BIBLIOGRAPHIC DATA SHEET

PN-AAJ-133

ECONOMIC GROWTH, EQUITY AND AGRICULTURAL DEVELOPMENT IN THE DOMINICAN REPUBLIC

PERSONAL AUTHORS - FLETCHER, L. B.
GRABER, ERIC

CORPORATE AUTHORS - IOWA STATE UNIV. DEPT. OF ECONOMICS

1980, 476P.
(IN INTERNATIONAL STUDIES IN ECONOMICS MONOGRAPH NO. 12)

ARC NUMBER - DR338.1.F613
CONTRACT NUMBER - AID/TA-BMA-3
PROJECT NUMBERS - 9310236
SUBJECT CLASS - AE300000G320

DESCRIPTORS -

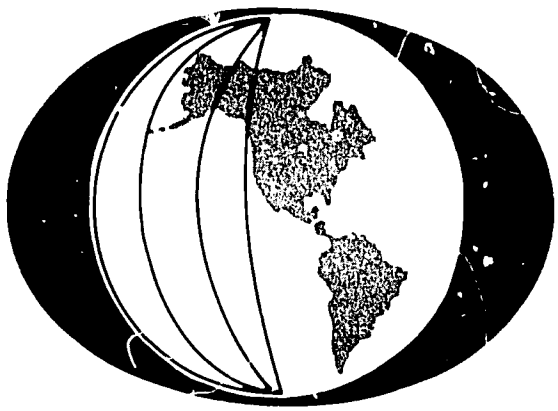
DOMINICAN REP.	NATURAL RESOURCES
PRODUCTION	RURAL AREAS
FOOD SUPPLY	SECTOR ANALYSIS
ECONOMIC CONDITIONS	AGRICULTURE
INCOME DISTRIBUTION	LAND TENURE
ECONOMIC DEVELOPMENT	

DR
338.1
F613

PN-AAJ-133

INTERNATIONAL STUDIES IN ECONOMICS

Monograph No. 12



Economic Growth, Equity and Agricultural Development in the Dominican Republic

by Lehman B. Fletcher and Eric Graber

with contributions by:

Michael Applegate
Daniel Bromley
William Janssen
Lee Martin
William Merrill

Department of Economics, Iowa State University, Ames, Iowa

May, 1980

This monograph, the twelfth in the series of International Studies in Economics, is the second to be sponsored by the Latin American Planning Network Project (LACPLAN). LACPLAN is a collaborative program of research, training, and technical assistance designed to assist Latin American and Caribbean countries in improving their planning and policy analysis capabilities. Iowa State University is cooperating with the InterAmerican Institute of Agricultural Sciences, located in San Jose, Costa Rica, and Michigan State University in this hemisphere-wide project.

The research that led to the preparation of this monograph was financed by the United States Agency for International Development Mission (USAID) in the Dominican Republic. The conclusions and content of this report are solely the responsibility of the authors. The support and cooperation of USAID and the Government of the Dominican Republic are gratefully acknowledged. William Janssen, then USAID's Rural Development Officer in Santo Domingo, and now in Tegucigalpa, Honduras, conceived of, and contributed to, this study of development strategy and program priorities. His successor in Santo Domingo, Eric Shearer, encouraged completion of the study. Eric Graber, now at Saint Louis University, was involved in all phases of data collection, analysis, and writing. Michael Applegate, of Oklahoma State University, did the original analysis of macroeconomic structures and performance. Daniel Bromley, University of Wisconsin, worked on the assessment of land and water resources. Lee Martin, University of Minnesota, analyzed professional training requirements. William Merrill, Iowa State University. prepared the chapters on demand and supply projections and marketing. Lehman B. Fletcher is Professor of Economics at Iowa State University.

Copies of this monograph and others in the series may be obtained by writing the Department of Economics, Iowa State University, Ames, Iowa 50011.

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Preface

Developing countries are seeking to improve the performance of the agricultural sector as a means to promote their overall economic and social development. A major concern in many countries is the low rate of growth of agricultural output. In most LDCs food production has barely kept pace with population growth. This inadequate growth in output has occurred in spite of large commitments of domestic and external investment resources to agricultural programs.

