and bananas, and the special case of mangoes, most fruit is grown on a small scale for home consumption, although some surplus production enters local markets. Propagation material for some of these fruit trees is provided by the Ministry. 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, also primarily for home consumption. Individual farmers in Belize and Cayo districts make a business of providing vegetables to urban markets. These markets are generally not well organized and cold storage and other 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.

For the past two years, the Ministry of Agriculture in conjunction with USAID, has been implementing an agricultural diversification project directed towards the identification of alternative crops and their markets (the Commercialization of Alternative Crops Project). While this project mainly seeks to provide alternatives to the growing of sugar cane (primarily winter vegetables for the U.S. market), it is envisioned that once the technologies are proven and the marketing channels established, the spread effects from these activities will be much greater.

CARDI is performing some research on white potatoes, onions, cabbage and tomatoes. However, there are many technical problems in vegetable production—varieties, diseases, insects, fertility, weed control and proper handling. The quality of vegetables, especially at certain marketing periods, is crucial. There seem to be some opportunities for processing locally grown vegetables to supply the domestic market and to substitute for imports. It is imperative that this processed food be of high quality, skillfully merchandized, and competitively priced to attract consumers. Belize's vegetable producers (both home and commercial growers) should be provided with much needed technical and market information on vegetable production. Lacking this, commercial vegetable production does not appear to have a strong potential.

An additional constraint to developing vegetable enterprises is the unpredictable domestic market which regularly presents gluts followed by shortages. Growers need better marketing channels, wholesale and retail price information, processing facilities, and improved storage facilities for fresh produce.

For three centuries the economy of Belize relied on the exploitation of its forests. During this time, forestry was virtually the only economic reason for the existence of the British colony in Central America. As recently as 1955, more than 60 percent of the nation's export revenues were derived from forest products. By 1968 this figure had declined to 5 percent, 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 percent of the estimated volume is mahogany or cedar and 3 percent is pine; the remainder is composed of other "secondary" hardwoods. Mahogany was, and still is, the principal species for export. Other species have potential value but are found in very heterogeneous stands. No one species dominates, and the selective cutting of the more valuable species is difficult

About 1.6 million acres, or two-thirds, of Belize's forest land is now held in reserves. In the past, the Forestry Department of the Ministry of Agriculture has primarily emphasized timber development on these lands. Some reserve lands, however, especially those of the Cockscomb Basin, are under pressure for agricultural use and a comprehensive national land use plan for the future of these lands is needed. The private sector owns an additional one-third of the forest land, some of which contains the best remaining stands of mahogany.

While data are difficult to obtain, estimates of 50 million cubic feet of annual lumber output of commercial species seem reasonable. This compares to the present harvest of less than 1.8 million cubic feet annually. Deforestation is not yet a serious problem, but in the long term, both silvicultural and human managerial skills will need to be strengthened in this area. Only in this manner can Belize be assured of a viable forest resource over time.

The public resources devoted to forestry are very limited (5 permanent forest officers and three technicians with degree training). There is clearly a need for more trained silviculturalists and forest products specialists. A few private firms in forestry do have technical and managerial expertise, but many smaller firms are needed for a prosperous industry.

There are very few wood-based industries to provide a demand for forest products, although potentially good markets exist for

export products. Additionally, another factor inhibiting the development of forestry resources are the considerable number of small and inefficient lumber mills operating in the country.

The development of a paper products industry would require a large-scale operation in order to be economically viable. Belize's small domestic demand for these products, plus strong competition in the regional paper products market, does not currently justify this alternative.

A final limitation on forestry development is a lack of forest planning. The GOB and the Ministry of Agriculture 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. In exchange, firms interested in the exploitation of forestry resources must be guaranteed protection against encroachment by outsiders, especially for agricultural purposes, if any meaningful long term management activities are to take place.

An indigenous livestock industry began about 1950 and Belizean diets now include a variety of animal products. The large amount of arable land has provided one incentive for the cattle industry. Swine and poultry for home consumption are major items in the diets of rural peoples.

The sector consists of the input supply industry, beef, swine, dairy and poultry production industries, packing and processing firms, and marketing and retail firms. It operates predominantly in a free market setting with relatively little government intervention, especially since retail meat prices were recently deregulated.

In the aggregate, the livestock sector fails to supply sufficient quantities to meet domestic demand, and the country is a net importer of animal products. The swine industry produces less than one-third of the 15 pounds of annual per capita pork consumption. Likewise, Belize is an importer of dairy products producing only 5 percent of annual consumption. Nearly all poultry consumed is produced by the domestic industry, and the consumption of poultry and eggs has increased rapidly in recent years. The sector is a net exporter of beef products while providing consumers with 18 pounds per capita of these products annually.

Growth in the livestock sector has been mixed over the past decade. From 1978 to 1985, pork production declined 17 percent and beef production declined 11 percent. Broiler and milk production on the other hand, increased 84 and 20 percent respectively over the same period.

The increased broiler and egg production is from the Mennonite communities. These small enclaves use integrated production systems, closely coordinating the growing of grains, the processing of feeds, the raising and processing of poultry, and the commercialization of the final products.

The vast majority of animal feed concentrates are imported through the two Mennonite feed mills. This is then combined with local products, mostly corn at present, for formulation into poultry, swine and cattle rations. These two mills dominate the country's feed supply system. They sell to community members and to the general public as well.

The marketing of animal products is characterized by direct sales from producers to packers or processors. In the case of beef, most sales are made to four packing/processing firms. One beef packing/processing firm (Belize Meats, Ltd.) meets U.S. Department of Agriculture requirements and can export meat to the U.S. and Caribbean countries. A small portion of beef sales is made to butchers. Likewise, hogs are sold directly to packers, processors and butchers. The little locally produced milk which is sold does not enter the formal marketing system, although a small cooperative dairy has recently been established and has begun to sell its products at retail outlets. The broiler and egg processing plants are owned by the Mennonite communities. For the most part, these plants purchase birds and eggs from

their members and sell the products directly to retail outlets.

Average costs of production for hogs, and beef and dairy cattle vary greatly depending on scale and level of technology applied. Nevertheless, several conclusions can be drawn from the available data. It appears that average costs of production for hogs and dairy cattle are near market prices, while those for beef cattle are above. Few economic incentives exist that would cause a dramatic expansion of the livestock sector. In order for expansion to happen, substantial product price increases or productivity gains would have to occur. The key elements to these gains appear to be: a) lower feed costs and/or improved feed conversion rates for hogs; b) improved breeding and nutrition practices for dairy cattle; and, c) improved pasture carrying capacity and calving rates for beef cattle.

Imported concentrates and premixes from the U.S. dominate the feed supplement market. In 1985, the country imported nearly 12 million pounds of feed supplements, and these imports have been increasing. The feed mixing and distribution network is primarily in the hands of a very small number of commercial entities, and there is little competition within the feed supply network. However, there is little economic justification for encouraging the operation of more conventional large-scale feed mills due to the small size of the feed supply market.

Livestock producers face relatively high feed prices and have strong incentives to use lower cost feed sources such as local by-products. The country has quantities of these potentially available by-products that have demonstrated feeding value. Some of the more promising are dried cacao pods, citrus pulp, poultry offals, spent brewer's grains, and reject bananas. These by-products have been used successfully in feeding trials, and in many cases can be obtained at little cost. However, their availability tends to be seasonal, storage is sometimes difficult, and most must be processed or dried to make them usable in commercial feed. Capital investments in storage, processing, and transportation systems would further hinder their adoption, as does the small size of the potential market.

Several constraints to the development of the livestock sector have been identified including the small size of the local demand for animal products, high transportation costs for imported inputs, and an apparent lack of competition in the feed supply industry, poor infrastructure, and a shortage of short term production credit. However, the most important constraint to the sector lies with marketing. Currently there is a lack of a central assembly/collection point where producers can bring their animals. The result is an efficient procurement system, requiring each buyer to search for animals and each seller to make a sale with little price information. In addition, no grading system is used which makes the establishment of price difficult, and provides a disincentive to the provision of quality animals.

An overview of livestock production in Belize was prepared in October, 1984. On the basis of this overview, USAID initiated the Livestock Development Project with emphasis on dairy production and marketing, swine improvement, livestock forage improvement, processing facilities, a biological residue laboratory, and a strengthened Ministry of Agriculture capability for agricultural policy analysis. This project is now nearing completion and has made several important contributions to the sector. A recent project evaluation states that, "Technical assistance to meat slaughtering and processing enterprises has called attention to import substitution potential for meat products and has stimulated an expansion of the industry and of the variety of products produced." The evaluation goes on to comment that the swine component has stimulated producer interest in establishing swine enterprises. Nevertheless, it appears that the accomplishments of the pasture component have been limited, although a second phase to this project is due to begin shortly. Building on the experiences gained in the first phase, it will concentrate on the marketing of animal products, short term production credit, pasture improvement on farmer plots and animal health.

Introduction

The fishing industry is a significant sector of the economy of Belize, contributing substantially to the foreign exchange of the country, providing employment for a large number of people, and providing food for local consumption. The commercial saltwater fishery takes place mostly inside the barrier reef around Glovers, Turneffe and Lighthouse reefs. The most valuable fishery is for the spiny lobster, others of importance are those for conch, shrimp, and scalefish. The sport fishery is a growing segment of the industry, with promising potential.

Administration of the fisheries sector is under the Ministry of Agriculture. The Department of Fisheries is responsible for the supervision and development of the industry, through a small Fishery Unit in Belize City.

The fishing industry is in a critical period. This is the result of growing pressure on the stocks by an increasing number of fishermen and through past neglect by the government. The resolution of its problems will require the GOB to make several hard and unpopular decisions in the near future. At the same time, however, there are hopeful signs in some segments of the industry, especially that of shrimp culture.

Lobster

This is by far the most valuable fishery of Belize. The product is in high demand in the U.S. and elsewhere, and commands a high price. As a consequence, nearly the entire annual catch is exported although by law five percent must be sold domestically. Recent data show that the fishery produced a nearly steady yield of approximately 400,000 to 500,000 pounds through 1980; in 1981 the catch increased sharply to 750,000 pounds; held steadily at around 650,000 pounds through 1985; and in 1986 fell to 515,000 pounds.

This record of fairly stable production does not reflect the status of the lobster stocks since a decreasing average size of animal and a decreasing catch per unit of fishing effort strongly suggest that overfishing is taking place. For example, the catch per fisherman fell from 954 pounds in 1965/66 to 386 pounds in 1985/86. It is thought that this is probably a consequence of overfishing and of losses due to keeping animals of too small a size.

In this case, the problem does not appear to lie with government policy and regulations, but rather with their lack of enforcement. In this regard, it is felt that both the annual quota and the current closed season are adequate given the data available—but they are not being enforced. If this problem, which concerns all of the country's fisheries as well, is not addressed soon, Belize could risk loosing one of its major resources.

Conch

The conch fishery rose from an item of essentially no commercial value as recently as 1960, to the second rank as a commercial fishery in the 1970's. Nevertheless, a steady decline in catches in recent years has put the value of this fishery behind that for shrimp and scalefish.

Conch are caught in the shallows by skin divers using forked sticks. Most are exported, but 10 percent of the yearly catch must by law be sold domestically. The conch fishery is being seriously overfished, and is in danger of significant damage to stocks. Data on conch landings demonstrate a precipitous decline from exports of 1,240,000 pounds in 1972 to 232,000 in 1986. What this clearly shows is that stocks are being overexploited, and that the fishery is being rapidly decimated. As in the case with lobster, current laws and regulations governing the conch harvest would go a long way toward protecting this resource from destruction, but these rules are being ignored. Foreign fishermen in the south of the country are fishing during closed seasons and are taking undersized conch at all times of the year. Moreover, Belizean fishermen take very large quantities of undersized animals which they sell to hotels and other buyers. These yield no revenue from export sales or income taxes, and give fishermen less return for their effort because of the lesser price paid for small animals.

Shrimp

A rapid rise in shrimp production, mostly by trawlers, has vaulted this fishery to the number two rank after that for lobster. In 1986, 236,000 pounds of shrimp were exported for a value of US $ 1,180,000. Several shrimp farms are scheduled to begin production during 1987 which will increase the importance of this commodity. Most of the shrimp harvest is exported to the U.S. and Jamaica.

Interest in shrimp farming is strong, and its development is a high priority of the government. Some expert opinion states that potential shrimp farm sites in the country are better than any on the Caribbean islands, rating about 7 on a scale of 1 to 10. Two substantial investments have been made in the industry to establish commercial projects under well qualified managerial and technical personnel. These are capable of supplying post-larval shrimp to stock ponds, and of producing shrimp of marketable size. The GOB has announced plans to establish and staff a shrimp aquaculture section in the Fisheries Unit to provide expert advice to shrimp farmers. This will require that the staff be augmented and trained, since the Unit is presently incapable of carrying out this task.

Scalefish (Finfish)

The fishery for scalefish in Belize is growing. Exports of all fish in 1986 amounted to about 379,000 pounds, valued at US $ 563,000. Of this, frozen fillets accounted for 18 percent of the poundage exported, while 82 percent was exported as whole fish. There is also a small catch of fish from the shallows inside the reef for local sale and personal consumption. In addition to groupers and snappers, other species are caught, including porgies, sharks, jacks, grunts and many others. While data are sparse on which to base a judgment, it is likely that the fish stocks inside the reef are for the most part fully exploited.

Fisheries Administration

Because of its multiple activities and responsibilities—as a food producing unit, as a protector of valuable natural resources, as a regulator of marketing and trading, and with cooperative and health duties—the Fisheries Unit has a long history of shifts among GOB agencies and ministries. These shifts have not contributed to the stability of the Unit, nor to its effectiveness.

The manpower and other resources of the Fisheries Unit are far below those necessary for it to carry out the many responsibilities in its charge. The laboratory and office building are seriously run down and the laboratory is largely unused due to a lack of adequate resources over many years. Likewise, most of the Unit's equipment (ie., boats, motors, docks, etc.) is inoperative, or in a state of poor repair.

It is clear that the GOB has allowed the Fishery Unit to deteriorate to a point where its manpower and other resources are far below those necessary for it to fulfill even the barest minimum of routine tasks, let alone perform services which will protect, expand and strengthen the fishing sector.

The need to revive the Fishery Unit is far and away the most critical priority of the GOB in relation to fisheries. The effectiveness of all other actions in this sector depend heavily on this one, since without it the execution of policies and decisions concerning the safeguarding and expansion of the fisheries will be lost.

Assistance to the fisheries sector should include an integrated approach dealing with several constraints. Support should be given to rebuilding the Fisheries Unit and to the training of its staff. A credit program needs to be established to allow fishermen access to financial mechanisms to increase their productivity. Lastly, research needs to be undertaken to asses the potential for the deep water fishing of scalefish, which is currently unknown.

Agricultural Inputs

Providing adequate inputs in a timely manner at competitive prices is a function crucial to the development of agriculture in Belize. Feeds, seeds, agricultural chemicals, fuel, and equipment are the main inputs, most of which are imported. The challenge is

not only to secure and distribute inputs but also to assure that costs are within the margins that producers need in order to be profitable.

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

Livestock protein supplements are principally imported by the two Mennonite mills, mainly for the feeding of poultry (nearly 12 million pounds in 1985). Imports of protein supplements for cattle and swine feed had been increasing until several years ago when government controlled beef prices limited profit margins on beef cattle production to the point where supplemental feeding became uneconomic. When these controls were relaxed recently, imports of feed supplements began to rise again.

Imported farm machinery is handled by four dealers. Sales of new equipment are quite variable. In 1984 none of the dealers had sold a new tractor in three years, although this trend seems to have been reversed more recently. Much used equipment is imported from the U.S. and Canada, particularly by the Mennonite communities.

Some farm input supply stores have recently appeared in rural areas. The availability of supplies has been a particular problem in the Toledo area, where the GOB has had to provide some inputs not available through private channels. One firm serves the fertilizer needs of the entire country under a concessionary agreement with the government. This plant operates at only 25 percent of capacity, however, and there is some concern about the prices being charged for this input by a single firm controlling the country's entire supply.

Agricultural chemicals imported in 1983 (800,000 pounds) were valued at US $ .95 million. Three firms handle most of these chemicals, often distributing them through growers' associations for sugar cane, citrus, and banana production. No current governmental regulations exist on either sales or the application of agro-chemicals, although legislation is currently being drafted.

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

In general, the supply of agricultural inputs has the following drawbacks: a lack of adequate quantities at needed locations; insufficient and inefficient usage; low quality seed and chemicals; and, high prices due to a lack of competition, poor distribution, and the fact that most are imported. The government has played a major role in attempting to deliver necessary inputs to farmers, but by and large this system has not functioned efficiently.

[illegible] Credit

The rural financial market in Belize includes four privately owned banks, the government-owned Development Finance Corporation (DFC), and some credit unions. The commercial banks, plus the DFC, provide most of the farm credit, although 8 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.

Formal lenders emphasize secure and tangible loan collateral. Transaction costs for both lender and borrower are high. Loan recovery programs 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, as in most developing countries. Substantial remittances from Belizeans living abroad provide another 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 US $ 7 million for agriculture in 1985. These banks allocate about 25-30 percent of their loans for agricultural purposes, although recent estimates place this figure much lower. The DFC, the principal source of agricultural credit, disbursed about US $ 9.5 million in new loans in 1985. DFC funds come from external sources and several programs are targeted for specific agricultural projects. Current loan rates are 8 to 12 percent compared to the commercial banks' 16 to 18 percent for agricultural credit. Demand for the attractive loan rates of the DFC is greater than the supply of funds.

Commercial banks provide almost no loans to small farmers and the DFC reaches only a minority of rural borrowers. Three-fourths of the loans made by the DFC in 1983 were for US $25,000 or more, some to small farmer's groups. Estimates are that about 40 percent of farmers have access to formal credit, a relatively high proportion in relation to other developing countries. This figure would seem to indicate that there is currently sufficient liquidity in the agricultural credit system although this is misleading since allocation problems and the DFC's lack of funds for production credit are commonly cited as bottlenecks to the system.

Agricultural Marketing

Belize's agricultural products flow from farm to consumer (domestic or foreign) through a market system which varies in adequacy and efficiency. Domestic production and imports furnish the supply of products marketed and distributed in the country. A sizeable portion of the staple products consumed, 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.

Agriculture faces a limited domestic market as a result of limited human and livestock populations. The human demand for domestically produced and processed foods has also been limited by the low income levels of a large portion of the society, as well as by the acquired tastes and preferences of many urban consumers for imported goods. In the latter case, these goods are often priced lower than domestic goods, are regularly advertised, and are of higher quality.

Export demand has also been limited for most domestic products because of high production costs which result in high product prices relative to those from competing countries, lower quality, unreliable supply, and a currency tied to the U.S. dollar which has risen in value during the 1980's. This situation has meant that agricultural exports have depended on protected and concessionary markets for such items as citrus, bananas, sugar, and beef. These protected markets include the Caribbean Common Market (CARICOM), U.S. preferential trade agreements, and the Lome II Agreement with the U.K. All these offer protection or exemption from tariffs for processed foods and limited amounts of fresh and live produce as well. As a result, few Belizean products are able to compete with those of other exporting countries in unprotected markets.

Collection and storage functions are now principally provided by the private sector, although the Belize Marketing Board (BMB), a quasi governmental body, does purchase rice in Toledo district. A number of channels are used and the degree of organizational market structure varies considerably. Assembly markets for agricultural products tend to be better organized on the average than food distribution markets. Even in major population centers the wholesale markets are poorly organized. On the other hand, retail outlets in larger towns are fairly well organized and stocked, although mostly with imported items.

The transportation of products from farmer to buyer is largely by truck. Although vehicles appear adequate in quantity and quality, the transportation system is hampered by poor roads, especially in certain times of the year and in certain parts of the country. Costs vary depending on commodity and location.

Only minimal amounts of processing of agricultural commodities occur except in the case of citrus, sugar cane, cacao and

rice. These industries have a relatively high level of technology and tend to be cost effective in processing. Some processing for import substitution purposes has also 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. One fluid milk packaging cooperative is also in operation. There are several livestock slaughtering facilities, and two relatively large and efficient poultry processing plants as well.

Agricultural products are priced in a number of ways. The competitive market structure in which buyers and sellers bargain on prices ranges from moderately competitive to strongly dominated by a few participants 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. Exceptions to this may be citrus, bananas and sugar, which have relatively strong producer bargaining associations or have been operated largely under government influence.

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 poorly monitored and enforced.

The potential for growth and efficiency of the agricultural marketing system will depend on the ability to resolve the following constraints:

The generally poor condition of the road system delays or prevents movement of agricultural products in a timely manner. Many marketing problems in rural areas can be tied to problems of transportation. This situation affects perishable goods the hardest.

Strong competition in world markets exists for almost every commodity produced. Currently there are very few agricultural products that can move into the world market without some concessionary protection.

Lack of market regulations and/or monitoring of non-competitive pricing practices, unfair trading activities, unequal access to markets, and deceptive buying and selling affects most agricultural producers in the country's relatively small and fragile economy.

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.

Marketing and other control boards are not reaching their full potential as tools of market stability and competition. Instead they are often constrained by unclear and confusing operational guidelines, inadequate databases for analytical work and decisions, limited staff, political influence, and conflicts of interest.