The situation in most countries is even less satisfactory with regard to objectives other than production. Improving nutrition, reducing under-employment, raising productivity, and providing access to basic social services for the rural and urban poor, are goals that are increasingly emphasized in LDCs. These goals reflect the economic, social, and political dimensions of food production. They recognize the pervasive problem of poverty and the inability of the bulk of the population to afford adequate food even if it can be produced. More and more, LDC governments and aid agencies are placing priority on programs whose benefit will be widely distributed by the output- and productivity-increasing process itself, rather than deferring concern with equity questions until after adequate production levels have been achieved. The necessity for equity objectives to shape the choice of basic development strategy and programs is now generally recognized.

"Rural development" is becoming widely used to reflect the idea that the objectives of agricultural development must include expansion

of productive employment opportunities both on and off farms and greater sectoral, regional, and personal equity in the distribution of income and social services, as well as substantial increases in output, if the large number of rural poor in LDCs are to benefit from growth. In this sense, rural development looks at the LDC growth process from the viewpoint of a target population--the majority of people in rural areas who now exist in varying degrees of absolute and relative poverty and whose conditions are tending to deteriorate in many countries as rural populations grow relative to available resources, technology in use, and prevailing institutional structures.

This express concern of rural development with multiple economic and social goals for the target population has not yet produced an adequate analytical framework or an approach that shows how the benefits of the development process can be effectively extended to the small farmers, landless laborers, and nonfarm workers who constitute the poor majority of LDC rural populations. Agricultural sector analysis provides a framework for dealing with this precise concern. It can be used to view increasing output, improving productivity, and expanding employment in farm and nonfarm activities as a means towards higher incomes and increased provision of basic social services for the rural population. It can clarify the consequences of existing growth patterns and processes and identify feasible and consistent strategies, policies, and programs for benefitting specified groups. It can assist in developing coherent multi-objective, multi-activity agricultural and rural development programs and projects for specific districts. It can contribute to the important and difficult task

of insuring that national and sector policies are consistent with the priority objectives of the proposed rural development programs.

The approach of project identification, analysis, and implementation often used by many countries in the past is not adequate to cope with the situation confronting most LDCs at present. It is becoming increasingly apparent that sound planning, appropriate policy formulation, and relevant program development are the keys to successful agricultural sector development. Without good planning and policy analysis, LDCs are finding it increasingly difficult to identify and implement the linked and interdependent policies, programs, and projects at the national, sector, regional, and district levels needed to achieve their multiple objectives for economic and social development. Concern with the interaction of the agricultural sector with the overall economy and the linkage of projects and districts to sector and economy plans and policies are essential elements of sector analysis.

The purpose of sector analysis is to assist LDCs to devise agricultural and rural sector policies, programs, and projects that achieve adequate increases in food production while substantially reducing problems of underemployment, unequal income distribution, and low levels of living for the poor majorities of their populations. It deals with the complicated effects on these key goals of policy choices that involve complex interactions of a large number of important variables. It involves interrelated farm and nonfarm socio-economic systems that must change radically and rapidly but that are not well understood. It evaluates alternatives for policy-makers where inadequate analysis can be costly in terms of waste of

scarce resources or unintended and unanticipated consequences for their priority goals and target populations.

This monograph reports a study of the agricultural sector in the Dominican Republic. The objective of this work was to suggest priorities for government policies, investment programs, and projects. It begins with an econometric analysis of macroeconomic structure and performance and the impact of the existing growth processes on rural incomes, employment and levels of living. Subsequent chapters analyze soil and water resources, agrarian structures, farm production and marketing patterns, and income levels. The purpose of these chapters is to identify the key constraints that affect small farmers. Next, an assessment of government institutions and programs is undertaken. In the final chapter, a strategy that would benefit the rural poor while promoting domestic food production is recommended, and priority policies, programs and projects to implement that strategy are identified.

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Chapter 1

I. MACROECONOMIC STRUCTURE, POLICIES, AND PERFORMANCE OF THE ECONOMY

Both 1977 and 1978 were unfavorable years for the Dominican economy. In 1978, for the first time in over a decade, real growth in gross domestic product (GDP) only slightly exceeded population growth, so per capita GDP was virtually unchanged (Table 1.1). This performance reflected a reduction in overall economic growth, which averaged 5.9 percent in 1974-78 compared with 10.3 percent in 1970-74.