The level of technical skills needed to solve day-to-day problems of storage, handling, processing, and the merchandising of agricultural products is often lacking. This constraint manifests itself throughout the agricultural sector and results in lower quality products at higher prices.

Food processing capacity is limited. Processors are not generally large enough to produce efficiently, nor technically advanced enough to provide a high quality product.

The lack of central markets and assembly points for livestock raises assembly costs, reduces the bargaining position of sellers, makes monitoring of the marketing process difficult, and reduces the level of market information available to producers.

Public Sector Support for Agriculture

The GOB supports the agricultural sector in several ways. Three of its major components are analyzed here: policy making,

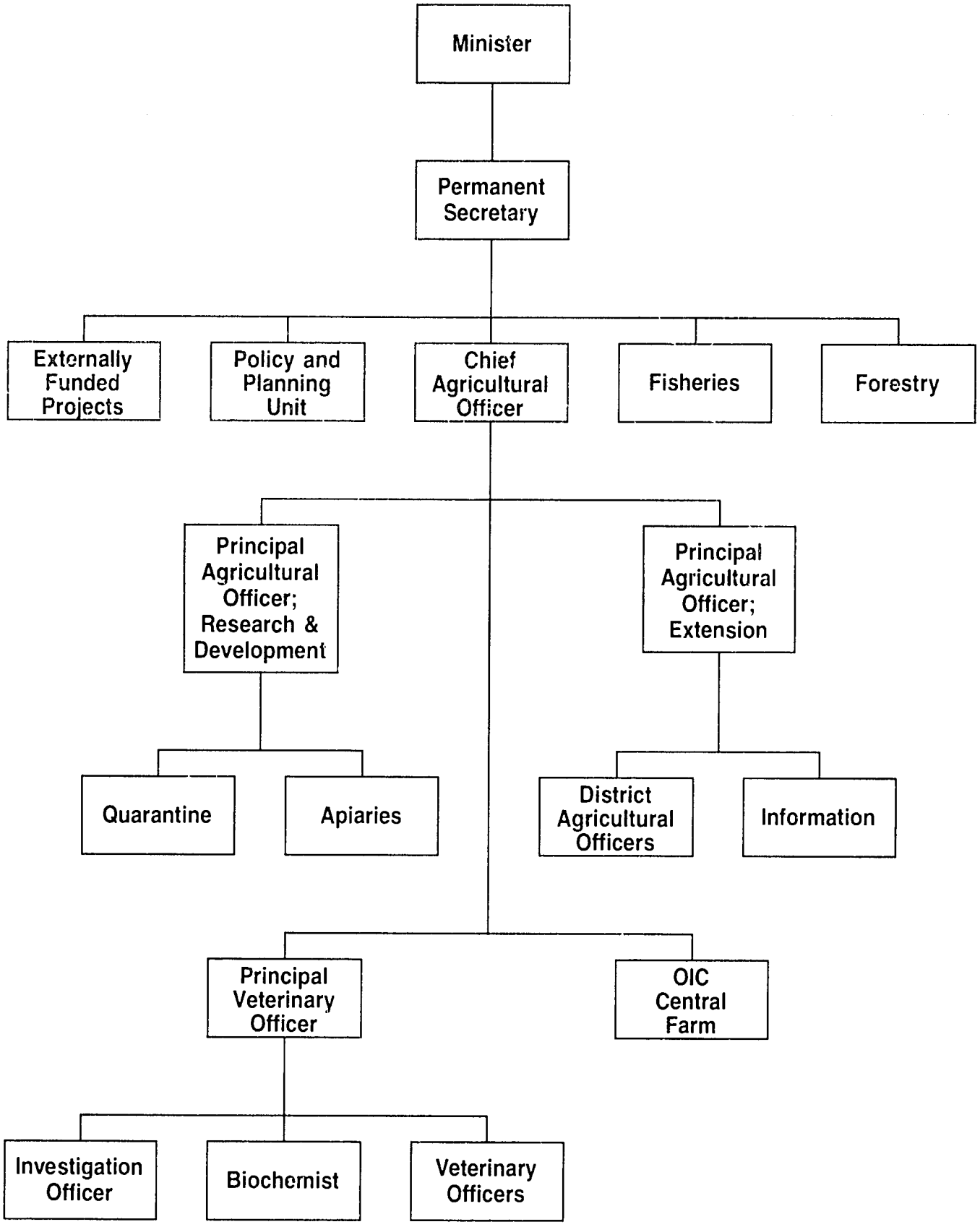


FIGURE 1
ORGANIZATIONAL CHART,
MINISTRY OF AGRICULTURE, 1987

planning and information services; agricultural research; agricultural extension; and agricultural services.

Policy Making, Planning and Information Services

The GOB functions through its several ministries. The Ministry of Agriculture 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 the Ministry of Agriculture functions are performed by staff units as well as government boards (Marketing, Banana Control, and Citrus Control) and through such projects as Accelerated Cocoa Development, Livestock Development, Commercialization of Alternative Crops, and others. The organizational structure of the Ministry is illustrated in Figure 1.

The ability of the Ministry of Agriculture to develop policies and plan its activities has recently been strengthened through the Livestock Development Project funded by USAID. In addition to other activities, this project has provided a long term technical advisor to the Ministry's Economic Policy and Planning Unit, and graduate training for two of its staff members.

Finally, the data base and framework of analysis for planning and policy making in agriculture are inadequate. Best judgments 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 Ministry of Agriculture and elsewhere in government are often presented in the form of objectives and targets, but planners lack the information and financial resources to effectively implement them.

Agricultural Research and Extension

Research and extension, 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.

Staffing continues to be the major problem in research and extension. Under the new ministerial reorganization, which took agriculture out of the Natural Resources Ministry the Ministry of Agriculture has nine posts in its research program. Only 4.9 full-time equivalents (FTE) of these are actually devoted to research, however, and two positions within the unit are nearly full time administrative jobs. There are 2.1 FTE researchers assigned to teaching or special projects. These levels are inadequate.

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

In the service area (veterinarian, animal health, quarantine, livestock, apiaries, etc.) there are 29 posts listed and 23.8 FTE filled positions. Commodity groups support research and extension work in sugar, and to some degree in citrus, bananas and cacao. A total of 16 FTE are provided by these commodity groups. Regional organizations provide three people: two in CARDI, and one in CARICOM.

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 out a full-fledged program with an already limited staff. There are now six to eight externally funded agricultural development projects with ex-patriot staff that call for counterparts from the Ministry. Major projects of this type are Citrus Rehabilitation, Accelerated Cocoa Development, Commercialization of Alternative Crops, Livestock Development, and Coconut Rehabilitation. Nearly all of these projects specify the requirement for part, or full time counterparts, but seldom can new staff be added to meet this requirement. The result is that ongoing research, extension

and service programs, already understaffed, must be stretched to accommodate counterpart requirements.

The extent of this problem is widespread. For example, in 1984, while 61.8 FTE of 89 listed posts were operational 10 FTE of these were away in training and 7.2 FTE were assigned to counterpart work. As a result, foreign advisors often work without an effective counterpart relationship.

Several other organizational problems have been identified within the structure of the Ministry. Key research and extension functions are not always headed by Principal Officers. Additionally, and until recently, there has been a lack of an organizational hierarchy with clearly-specified duties and reporting channels, and with many duties being "shared". Assistance in correcting this situation has been provided to the Ministry through advisors provided by the Commercialization of Alternative Crops Project financed by USAID. The attached organizational chart for the Ministry portrays the newly designed functional relationships.

One of the major deterrents to the long range improvement of research and extension efforts is the traditional civil service system. This system may serve the general public services system 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 concentrated 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.

Current agricultural research work is primarily in the areas of agronomic or livestock production in response to short run issues concerning cropping practices and livestock husbandry. Three principal research efforts currently exist: the Ministry of Agriculture, with activities located at Central Farm; CARDI's regional program of research and development, principally in oilseeds; and the Commercialization of Alternative Crops Project. The Toledo Research and Development Project (TRDP), a U.K.-funded program which looked into paddy and upland rice production systems for small farmers, recently concluded a five-year effort. Research in sugar cane is also performed by Belize Sugar Industries, a quasi-governmental body.

More recently, Hershey has begun research on cacao, and research on rice and livestock is a part of CARICOM's activities. In view of the number and heterogeneity of the country's agricultural problems, present research is less than adequate. Local researchers also need more regular contact with agricultural researchers outside of the country. There is very little economic or farm management research, and there is also a decided lack of training for Ministry staff in these areas. More advantage can be taken of regional research through improved linkages with CATIE, CARDI, CIMMYT and other institutions and universities.

In 1981, Belize was included in the USAID-sponsored Caribbean Agricultural Extension Project (CAEP) which promoted the development of a national extension improvement plan. By 1985, most of the goals of that plan had been, or were in the process of being, implemented. This project separated extension education from regulatory service functions; decentralized extension work and placed extension officers in each zone; provided transport; and trained staff in programming, job expectations, performance appraisal and supervision. The extension service is now in a position to greatly expand its field activities and its impact on agricultural productivity. One of the project's more recent accomplishments included the promotion of a national Extension Advisory Council which will coordinate overall extension activity for the country. Nevertheless, outside support will be essential to continued progress in these areas.

Agricultural Services

The GOB provision of agricultural services includes the Meat Inspection Service, the Veterinary and Animal Health Service, the Mechanical Services Division, the Quarantine and Inspection Service, and the Apiary Inspection Service. There are a total of 29

posts (24 of which are currently filled) in connection with these services.

One area currently missing from the list of government support services is pesticide control and applicator training. While a Pesticide Control Board has recently been legally established, its implementation has been slow and funding sources are in doubt.

It appears that the Mechanical Services Division falls short of fulfilling its goals. These services might better be performed by the private sector, which the GOB is currently considering. The Apiary Service seems to provide more of an education than a service function. Because of the development potential for more increased honey production, it deserves greater attention and needs to be incorporated into the Extension Service.

II. Major Limitations, Constraints and Opportunities to Agricultural Development

For the purposes of this presentation the discussion will be divided between 'higher order' and 'program level' considerations. The former are not generally thought to be within the capability of a government or a foreign assistance donor to resolve but must be taken into account in all project designs. The latter provide the basis for the specific development assistance recommendations in Section III.

The agricultural sector of Belize does not function in isolation to the rest of the national economy; rather it is a critical component of it. A series of interrelated limitations and constraints has impacted not only on this sector but also on the economy as a whole. Some of these are the cause of internal structural conditions, while others have their basis in historical and contemporary external influences. These constraints, many of which would be very difficult to alter, must be understood and taken into consideration if agriculture is to have any hope of achieving its development goals. These "higher order," or "generic," constraints are:

- The size of the country which often negates any attempts at achieving economies of scale;
- The lack of a competitive advantage for most agricultural commodities due to relatively high labor and other production costs, as well as a currency tied to the U.S. dollar;
- A man/land ratio which on the surface appears to be quite favorable, but in reality is often not beneficial due to much of the land being remote and isolated, of marginal quality and more appropriately left in forest preserves; and,
- A highly mobile population, with goals and aspirations similar to those in developed countries.

On the positive side of the equation, however, Belize does benefit from several factors which have the potential to support agricultural development. These are:

- A stable and democratic political environment which has the tendency to promote investment and to encourage ties to Belize's external markets;
- The country's location and proximity to its principal market, the U.S.; and
- The concessionary markets to which Belize has access including the Lome Convention with the U.K., the U.S. Preferential Sugar Treaty, CARICOM, and most recently the Caribbean Basin Initiative (CBI) legislation.

Scale of Operations:

As was described in the previous section, Belize is the smallest country in Central America and one of the smallest in the Caribbean as well. Exacerbating this smallness is the fact that Belize is only symbolically integrated into the common market structures of either region with which it is geographically linked (the Central American Common Market and the Caribbean Common Market).

This smallness is a constraint on the economy in that it does not allow the country to take advantage of economies of scale which increase production efficiencies and lower overall costs. The impact of this can be seen on both the supply and demand sides of the economy. On the supply side, the domestic market for locally produced commodities is quite limited. This often raises per unit production costs to the point where they cannot compete with imported goods, be they from the U.S. or Belize's surrounding neighbors. Import substitution activities are therefore often limited by these constraints. Additionally, this smallness has the tendency to allow for only one, or a few, producers or processors of any one commodity (for example, matches and beer each having only one producer, and chicken, eggs, and bottled milk having only a few). While this reduced number of producers or processors allows for a maximization of whatever economies of scale are available within the reduced market, the inherent lack of competition which this implies can lead to monopolistic positions which promote market domination, inferior quality products and higher than necessary prices to consumers.

On the demand side, similar symptoms are manifested. In the case of agriculture, most inputs, i.e., seed, fertilizer and agrochemicals, must be imported but often in uneconomic quantities. This frequently leads to their being the wrong kind, of low or deteriorated quality, or late in arrival. These factors necessarily lead to other inefficiencies which also raise production costs. Additionally, the relatively few suppliers of agricultural inputs (one, in the case of fertilizer, until recently) face a non-competitive market environment.

Competitive Advantage:

Given the limited domestic market discussed above, Belize will have to depend on its exports to promote agricultural development. Nevertheless, there are few, if any, agricultural commodities for which Belize holds a competitive advantage. While the reasons for this begin with the smallness issue discussed above, there are others such as high wage rates and a currency tied to the U.S. dollar which contribute to the problem. Minimum agricultural wage rates, which tend to set other wage and salary rates throughout the sector, exist in most countries and Belize is no exception. However, Belize's rate is two to three times higher than those in the surrounding countries of Central America. Additionally, while the minimum wages in the surrounding countries are largely unenforced, it appears that this is not the case in Belize where compliance is thought to be relatively widespread. Belizean agricultural workers also appear to have relatively greater freedom in accepting or rejecting work opportunities which do not remunerate them at the levels which they have come to expect. This further results in local products not being competitive.

External monetary forces also contribute to the uncompetitive nature of Belizean agriculture. Since the Belizean dollar is tied to the U.S. dollar, incentives for both its exports and imports are linked to the overall rise and fall of the U.S. currency. For example, during the early 1970's, when the value of the U.S. dollar was relatively low, both the U.S. and Belize found it relatively easy to export while at the same time imports were relatively expensive. This changed dramatically by the late 1970's as the value of the U.S. dollar appreciated, causing imports to increase while exports languished. As long as the U.S. dollar remains strong, and the Belizean dollar is tied to it, the country's export markets will remain limited and local producers and processors will face strong competition from imported goods. Unless the country moves to increased protection via tariffs, quotas or export subsides, or devalues its currency, its producers and processors will remain at a cost disadvantage

relative to its counterparts in other competing countries.

The Man/Land Ratio:

Most discussions of Belizean agriculture point out its vast amounts of land relative to its population, and indeed on the surface the statistics are compelling. Nevertheless, this analysis is misleading without considering the overall quality of the land its remoteness, and the financial investments which are required to bring it into production. Much of the coastal land is susceptible to flooding from both sea and fresh water. Further inland, large portions of the land are classified as Pine Ridge soils, which are highly acidic and inappropriate for most crops.

In the south, much of the land is mountainous and easily eroded once the vegetative cover is removed. Additionally, the good land is often covered with dense tropical growth which requires substantial capital investment to clear and prepare. These areas of good land are also often far from roads and other means of communication further adding to farmers' costs of production.

No doubt Belize has large amounts of land appropriate for agriculture which are not currently being used. Nevertheless, the quantities of good agricultural land are finite and the country's population is growing at a rapid rate. While the alarming land constraint faced by many countries is currently not present in Belize, it does exist in the sense of lack of knowledge about the "best use" alternatives which will be necessary if the country is to use its resources wisely in promoting sustained long-term development.

Human Resources:

The citizenry of Belize differs in several respects from those of many other developing countries. Its people are quite well educated as measured by adult literacy above 90 percent, plus a primary education enrollment of over 95 percent. In general, the population is therefore more cosmopolitan and knowledgeable of external events and opportunities than their counterparts in other countries. The population is also quite internationally mobile, as is demonstrated by the proportionally large numbers of people who emigrate each year. These emigrants provide an important source of income for relatives who remain behind, as well as providing a channel for the flow of information concerning the tastes, preferences, and desires formed in the industrialized nations where Belizeans tend to migrate. Lastly, modern communications links with more developed nations such as the U.S., the U.K., and Mexico have reinforced these "developed country" desires and aspirations among the populace.

These distinguishing factors impact on the country's attempts to develop in at least two ways. The first is the so-called "brain drain" on society, which inevitably occurs as a result of out-migration to other countries. Quite frequently the people who migrate are often the ones best educated and motivated. This denies the country, and especially the agricultural sector, of valuable human resources required for development. The second is the currently denigrated position of agriculture and the physical labor which it requires. This is manifested, on the one hand, by periodic labor scarcities in spite of relatively high agricultural wages, and high unemployment among youths fleeing agriculture in favor of the bright lights of the cities and towns, on the other.

Another consideration specifically appropriate to the cane farmers of the northern districts is the fact that they tend to live in towns and 'commute' to their farms to perform necessary labor tasks. Up until now this custom has been compatible with many farming systems—especially cane growers—due to the relatively low need for daily supervision of that crop. Nevetheless, as farmers diversify away from cane and towards other, more demanding crops, a necessary change in lifestyles will most likely be required.

The Political Environment:

On the positive side, development activities in Belize benefit from a stable and democratic political environment in con-

trast to many of its neighbors. While the nation is relatively new, the political and governmental systems promulgated under colonial rule appear to be strong and well-established. This is a beneficial asset which few developing nations have, and which will be critical as the country attempts to attract and hold investment capital. This asset will also become more important as Belize attempts to expand its ties to other countries in its search for export markets.

Nevertheless, while Belize does benefit from a stable political environment, many of its neighbors in the rest of Central America do not. The unrest and instability in countries such as Nicaragua, Honduras, Guatemala and El Salvador most likely adversely affect the development climate of Belize; especially in terms of foreign investment.

Proximity to External Markets:

An additional factor which could benefit Belize's attempts to promote its agricultural development is its proximity to the enormous U.S. market. This proximity holds the potential to greatly facilitate the transportation of perishable agricultural commodities by shortening the time required to get produce to market and thereby increase shelf-life.

In the past, however, this relative advantage was not fully exploited due to the absence of adequate deep-water port facilities and regularly scheduled airline cargo space. Problems with land transportation through Mexico to U.S. markets have also plagued exporters. Nevertheless, there are current indications that these problems are subsiding. The port in Belize City now has containerized 'roll-on/roll-off' capabilities, although goods must still be transferred to large vessels for subsequent transport to foreign destinations.

In the case of air transport, Belize City is now served by three daily scheduled carriers—up from one, only a few years ago—which has greatly relieved the scarcity of these services; especially in the case of perishable agricultural products. Likewise, recent agreements with the Mexican government have resulted in reduced administrative delays for the transshipment of goods through that country.

Concessionary Markets:

Belize is favored by being allowed access to several concessionary markets. These include: the Preferential Sugar Agreement of the U.S. which, in the past, guaranteed the purchase of a specified number of tons of sugar at prices substantially above those paid in the world market; the Caribbean Basin Initiative (CBI) which allows for the exoneration of U.S. tariffs on many commodities; the Lome II Agreement with the U.K. which allows for the tariff-free importation of certain commodities (i.e., principally bananas and sugar in the case of Belize) at higher than world market prices; and, the Caribbean Common Market (CARICOM), which establishes tariff-free trade agreements between member nations on specific commodities at higher than world market prices.

While these preferential trade agreements exist for the benefit of the country, several factors serve to dilute their impact. The quota allowed under the Sugar agreement was cut from approximately 33,500 tons in 1983/84 to 10,000 tons in 1987/88, and indications are that this will be reduced further as the U.S. sugar support program becomes self-supporting.

Additionally, the value of those commodities covered under the Lome II agreement was substantially eroded during the early 1980's as the pound sterling devalued relative to the Belizean dollar and the market has yet to return to its prior strength. CARICOM, while being potentially beneficial for Belize, has never functioned well due to regional political maneuvering and the lack of direct transportation links between Belize and the rest of the Caribbean. Presently, the country is only able to export citrus concentrate to Trinidad and some fish products and beef to Jamaica under this agreement.

Even the potential impact of the CBI initiative is in danger of being lost for several commodities. The U.S. Environmental Protection Agency recently banned the use of ethylene di-bromide (EDB) as a fumigant to meet USDA/APHIS quarantine requirements for the importation of fresh fruits and vegetables into the U.S. EDB had been used

on several of Belize's exports such as papaya and mangoes, and potentially could have been used for fresh citrus exports as well. It is not thought that other chemical alternatives currently exist as a replacement, and other alternatives such as irradiation technology would not be feasible due to the low volumes produced by Belize. Likewise, the U.S. citrus lobby has recently been successful in establishing obstacles to the importation of citrus concentrates into this potentially lucrative market.

Aside from the above discussed 'higher level' considerations, the agricultural sector of Belize contains several other limitations, constraints and opportunities which are thought to be amenable to GOB and donor technical and financial assistance for their resolution. These are:

A dependency on sugar as the mainstay of its agricultural economy;
The absence of an appropriate marketing system for agricultural commodities and livestock;
An inadequately staffed and underfinanced Ministry of Agriculture;
A scarcity of practical on-farm research or training;
An inadequate rural financial system;
An overexploited and uncontrolled fisheries resource;
An underexploited forestry resource; and
An inadequate network of rural infrastructure.