In 1977-78, uncertainty due to the national elections and the subsequent political transition discouraged investment and slowed economic growth. The country's balance of payments deteriorated as import prices (oil) rose and export prices (sugar, coffee, cacao) and volumes (coffee, ferronickel, bauxite) fell. An increase in the current account deficit to an estimated 8 percent of GDP and a large deficit in the government's budget in 1978 created a need for short-term stabilization measures to prevent further deterioration in the economy. These stabilization measures were directed toward reduction of the balance-of-payments and government fiscal deficits, containment of inflationary pressures, and encouragement of domestic investment.[1/]

In addition to short-term stabilization requirements, the need for adjustments in long-term development policies to ensure that benefits of growth are shared more widely and equitably is becoming increasingly

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[1/] World Bank, Current Economic Memorandum on the Dominican Republic, April 30, 1979.

TABLE 1.1

GROSS DOMESTIC PRODUCT AND RATES
OF GROWTH
(constant 1962 prices)

Period	Rate of Growth	
	GDP	GDP per capita
1951 (50-52 av.) - 1959 (58-60 av.)	5.2	2.1
1959 (58-60 av.) - 1967 (66-68 av.)	3.7	0.6
1967 (66-68 av.) - 1976 (75-77 av.)	8.4	5.3
1970 (69-71 av.) - 1974 (73-75 av.)	10.3	7.2
1974 - 1976[a]	5.9	1.8
1974[a]	6.0	2.9
1975[a]	5.2	2.1
1976[a]	6.4	3.3
1977[a]	4.4	1.3
1978[a][b]	3.2	.1

Source: National Accounts, Central Bank

[a] Measured in 1970 prices. In 1978, the Central Bank changed the base for its constant price statistics to 1970 from 1962. This change raised the measured growth rates for recent years. For example, using 1962 as the base year, real GDP growth in 1977 was 3.3 percent and probably slightly less than 3 percent in 1978.

[b] preliminary

recognized. In the 1967-76 decade, GDP grew at an average real rate of 8.4 percent annually, one of the highest in the world. As a result, production per capita practically doubled. At the end of the 1970s, the economy contained about five million people and was generating a real income of approximately $500 per person [1/] (Table A1.1). Yet the country continues to confront serious problems of high unemployment and underemployment and poverty, especially in rural areas. There is growing interest in encouraging a development process that benefits the bulk of the poor rural population through higher productivity and an improved distribution of income and social services.

Agricultural and urban development are closely interrelated in the Dominican Republic. Government policies to promote industrial and urban growth have discriminated against the rural sector and particularly against the rural poor. This discrimination has been evident in policies designed to promote capital-intensive production for import substitution and improve urban levels of living, while relatively little attention has been given to increasing productivity of, or social services available to, the rural population.

This chapter summarizes how structure, government policies, and performance of the economy have evolved in recent years. Emphasis is placed on illustrating how the macro structure and behavior of the economy have affected the agricultural sector and the welfare of the rural population.

[1/] The official exchange rate is RD$1.00 = US$1.00. In the parallel market, the rates fluctuate daily usually within a range of RD$1.20 - 1.25 = US$1.00.

1.1 Structure of the Economy

1.1.1 Composition of GDP

The recent growth of GDP is disaggregated by sector of origin in Table 1.2. The lower overall growth rates since 1973 have been shared by all major sectors of the economy but the slowdown has been more marked in the primary and secondary sectors than in the tertiary sector. Agricultural output growth recovered in 1976 after the 1974-75 drought years, fell again in 1977, and moved sharply upward in 1978. Crop production has been more variable than livestock output, at least since 1974. Mining output fell absolutely, both in 1977 and 1978, in response to declining export demand for bauxite and ferronickel. After maintaining a high rate of growth in the 1973-76 period, manufacturing growth declined sharply in 1974 and has yet to regain its previous level of annual growth. Construction growth slowed in all years except 1977.

The longer-term evolution of the structure of output is shown in Table 1.3. Currently, the tertiary sector accounts for about one-half of output and the primary and secondary sectors constitute about one-fourth each. While the services sector has maintained a relatively constant share since the early sixties, the output share of the primary sector has consistently declined while that of the secondary sector has risen. This is the pattern of structural change that is commonly observed in developing countries.