The Sugar Industry and Diversification:

The sugar industry can no longer be relied on to provide a majority of export earnings as it has done in the past. Nor can it be relied on to support the majority of the 4,500 cane farmers currently dependent on this crop. Reduced per-capita sugar consumption rates in the industrialized nations teamed with the recent surge in artificial sweeteners and the European dumping of beet sugar on the world market have cut into the world demand for cane sweeteners, causing prices to plummet. In order to narrow the gap between these low world market prices and the U.S. preferential price for this commodity, country quotas have generally been decreased. Neither these concessionary quotas nor the world market price of sugar are expected to rise into the 1990's. In sum, the sugar industry is suffering a severe decline.

To deal with this problem, Belize adopted two parallel courses of action beginning several years ago. The first was a reorganization of the sugar industry to maximize its potential efficiencies including: the closing of the older mill in Corozal; the reassignment of delivery permits at production levels commensurate with expected preferential quotas; a GOB-backed sale of Belize Sugar Industries (BSI) to the growers and workers with the ex-owners being retained as managers; an additional line of credit to allow the more productive farmers to renovate their cane fields; and, the introduction of price incentives to farmers based on quality considerations.

The second course of action adopted includes a multi-pronged program to research and promote alternatives to sugar cane. Two initiatives in this area are the GOB's current emphasis on oilseed crops being supported in part by CARDI and on winter vegetables being partially financed by the Commercialization of Alternative Crops Project. While the former is directed at the substitution of locally produced cooking oils for imported ones, the latter is directed at the export market to the U.S.

Both of these initiatives are beginning to show positive results, but as they move from their present experimental/trial stage to full scale commercial activities certain constraints will most likely manifest themselves. The most prominent of these will be the lack of a land use analysis and planning capability concerning the most appropriate areas for the planting of these new crops. In the past, land use surveys have been conducted for specific, relatively small areas of the country, but a comprehensive, country-wide survey has never been performed. In the absence of such a survey, the potential exists for the development of serious inefficiencies in the future expansion of alternative crops.

The Marketing System:

Belize suffers from an inadequate and inefficient marketing system for most of its agricultural commodities. The result of this is increased product costs, as well as market gluts followed by scarcities, as the inefficiencies of producers receiving the wrong signals manifest themselves. In most cases, this situation is caused by inadequate or nonexistent market information and infrastructure; both for basic grains, as well as for livestock and animal products.

In the cases of basic grains the problems arise from the country's imperfect economy caused by its relatively small size and isolation. This situation calls for an agency which monitors the flow of basic commodities while buffering both producers and consumers from large swings in the prices and volumes of those commodities. While this was the original theoretical intent behind the establishment of the Belize Marketing Board (BMB), it has neither the staff, the infrastructure, nor the appropriate levels of other resources to carry out this mandate.

Furthermore, its past role as buyer of last resort in its position between producers and consumers almost assured its status as an economic drain on the economy.

Additionally, political influence in the past has often served to further skew the imperfections in the Board's activities. Changes in it's operational structure several years ago forced it to become independent of government subsides and to rely on its own trading activities to earn its operational budget. Nevertheless, recent policy decisions have led to the termination of the Board's trading activities in favor of these being performed entirely by the private sector. These activities, however, are to be conducted within specific floor and ceiling prices determined by the Board. These recent policy changes represent positive steps in reducing past drains on the national treasury and in allowing for increased private sector involvement in the grain trade.

The regulatory functions which the Board has retained are also thought to be necessary and appropriate for a governmental agency. The unique characteristics of a country such as Belize necessitate an orderly and dependable marketing system for basic commodities. Such a system must oversee the interests of both producers and consumers by hedging against the eventuality of individuals or groups influencing the supply and demand of basic commodities to their own ends. This function lies within the mandate of authority which is normally considered to be the role of government.

The marketing of livestock and animal products suffers from a complementary set of additional problems including: a lack of central assembly/collection points; a lack of producer confidence in the current pricing system including negative past experience with auctions; and, the lack of differential pricing mechanisms which discriminate between types of animals and other quality considerations. Nevertheless if these problems can be resolved and the costs of production lowered, Belize holds the potential to become a net exporter of livestock, especially in the case of beef cattle to CARICOM and other Caribbean markets.

The Ministry of Agriculture:

In order to carry out the difficult task of agricultural development, Belize will have to depend heavily on its Ministry of Agriculture (MOA). Nevertheless, giving its current mode of operation the MOA is understaffed, undertrained and underfinanced. This situation appears to be the result of a heavily burdened national treasury and the dilemma of allocating its scarce resources.

One obvious manifestation of this is that, while staff positions are approved on paper, they are not filled in practice due to budgetary shortfalls. This is most evident in the MOA's inability to provide adequate counterparts for several of its projects receiving foreign assistance.

Additionally, the MOA suffers from a decision/approval structure which requires technical staff to be involved with even the most mundane administrative details. This, combined with a rigid and inefficient civil service system causes much waste, duplication of effort, and employee dissatisfaction. Incentives to promote a dynamic work ethic

among staff are also lacking. Since the GOB is limited in the amount of resources it can provide to the MOA, and donors often hesitate to provide direct budgetary support to line ministries, attempts to improve the situation will have to be made through the utilization of existing resources available to the MOA.

Attempts are currently underway within the Ministry to reduce the impact of this problem. Through the Commercialization of Alternative Crops Project, the MOA is receiving technical assistance in the preparation of an action plan to include the specification of terms of reference for all employees, the streamlining of reporting requirements, and the reorganization of activities towards increased interaction with farmers and growers.

Research, Extension and Training Needs:

Agricultural research activities in Belize are currently being conducted by several entities including Central Farm, CARDI, the Commercialization of Alternative Crops Project and BSI. While this research is both practically oriented and achieving results, it is not sufficient if Belize is to effectively develop its agriculture in the near term.

Likewise, the training of technicians working in agriculture is also often insufficient for the tasks. The thin veneer of high level technicians is often inadequate with many specialty categories lacking (i.e., agricultural economics, plant breeders, resource managers). The fact that many of the Ministry's technicians are involved in administrative functions makes matters worse. At the field level, extension agents are often not provided with sufficent on-farm training appropriate to the day-to-day requirements of farmers. Additionally, field level staff rarely receive updates, or refresher courses in their technical skills.

Two recently completed activities, however hold promise in improving this situation over the long term. These include the Caribbean Agricultural Extension Project (CAEP) and the Belize Livestock Development Project, both partially financed by USAID. The former facilitated the reorganization of the Extension Service and the development of a country-wide action plan for extension, while the latter provided two scholarships for advanced degrees in agricultural economics for two MOA staff.

One last limitation in the areas of research and extension is the fact that collaboration with the research and training facilities of the international centers (CIMMYT, IRRI, CIAT), the regional institutions (CARDI, CATIE), and other national government agencies has been either lacking, or has not been exploited to its fullest.

The Rural Financial System:

An examination of Belize's rural financial system reveals that the combined resources of the commercial banks and the Development Finance Corporation are sufficent to meet the agricultural credit needs of farmers. Nevertheless, this credit often does not reach those who need it due to a combination of interest rates and other "transaction costs" which make the growing of many crops using credit uneconomical. At the same time, no attempt is being made to mobilize savings in the rural areas which could, over time, allow for varying degrees of capital self-sufficiency and farmer/financed investment in agriculture.

The Overexploited Fisheries Resource:

Belize's fisheries resource once appeared to be inexhaustible and as a result was never provided with the necessary care and supervision for its proper long term exploitation. Several potentially rewarding enterprises still exist (shrimp and grouper rearing, for example), but the GOB's ability to promote and regulate these types of enterprises is almost non-existent. Likewise, its ability to care for and protect present resources is also severely limited to the point where they are rapidly being depleted, some to the point of extinction.

The Underexploited Forestry Resources:

Belize's forestry resources are considerable, and forestry was the mainstay of the economy for much of the country's history. The inventory of primary hardwoods while can be easily harvested has, for the

most part, been depleted. Existing stands of mahogany, cedar, and rosewood are located in areas too remote for profitable commercial exploitation. Secondary hardwoods, which are often accessible, present yet another set of difficulties including: a lack of consumer knowledge as to their qualities; uneconomic volumes of any one species and a lack of technical knowledge concerning their utilization. Nevertheless, these secondary hardwoods represent an unused resource which could be exploited to the country's advantage.

Rural Infrastructure:

In terms of many of the normal socio-economic indicators used in development work (i.e., per capita income, literacy, infant mortality, etc.) Belize appears far more developed than its rural infrastructure demonstrates. For example, large areas of the country are often cut off from vehicular traffic for extended periods. This is not only a hardship on residents in these areas but it also severely impedes the flow of agricultural products and inputs which greatly increases production costs. Other forms of rural infrastructure such as electricity and potable water are also insufficient, further impeding rural development. Given the costly nature of constructing and providing such services, it is doubtful that the GOB can remedy this situation in the near future.

III. Specific Interventions Appropriate for the Government of Belize and Donor Involvement

Having described the agricultural sector of Belize in Section I, and having analyzed its constraints, limitations and opportunities in Section II, specific recommendations for project development are presented below. The proposed projects, not necessarily in rank order, are as follows:

- Support to the sugar industry to increase efficiency;
- The implementation of a land use survey;
- Assistance to the Belize Marketing Board in establishing grades and standards for the domestic and non-traditional export markets;
- Assistance to the Livestock Producers' Association for the establishment of an auction facility combined with a production credit mechanism;
- The development of a farmer/extension agent training and research facility in Toledo district;
- Assistance to the Development Finance Corporation;
- Support to the Forestry Department in the identification of secondary hardwood characteristics combined with market development;
- Support to the Fisheries Unit for the monitoring and regulation of fisheries resources; and,
- Selected assistance in the development of rural infrastructure, principally roads and bridges.
- Support in the implementation of the National Extension Improvement Plan.

[illegible]

Purpose

To assist the sugar industry in increasing its efficiency of operations.

Project Description

As the earlier analysis described, the Belizean sugar industry has been facing considerble difficulties since the early 1980's. Overproduction, high production costs and low world market price have combined to make this once-profitable industry a losing proposition. Several steps must be taken to improve the overall efficiency of the industry while alternative agricultural enterprises are sought to replace sugar on much of the land.

Since the sugar crisis began to be felt in the early 1980's, several steps have been taken in order to cut losses and improve efficiency. For example, the old and deteriorated Corozal mill and refinery has been closed leaving the relatively new and efficient mill in Orange Walk as the only one in the country. Likewise, cane growing and hauling permits have been reduced more in line with the potential demand for the country's sugar.

Finally, Belize Sugar Industries (BSI), which at one time owned and managed both mills, has been purchased by the workers and growers from the previous foreign owners. Nevertheless, several steps still remain to be accomplished in order for the industry to become totally efficient and compete in the world market. These steps include:

- The introduction of a differential price mechanism to allow for differences in the quality of cane delivered to the mill. The higher the quality of delivered cane, the better the extraction rate. As the extraction rate increases, per-unit processing costs are reduced. This type of mechanism has not been introduced in the past due to bottlenecks in the cane delivery system which result in overall lower quality cane.

- A reorganization of the cane delivery system to avoid bottlenecks and long waits at the processing facility. This is also directed at a lowering of per/unit processing costs and will require the concerted efforts of both growers and mill supervisors; and

- Increased lines of credit to the more efficient cane farmers to allow for field rejuvenation, appropriate fertilization and pest control practices. This will allow the cane farmers who remain in sugar to be as efficient as possible in their farming activities.

With the exception of the provision of credit to cane farmers, the other proposed measures are totally within the capabilities of the GOB, the BSI, and the Cane Growers' Associations to implement and would not require outside donor assistance. In contrast, the provision of credit to cane farmers would require financial assistance from outside sources. These funds should be administered by the Development Finance Corporation using its present guidelines and procedures.

Relationship of Project to GOB Development 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 of the GOB's development strategy. This project will help with this problem in allowing the sugar industry to lower its costs of production so that Belize can maximize its foreign exchange earnings through sugar exports. Additionally, since many of the producers of sugar cane and most of the workers in the industry depend on this crop for their livelihoods, the project will also assist in easing rural poverty, still another of the GOB's major objectives.

Beneficiaries

About 4,500 farmers and tenants currently produce sugar on about 60,000 acres of land. Another approximately 500 workers depend on the sugar industry for a major part of their income. These individuals and their families will be the main beneficiaries of this project.

2. A LAND USE SURVEY TO ASSIST IN THE AGRICULTURAL PLANNING PROCESS

Purpose

To assist the MOA in conducting a land use survey for the country in order to rationalize the agricultural planning process.

Project Description

Belize no doubt has large amounts of land appropriate for agriculture which are currently not being used. Nevertheless, these quantities of good land are finite and pressure on the land is already becoming evident. While the alarming land constraint faced by many countries is not currently present in Belize, it does exist in the sense of a lack of knowledge concerning "best use" alternatives which will be necessary if the country is to use its resources wisely in promoting sustained, long-term agricultural development.

This necessary land use planning based on accurate data cannot be performed at this

time. The last land use survey was performed several decades ago using the technology of the time. Its 1:250,000 scale precludes all but the most general analysis.

As the country attempts to expand its agricultural base, the most proper use of its land must be sought. The correct mix of agriculture, livestock, forestry and preserve land must be rationally determined. The proportions of field crops and permanent crops must also be established. Finally, an appropriate solution to the environmental degradation caused by the increasing number of "milpa" farmers will have to be sought.

This project would fund a land use survey for all agricultural and forested zones of the country. The technology employed would most likely be aerial, using the NASA/ERTS remote sensing facilities in the U.S. Variables to be studied would include: soil type and depth, slope, drainage potential, existing vegetation, and subsoil characteristics.

Relationship of Project to GOB Development Strategy

This project would support many of the ongoing activities in the agricultural sector at this time through the provision of a sound data base for all agricultural planning. In this regard it is totally within the development strategy followed by the GOB. Nevertheless, the GOB does not have the required resources to carry out a task of this kind at this time. Both the European Development Fund (EDF) and the Food and Agricultural Organization of the United Nations (FAO) have expressed interest in implementing this type of a project. Additionally, the United Nations Development Program (UNDP) is exploring the possibility of financing a geological survey.

Beneficiaries

In this case, specific beneficiaries cannot be identified other than in a general sense. Since a survey of this type will serve to improve the agricultural planning process, all facets of the agricultural sector—producers, exporters, input suppliers, etc.—would potentially benefit from this project.

Purpose

To assist the Belize Marketing Board (BMB) in establishing and implementing a system of grades and standards for the domestic and export markets.

Project Description

The BMB is in the process of ending its involvement in the actual trading of basic grains and other commodities, although it will continue to influence these markets through the establishment of floor and ceiling prices. Another appropriate activity for the Board will be the establishment of grades and standards for both the domestic and export markets. In the domestic market this is needed to both protect consumers through the provision of quality produce and to provide clear price guidelines for producers. In the export market, this type of activity is even more critical due to the higher and more exacting standards which are required, and to the strong competition which is provided by other countries. Given the structure of most export markets, even seemingly minor violations of quality standards can lead to products being rejected and further shipments of these commodities being banned. Likewise, occurrences of this type in one commodity can severely influence the reputations of other commodities and exporters from the same country.

This project activity would therefore provide technical assistance to the BMB and commodity groups to establish, implement, and enforce grading and quality standards for a wide variety of domestic and export commodities. The in-country training of BMB officials in this area would also be an important component of this project. Additionally, members of the Belize Export and Investment Promotion Unit (BEIPU) would

also be trained in these areas so they can better serve the needs of exporters.

Relationship of Project to GOB Development Strategy

The more efficient operation of domestic markets for agricultural commodities is a stated goal of the GOB. Likewise, the promotion of exports, especially those of agricultural commodities, is also a very high priority. Witness to this is the relatively recent establishment of the BEIPU and the GOB's support of its activities. This project would serve to support both of these GOB priorities.

Beneficiaries

The project as conceived would benefit the entire agricultural sector—producers, traders, exporters, processors, and consumers—and its potential impact and spread effects would be considerable. No precise number of beneficiaries can be estimated at this time.

[illegible] TO THE
[illegible] LIVESTOCK
[illegible] ASSOCIATION

Purpose

To assist the BLPA in stimulating the country's livestock markets through the establishment of a live auction facility and the provision of production credits to producers.

Project Description

The experience of the Belize Livestock Development Project (BLDP) has demonstrated that the principal constraints to the improvement of the livestock industry are not necessarily of a technical nature, but rather are dependent on the marketing and credit channels available to producers. This project would address these issues in a two-pronged approach.

Establishment of a Livestock Auction Facility:

In order to address the constraints to livestock marketing, this project would assist the BLDP in establishing a livestock auction facility to be centrally located in the Cayo livestock producing region, most likely in the Belmopan area. This would be a permanent facility and would include an office, a roofed auction ring, corral and holding pen facilities for up to 500 head of cattle and 200 hogs, and up to 50 acres of improved pasture for experimentation and demonstration purposes. Weekly auctions are contemplated at this time, although this could be altered depending on the season and potential market demand. The existence of holding facilities would provide producers with both a place to assemble their animals, as well as a place to leave their animals should they not be sold. For these services, the BLPA would charge a commission on the sale price, plus a daily fee for animals held at the facility.

While past experience with livestock auctions did not result in improved market channels, it is hoped that two new factors will serve to ameliorate past problems. The first of these is the entry into the marketplace of two new potential buyers of live animals; Belize Meats, Ltd. and the Belize Livestock Producers' Association. It is thought that these two buyers of relatively large volumes will stimulate greater competition in the marketplace, thereby helping to avoid the collusion between the smaller number of buyers of livestock which formerly took place.

Secondly, the establishment of an auction system would include the concept of a 'floor price' based on the quality and size of each animal, and below which a sale would not take place. This price would be established between the owner of the animal and a technician from the BLPA working in conjunction with the auctioneer. Essentially, it would represent the auctioneer's starting bid for each animal. If through collusion, or simply through personal appraisal by the buyers, there are no bidders at the floor price, the animal would be returned to the holding pens for resale at a later time, be it that same day, or at a later auction. The

established floor price would be based on a livestock grading system defined in collaboration between the MOA and the BLPA, and would discriminate between animals based on recognizable characteristics such as size, weight, and type of animal.

Additionally the facility would serve other needs of the BLPA members. Since it would be a central place for them to normally congregate, an input store could be established which would sell veterinary supplies, feed supplements and small equipment. Likewise, pasture plots and feeding systems could be maintained at the facility on an ongoing basis. These activities would have the dual purpose of providing sustenance for the animals held at the facility while testing and demonstrating different feeding practices to members.

Several benefits could be achieved through this activity:

Producers would have more confidence in the establishment of a market price for their animals which would presumably lead to a greater incentive to produce for the market;

Transactions costs would be reduced resulting in a greater return to the producers;

The BLPA would be seen as providing a valuable service to its members thus greatly strengthening its institutional capacity to support and promote the country's livestock sector;

Markets would be established for both butcher and breeding stock thereby maximizing producer returns and avoiding the slaughter of prime breeding animals;

Given the more orderly and efficient assembly and collection system, foreign cattle buyers from surrounding countries would be more readily attracted to Belize thereby increasing competition; and,

Given the price differentials offered for quality and size, producers would place greater emphasis on these characteristics thereby improving the national herd over the long term.

It is currently estimated that such a facility could be constructed for approximately U.S. $150,000 to 200,000. It is further estimated that a portion of this could be raised through the sale of shares among the members of the BLPA.

Livestock Production Credit Mechanism:

The second principal constraint to the improvement of the country's livestock sector is the almost total lack of short and medium term credit for producers, especially for feeder cattle and breeding stock. The banking sector's preference for long term development loans rather than production credits, and their unwillingness to accept animals as collateral appear to be the main reasons for this.

One solution is the establishment of a credit mechanism for livestock producers modeled after those existing in Colombia and Honduras (Fondo Ganadero). The establishment of a credit cooperative within the Livestock Producer's Association is another organizational structure which has been suggested. The selection of the precise type of organization required would need further study, but the concept would remain the same. Members could receive in-kind loans consisting of live animals, be they for feeding or breeding stock.

In the case of feeder stock, the loans would be paid off at the time of sale through the BLPA's auction facility. The value of each sale would be used to offset the member's outstanding loan balance. The proceeds from sales over and above each member's balance, minus interest and commissions, would be paid in cash. In the case of breeding animals, the eventual sale of calves and piglets through the auction facility would also be used to reduce each borrower's outstanding balance.

The animals to be used in this scheme could be obtained either locally, or internationally depending on prevailing market conditions at the time. Loan funds would be obtained by the BLPA through the GOB or an international donor. The management of this financial mechanism would be under the supervision of a Board of Directors composed of representatives from the BLPA, the

MOA and the banking community. Depending on member demand for these credits, a number of BLPA-funded employees could be hired to supervise the correct management of the animals, as well as the sale of these animals through the auction facility. Ideally, the salaries of these supervisors would be funded through the commissions collected by the Association. The intentional conversion of these animals (or even unintentional in the case of cattle thefts), through sales other than through the auction facility would be discouraged through the use of an obligatory brand registration system managed by the Association.

While it is difficult to assess the potential demand for loans under this program, the figures of 5,000 head of cattle and 2,000 hogs with a monetary value of approximately U.S. $1,000,000 are thought to be reasonable.