Looking at the decade that began in 1966, when a period of unusually rapid and sustained growth got underway, the data in Table 1.3 show that growth was concentrated in mining, manufacturing, construction, and the services sector. Growth in the agricultural sector was only about half

TABLE 1.2

GROSS DOMESTIC PRODUCT BY SECTOR OF ORIGIN
(millions of RD$ at 1970 prices)

Sector	1973	1974	1975	1976	1977	1978
TOTAL ECONOMY	2,052.7	2,175.9	2,288.9	2,436.2	2,544.2	2,627.0
Primary Sector:	510.3	520.1	521.6	577.3	576.6	580.9
Agriculture	410.1	410.2	399.9	431.1	433.8	465.0
Crops	279.3	279.1	262.8	288.6	287.2	306.2
Livestock	118.3	118.8	125.5	130.7	136.1	147.5
Forestry & Fishing	12.5	12.3	11.6	11.8	10.5	11.3
Mining	100.2	109.9	121.7	146.2	142.8	115.9
Secondary Sector:	518.8	540.4	581.1	609.8	652.9	670.7
Manufacturing	381.3	399.4	428.5	454.7	469.4	483.2
Construction	137.5	141.0	152.6	155.1	183.5	187.5
Tertiary Sector:	1,023.6	1,115.4	1,186.2	1,249.1	1,314.7	1,375.4
Commerce	304.3	369.0	385.9	413.7	424.9	441.0
Transportation	140.6	155.9	161.4	166.7	184.5	194.8
Communications	16.2	19.2	21.2	24.1	25.9	28.3
Utilities	26.2	28.1	30.0	30.9	39.3	44.2
Finance	32.8	40.7	48.7	54.3	57.9	62.3
Housing	129.8	140.8	149.0	158.4	171.7	175.4
Government	157.1	168.6	183.1	185.3	187.4	190.1
Other Services	180.6	193.1	206.9	215.7	223.1	239.3
			RATES OF GROWTH			
TOTAL	12.9	6.0	5.2	6.4	4.4	3.2
Primary Sector:	15.7	1.9	0.3	10.7	- 0.1	0.7
Agriculture	8.6	0.02	- 2.5	7.8	0.6	7.2
Crops	10.0	- 0.07	- 5.8	9.8	- 0.5	6.6
Livestock	4.0	0.4	5.6	4.1	4.1	8.4
Forestry & Fishing	25.9	- 1.6	- 5.7	1.7	- 11.0	7.6
Mining	58.2	9.7	10.7	20.1	- 2.3	- 18.8
Secondary Sector:	15.5	4.2	7.5	4.9	7.1	2.7
Manufacturing	13.3	4.7	7.3	6.1	3.2	2.9
Construction	22.0	2.5	8.2	1.6	18.3	2.2
Tertiary Sector:	10.3	9.0	6.3	5.3	5.2	4.6
Commerce	10.2	8.4	4.6	7.2	2.7	3.8
Transportation	12.8	10.9	3.5	3.3	10.7	5.6
Communications	20.3	18.5	10.4	13.7	7.5	9.3
Utilities	17.0	7.2	6.8	3.0	27.2	12.5
Finance	14.7	24.1	19.7	11.5	6.6	7.6
Housing	9.3	8.5	5.8	6.3	8.4	2.1
Government	0.2	7.3	8.6	1.2	1.1	1.4
Other Services	16.9	6.9	7.1	4.2	3.4	7.2

Source: National Accounts, Central Bank.

TABLE 1.3

SECTORAL OUTPUTS, 1960-74

Sector	Composition of GDP by Sector (Percent of Total GDP) 1960-62	1966-68	1975-77	Growth in Output (constant prices) (1960-62) to (1966-68)	(1966-68) to (1975-77)
Primary Sector:	31.5	26.5	24.2		
Agriculture	30.0	25.1	18.3	1.0	4.6
Crops	21.6	16.4	11.8	- 0.6	4.4
Livestock	7.5	7.9	6.0	4.9	5.2
Forestry & Fishing	0.9	0.8	0.4	1.5	0.5
Mining	1.5	1.4	5.9	2.9	28.1
Secondary Sector:	18.3	19.4	24.3		
Manufacturing	15.5	15.0	17.4	3.6	10.1
Construction	2.8	4.4	6.9	11.7	14.0
Tertiary Sector:	50.2	54.1	51.5		
Commerce	17.4	17.0	17.9	3.6	8.9
Transportation, Communications, Utilities	5.8	7.5	7.9	8.4	9.1
Finance	1.6	1.7	2.1	5.3	10.7
Housing	6.8	7.9	8.0	6.6	8.5
Government	10.7	11.7	6.1	5.6	0.7
Other Services	7.8	8.4	9.5	5.2	9.8
TOTAL GDP	100.0	100.0	100.0	4.1	8.4