Relationship of Project to GOB Development Strategy

The GOB recognizes the crucial role which the livestock sector plays in the national economy, both in terms of percentage of GDP and in terms of animal product imports which could be replaced by local production. The recently published Food and Agricultural Policy Statement therefore assigns the expansion of the livestock sector the highest priority. This project would be extremely supportive of this priority ranking.

Beneficiaries

By statute, all livestock producers who sell animals are automatically members of the BLPA. The present number of members, and therefore the potential number of beneficiaries from a project of this type is approximately 3,000. Nevertheless, it is envisioned that a far larger number of people associated with the livestock industry would also benefit from a more rational livestock marketing and credit system. Examples of this expanded group would include workers on the farms of the members, livestock processors, packers and exporters, and the consumers of livestock products who would benefit from lower meat costs and higher quality products.

5. THE ESTABLISHMENT OF A FARMER/EXTENSION AGENT TRAINING CENTER IN TOLEDO DISTRICT

Purpose

To benefit from the accomplishments of the Toledo Research and Development Project (TRDP) through an expansion of the facility to include a farmer/extension agent training center, and an increased outreach program throughout the Toledo district.

Project Description

The TRDP administered by the British Development Division recently concluded its activities after five years of providing both technical and financial assistance. In that time it shifted its primary activities from attempting to stimulate lowland rice production to improving yields and cultural practices of that crop in the uplands. Throughout the evolution of the project, improvements in yields and a reduction in the pressure of 'milpa' farmers on the uplands were the primary goals.

While the project performed valuable work in documenting and potentially improving the farming systems of milpa rice farmers, it has been criticized for not having broadened and expanded its experience to the larger society. The principal reasons for this include the relative isolation of the Toledo district and the inability of the GOB to provide counterparts to the British technical assistance team due to staff shortages.

The proposed project would build on the experience of the TRDP while expanding its activities in the areas of training and extension. Funds would be made available for the construction of dormitory and classroom facilities for the establishment of a training center for farmers, extension agents and students from the Belize College of Agriculture. It would be operated as a classroom laboratory with heavy emphasis on actual field experience on the surrounding

farms to support the knowledge learned in the classroom.

Farmers selected for training would reside at the center for specified periods during which they would receive instruction on improved farming systems applicable to the Toledo district. This instruction would then be followed by daily field exercises to either observe, or actually perform, the activities discussed in the classroom. Similar or joint classes would be conducted for extension agents from all over the country, either as part of their initial training, or as refresher courses. BCA students could spend their last semester at the center where they would receive the same practical instruction as farmers and extension agents.

The staff and students of the center would form long-term relationships with area farmers, farmer groups, and communities in an attempt to strengthen extension services in the Toledo district. It is hoped that over time the center would expand its focus beyond rice farming to include most types of farming and livestock enterprises practiced in the district.

Relationship of Project to GOB Development Strategy

Due to its relative isolation and low levels of infrastructural development, the GOB has placed a high priority on development activities in Toledo district. Additionally, the potential for environmental degradation in this area of the country is greater than anywhere else due to population pressures and the farming technologies utilized by the farmers. Seeking solutions to this problem is another priority of government.

Beneficiaries

Initial beneficiaries would include the 1,500 to 2,000 milpa farm families in Toledo District. However, the number of secondary beneficiaries would be far greater extending to the over 9,000 milpa farmers in the entire country, plus the 200 to 300 extension agents and students who would benefit from improved and more relevant training and knowledge.

6. SUPPORT TO THE DEVELOPMENT FINANCE CORPORATION

Purpose

To assist the Development Finance Corporation (DFC) in mounting a savings mobilization program.

Project Description

The DFC provides a significant part of the loans used in agriculture and also extends most of the long-term financing available to that sector. It has also recently received permission to amend its bylaws to enable it to become a full-service bank and is presently studying the most feasible means to accomplish this. The bulk of its loanable funds come from external donors with the remainder coming from the GOB. This project aims at helping the DFC in attracting local savings to increase its lending capacity, decrease its dependency on outside sources of funds, and to promote a 'saving ethic' among its borrowers.

The resources necessary to accomplish this would include technical assistance, as well as a limited amount of capital financing to underwrite the cost of an advertising campaign, the establishment of several new branch offices, and the computerization of its financial records.

Relationship of Project to GOB Development Strategy

The GOB development strategy stresses an easing of balance of payments problems, promotion of exports and import substitution, diversification [illegible] from sugar, and assistance to the poor. This project will allow the DFC to become more self-sufficient through savings mobilization and thus lessen the need for Belize to borrow externally to fund its agricultural credit programs. Improved and expanded services brought on by this project will support efforts to expand agricultural output for both exports and import substitution enterprises. A strong DFC will also play a vital role in helping to finance new enterprises undertaken by sugar producers who diversify their opera-

tions. 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.

Beneficiaries

About half of the rural households in Belize 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 through savings mobilization, 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 by current DFC procedures. The project will also allow the DFC and selected credit unions to sharply expand the numbers of rural households with convenient access to financial savings services.

[illegible]

Purpose

To assist the Forestry Department in assessing the vital characteristics of selected species of secondary hardwoods for commercial export. Additionally, this project would seek to develop export markets for secondary hardwoods which meet the needs of these markets.

Project Description

For most of its early history Belize depended on its forests to sustain its economy. While a large part of the country is still covered by dense tropical forests, the country now realizes relatively few benefits from its forestry resources. In general terms, the varieties and species which have been exported for years, and whose characteristics are well known in international markets, are rapidly reaching depletion (i.e., mahogany, rosewood, cedar and ziricote). Nevertheless, the forests of the country are stocked with many other species about which relatively little is known, but for which potential markets are thought to exist.

One study concerning Belize's forestry resources has identified 15 species which could be considered suitable species for export. However, almost no research has been performed concerning their characteristics such as: strength, structural integrity, porosity, weatherability, and the ability to take a finish. One phase of this project would provide financial and technical assistance in determining these characteristics. Additionally, a second phase would provide funds for the Forestry Department in conjunction with the Belize Export and Investment Promotion Unit to advertise and promote these species to lumber importers in the U.S. and elsewhere.

Relationship of Project to GOB Development Strategy

Both the development of alternative exports and the efficient use of its forestry resources are clear and often articulated goals of the GOB.

Beneficiaries

In this case, beneficiaries need to be determined in terms of the entrepreneurs and workers who will benefit from an expanded market for a wider variety of lumber products. Additionally, the country as a whole will benefit from the increased foreign exchange earned from a more thorough exploitation of the country's forest resources.

B. RURAL INFRASTRUCTURE IMPROVEMENT

Purpose

To assist the GOB in improving the rural infrastructure of the country, principally through the construction of farm-to-market roads and key bridges.

Project Description

For the next several decades it is likely that Belize will realize increases in agricultural output by bringing more land into production. New transportation networks will be needed in these areas to deliver agricultural inputs and to carry produce to market. Additionally, large areas of the country already in production are generally hindered by a lack of all-weather roads and the absence of several key bridges. This situation often greatly increases costs of production, making many agricultural enterprises uneconomic. An inventory of rural road requirements was prepared under the USAID-financed Rural Access Roads and Bridges Project. In terms of the required mileage, as well as the location of bridges, the shortfall was found to be substantial. This project recommendation would therefore consist of support to the Ministry of Public Works in its program of rural road and bridge construction and maintenance.

Relation of Project to GOB Development Strategy

Increased agricultural output to substitute for imports or to increase exports will depend on improvements in agricultural infrastructure; particularly roads. Improvements in the rural road network will be necessary to make Belize's agricultural products more competitive in terms of price and quality. This is a well acknowledged fact among Belize's planners who accord it a high priority.

Beneficiaries

Improvements in transportation facilities under this project would be concentrated in those areas identified as having the greatest potential for increasing agricultural production. Existing and new farmers and their families in these areas will be the main beneficiaries from new road construction.

B. ASSISTANCE TO SUPPORT THE FISHERY UNIT

Purpose

The purpose of this project will be to strengthen the regulatory and control functions of the Fishery Unit of the Ministry of Agriculture.

Project Description

The fishery sector of Belize is in crisis. Several of the country's most valuable fisheries (conch, lobster, shrimp and scalefish), are at the point of being severely depleted or of becoming extinct. Laws and other regulations do not appear to be the problem, but rather reside in the inability of the Fishery Unit to enforce them. As a result, there appears to be a rampant violation of these laws—as well as a lack of sound sustained-yield fishing practices—by local fishermen and those from surrounding countries.

This project would provide the Fishery Unit with the means to enforce the country's conservation laws, especially those relating to the conch and lobster fisheries. This will require that a separate enforcement section be established which is big enough and well equipped enough to stem the disasterous loss of fishery production and revenue now occurring. This enforcement section would be given a separate identity and staff to separate it from the Unit's research and development activities.

A senior law enforcement officer, at the same rank as the fishery officers, and with a similar level of education, would be hired under the project. This person would be backed by two assistants to help with patrols and to prosecute cases, and 5 or 6 inspectors. The project would also provide a four-wheel drive vehicle and several motorcycles, as well as two fast skiffs of about 18 feet for patrols. Radio equipment to assist in the apprehension of offenders would also be provided.

In addition, the Fishery Unit itself would be revitalized through:

- Rehabilitation of its laboratory, jetty, and office building;
- The provision of adequate staff presently determined to include two additional Fishery Officers and two technicians;
- The provision of vehicles and motorcycles in addition to the ones provided to the enforcement section;

- The refurbishing of the Unit's vessels;
- Increased funding for specific research activities; and,
- The training of staff members in specific technical skills.

Relation of Project to GOB Development Strategy

Belize's fisheries in the past have been a consistent source of foreign exchange earnings, employment, and food for a large portion of its population. If the present situation is allowed to continue, the country runs the risk of losing this resource for all time. The implementation of a project of this type has therefore been accorded high priority status.

Beneficiaries

The beneficiaries of this project can only be considered for the medium to long term since many of the proposed activities will not demonstrate results for several years to come. More importantly, however, is the fact that if nothing is done, many people—fishermen, consumers, and the country as a whole—will be seriously affected in a negative way.

Purpose

To assist the Ministry of Agriculture in the institutionalization and further implementation of the Belize National Extension Improvement Plan which was developed under the Caribbean Agricultural Extension Project (CAEP).

Project Description

The Belize National Extension Improvement Plan calls for decentralization of the extension staff into agro-ecological zones where there would be more direct contact between extension agents and farmers. The plan includes training for agents in specific technologies relevant to distinct agro/ecological zones and the development of materials for those zones. The plan also calls for the construction of housing, or the revitalization of existing housing, so that extension agents can live in the districts in which they work.

In addition, the Plan calls for the development of a communications unit which would support agricultural development efforts throughout Belize. The equipment and basic beginnings of the communications unit were initiated under the Caribbean Agricultural Extension Project (CAEP). However, without additional support and technical assistance, the communications unit will not become an essential part of agricultural development activities and the Extension Service will not attain its full potential.

Regardless of how agriculture is organized, and regardless of what other agricultural development efforts take place, there will be an extension staff which needs support, training, and technical assistance to more effectively serve its intended target population. This project would therefore be aimed at continuing the efforts initiated under CAEP as part of a continuing activity to strengthen the Extension Service.

APPENDIX

Appendix A

An 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 (used in the manufacture of dyes). In the latter half of the eighteenth century mahogany replaced logwood as the major export when its price dropped sharply and demand for mahogany arose.

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 (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 to do some farming to relieve them of the 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 dominate 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 U.S. expatriates after 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 palm 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 today.

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, and 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 resources, 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 by sugar mostly 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/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 was to be the basis of government policy during the 1960s and '70s, did not adopt the recommendations concerning immigration, and was ambiguous about the relative emphasis to be put on capital intensive agriculture and small farm production. Reuss (1966:8) argued that this ambivalence led to governmental agricultural policies with difficult goals. He summarized the basic aims of the Belizean government's agricultural policies as follows: to boost agricultural production in order to reduce food imports and increase agricultural exports; to assist small farmers and encourage cooperatives; and to keep the cost of living stable. In the early 1970s, it was argued that the Belizean government sidestepped potential conflicts by aiming its help mostly at large-scale producers and did not provide meaningful assistance to the smaller farmer. Today, however, the interests of small farmers are also being stressed.

Appendix B

Belize Coordinating Committee Agricultural Sector Assessment (1984)

NAME	ORGANIZATION AND TITLE
David Aguilar	Principal Lands Officer, MNR
Alvaro Bautista	Agricultural Division, DFC
Sandra Bedran	Manager, Belize Marketing Board
Clarence Borland	Office of Economic Planning
Henry Flowers	Chief Forestry Officer, MNR
Liborio Gonzalez	CAO, MNR, and Committee Chair
James Hyde	Permanent Secretary, MNR
Charles Jenkins	USAID Agricultural Officer
Cyrilo Mahung	General Manager, DFC
Fred Mangum	Chief of Party, BLDP
Rodney Neal	PAO; Research, and Co-Team Leader
Wendell Parham	Resident Director, Central Farm
Carlos Santos	Advisor, MNR
Balmore Silva	Principal Veterinary Officer, MNR

Appendix C

List of Individuals and Organizations Consulted or Interviewed by the Team (1984)

NAME	TITLE or ORGANIZATION
Neboysha Brashich	Representative, USAID
Richard Wilk	USAID Consultant
Kim Kennedy	PDAP Advisor
Don Smucker	CAEP Advisor
Elton Jones	Chamber of Commerce
Marshall Godwin	USAID Consultant
Norris Wade	Hershey Humingbird
Jim Corvin	Cocoa Project, PADF
H. S. Penjette	FAO Census Advisor
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
Fred Mangum	Team Leader, BLDP
Cyrilo Mahung	Manager, DFC
Alvaro Bautista	DFC
F. J. Garbutt	Director, Central Bank
Clarence Borland	Office Economic Planning
Annette Gilzene	DFC
Ms. Luben	Central Bank
William McDonald	Royal Bank of Canada
Brenda Johnson	Manager, Credit Union League
Mr. Rodriguez	Manager, DFC Belize City
Franco Tzul	Manager, DFC Punta Gorda
Sandra Bedran	Manager, BMB
Edmond Zuniga	Dist. Acct., Punta Gorda
Mrs. Enriquez	Treasurer's Office
Cypriano J. Avilez	Credit Union, P.G.
Mr. Santos	Big Falls, BMB
Almon Plett	Mennonite Farmer
Hugh Fuller	Belize Sugar Industries
A. L. Ayuso	Sec., Belize Sugar Board
Henry Flowers	Chief Forest Officer

NAME	TITLE or ORGANIZATION
Oscar Rosada	Principal Forest Officer
Sam Brimpong	Forestry Department
Jim Nilsen	Forest Department
Barry Bowen	Hillbank Agro-Industries
Gilbert Canton	Minter Naval Stores
John Robertson	Belize Timber Ltd.
Carol Thompson	British High Commission
A. C. Duncan	Belize Estate and Produce Co.
Amir Segura	Barrow Lumber Co.
Stanley Calder	British High Commission
Earl Green	Forest Officer
Larry Chaote	DAO, Orange Walk
Frank Barkman	Quality Poultry Products

INSTITUTION	LOCATION
Belize Marketing Board	Belize City
Belize Livestock Producers Assn.	Belmopan
Belize Meats Ltd.	Belize City
Corozal Sugar Board	Corozal District
Belize School of Agriculture	Teaching Staff
Central Farm	Research Staff
Central Agricultural Supply	Rodney Allen
Orange Walk Sugar Board	Orange Walk
Chamber of Commerce	Belize City
Office of Economic Development	Belmopan
TRDP Research Center	Toledo
Banana Board and Field Operation	Cowpea Area
Citrus Growers Association	Stann Creek
Citrus Processors Facilities and Managers	Stann Creek
Meat Processing Facilities	Belize District
Food Processing Facilities	Cayo
Rice Mill and BMB Facility	Toledo

POST / INSTITUTION	NAME
Secretary, Sugar Board	Liborio Ayuso
Belize Sugar Industries	Agripino Cawich
Belize Sugar Industries	Hugh Fuller
Cane Farmers Association	Corozal
Cane Farmers Association	Orange Walk
Mennonite Community (Blue Creek)	Orange Walk
Mennonite Community	Management Committee
Belize Food Products	Denziel Jenkins
Citrus Company of Belize	Jerry Sharpe
Citrus Growers Association	Gustavo Buller
Corporation Officer	Allan Chubb
Banana Control Board	General Manager
Permanent Secretary, MNR	Jim Hyde
Agriculture Development Advisor	Carlos Santos
Chief Agricultural Officer	Liborio Gonzalez
Chief Forest Officer	Henry Flowers
Principal Lands Officer	David Aguilar

POST / INSTITUTION	NAME
Permanent Secretary, Trade and Industry	Egbert Grinage
Office of Economic Planning	Clarence Borland
General Manager, DFC	Cyrilo Mahung
Agricultural Division, DFC	Alvaro Bautista
Central Statistics Unit	Sylvano Roberts
CARDI	A. Singha
CARICOM Farms Ltd.	J. P. Cal
Information and Statistics Unit	Alfonso Tzul
Information and Statistics Unit	Panjette
Chief Extension Officer	Eulalio Garcia
Social Development Officer	Edwin Belisle
Hummingbird Hershey	Pat Scott
Resident Director, Central Farm	Wendell Parham
Agricultural Chemist	Marla Holder
Agronomist	Joe Smith
Extension Officer	Ismael Cal
Livestock Officer	Luis Betancourt
Extension Officer	Sabino Escalante
Extension Officer	Allison Patten
Agricultural Officer	Stephen Serano
Extension Officer	Ralston Flowers
General Manager, BMB	Sandra Bedran
Bureau of Standards	Douglas Fairweather
James Brodie Co., Ltd.	Hector Lopez
Prosser Fertilizer Co.	Salvador Espat
Hofius A & A	Charles Vernon
Belize Supply Co., Ltd.	Ray Nisbet
Barclays Bank International	J. Auil
Atlantic Bank	Roberto Stanley
Principal Veterinary Officer	Balmore Silva
Minister of Works	Honorable Fred Hunter
Permanent Secretary, MTI	Egbert Grinage
Chief Agricultural Officer, MOA	Liborio Gonzalez

Individuals Contacted in Belize (1987)

NAME	TITLE or ORGANIZATION
Efrain Aldana,	PAO: Extension
Robert Bank	Manager, Hershey
Ralph Barrett	ODA Advisor, BCA
Alvaro Bautista,	Head, Agriculture Division, DFC
Abdullah Bedran,	Running W Meats
Sandra Bedran	Manager, Belize Marketing Board
Raymond Bradley	Executive Secretary, National Fishermen's Cooperative
Nebaysha Brashich	Representative, USAID/Belize
Frank Brechin	Country Director, CARE
Moises Cal	Principal, BCA

NAME	TITLE or ORGANIZATION
Gilley Canton	USAID/Belize
John Carr	Chairman, BLPA
Don Contris	Belize Meats, Ltd.
Anton Danner	Brewmaster, Belize Brewing Co.
Jerry David	Director, Belize Mills
Henry Dean	Manager, Broiler Processing
Godsman Ellis	Manager, Macal Cooperative
Henry Flowers	Chief Forestry Officer, MOA
Eulalio Garcia	Principal Extension Officer
Vincent Gillette	Administrator, Fishery Unit
Ruben Gonzalez	Manager, Caribena Fishermen's Cooperative
Sylvano Guerrero	Program Manager, CARE
Manuel Heredia, Jr.	Chairman, Caribena Fishermens' Cooperative
Sue Hufford	Belize Meats, Ltd.
Marla Holder	Director, Central Farms
Robert L. Johnson	Devres, Inc.
Eduardo Juan	Minister of Commerce, Industry, Cooperatives, and Tourism
Elias Juan	Manager, Belize Beef Corp.
Trinidad Juan	President, Macal Agricultural Cooperative
Stanley Longworth	Director Caribbean Shipping Agencies
Cirilio Mahung	Manager, DFC
Fred Mangum	Policy Advisor, BLDP
Gregory Marshall	Biologist, USAID Conch Project
Karl H. Menzies	Chairman, Fisheries Advisory Committee
Winston Miller	Investment Officer, BEIPU
Rene Montero	Livestock Officer, Central Farm
Dwight Neal	Assistant Fishery Officer, Fishery Unit
Rodney Neal	Permanent Secretary, MOA
Elroy Navarro	Livestock Producer
Joe Novelo	Livestock Producer
Felipe Novelo	Livestock Producer
Orlando Orio	Secretary, BLPA
Wendell Parnham	Agricultural Economist, MOA
Melano Pech	Central Farms
Leroy Peters	Pastures Advisor, BLDP
Mr. Puga	Office of Economic Development
B.K. Rai	CARDI
Wade Reeves	Devres, Inc.
Ernest Reimer	Reimer's Feed Shop
Oscar Rosado	Principal Forestry Officer, MOA
Balmore Silva	Chief Veterinarian Officer, MOA
A.K. Sinha	CARDI
Steve Szadek	ADO, USAID
Allen Turner	Devres, Inc.
Robert Usher	Executive Secretary, Northern Fishermen's Cooperative
Elide Valencia	Central Farms

NAME	TITLE or ORGANIZATION
Alfred Vasquez	Officer in Charge, Belize City Branch, Caribena Coop
Evan Young	BEIPU
Syivan Wittwer	Devres, Inc.

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