Source: National Accounts, Central Bank

as large as the economy's overall rate of growth and lagged well behind the high-growth sectors of the economy. As a result, the contribution of crops and livestock production declined to 8.3 percent of total GDP in 1975-77, down from 30.0 percent in 1960-62 and 26.5 percent in 1966-68.

The real output of the "government" sector has grown at an average annual rate of less than 1.0 percent since 1967. (The government, or public, sector includes both central and municipal governments and some 20 autonomous public agencies.) In the early 1960s, the government accounted for about 11 percent of GDP. In the late seventies, its share in GDP fell to 6 percent. With population increasing at 3.1 percent annually, a rate of growth in public output of less than one percent per year means that the level of real public-sector services per capita has been declining at more than two percent annually.

1.1.2 Inflation

Economic growth since 1966 has been accompanied by modest (by Latin American standards) price inflation. The consumer price index for Santo Domingo reveals two distinct patterns of inflation in recent years (Table 1.4). The average annual increase in the total consumer price index was only 5.3 percent for 1969-72 compared to 11.8 percent for 1973-78.

Worldwide inflation and increases in oil prices explain part of the increase in the rate of inflation after 1972. Allowing for lags, increases in the money supply, associated in part with increases in world sugar prices, were also a contributing factor. The annual rate of growth of the money supply was 9.4 percent during 1966-71. This rate doubled to 18.7 percent during 1972-75, and was associated with a rate of inflation

TABLE 1.4

CONSUMER PRICE INDEX: SANTO DOMINGO

Part A: Annual Price Index

Year	Index	% Δ
1969	100.0	--
1970	103.8	3.8
1971	108.3	4.3
1972	116.8	7.8
1973	134.4	15.1
1974	152.1	13.2
1975	174.1	14.5
1976	187.8	7.8
1977	211.8	12.8
1978	219.3	7.5

Part B: Price Changes by Type of Good

Type of Good	Annual % Change in Price Index	
	1969-72	1973-78
Food, Drinks, & Tobacco	5.6	9.2
Housing	6.5	10.6
Durable Goods	5.0	13.4
Nondurable Goods	4.1	17.4
Services	5.8	8.6
TOTAL	5.3	11.8

Source: Central Bank

during the 1972-77 period that more than doubled compared to 1969-72.

The average rate of inflation during the 1973-78 period was greatest for nondurable goods (such as clothing) and least for food and services. Food price declines in 1978, due to favorable crop conditions, and a slackening in the increase of housing costs helped moderate the overall inflation rate in 1978. Available data for Santo Domingo indicate that lower-income groups have experienced greater increases in their cost of living since 1973-74 than have higher-income groups. It seems likely that the observed pattern of price increases has also penalized low-income consumers in rural areas.

1.1.3 Investment

Investment has been the most dynamic element in the growth of the Dominican economy. Total private and public investment increased rapidly after 1966. The average compound rate of growth of total investment in real terms was nearly 15 percent during the 1966-75 period. As a percentage of GDP, domestic investment rose steadily from 13.1 percent in 1966 to a level of 24.5 percent in 1975. Fixed investment spending equaled 22-23 percent of GDP in 1976-78. Construction accounted for approximately 60 percent of total fixed investment during 1966-76, and machinery and equipment for the remainder. Since 1969, the average rate of growth of investment in machinery and equipment has exceeded that for construction. Since almost all machinery is imported, such increases could not have been possible without high rates of growth of exports and improvements in the international terms of trade that occurred during this period, particularly for sugar.

Private investment in manufacturing, construction, and mining in the seventies responded to mineral export opportunities, manufacturing for the protected internal market, and the creation of special industrial "free zone" parks. Public sector investment expanded the transportation system and emphasized urban and tourism infrastructure needs.

Much of the expansion in public investment was achieved at the expense of current outlays. Restrictions on current expenditures coupled with increased tax revenues from exports led to substantial current budget surpluses in the early 1970s, which were used to finance an accelerated public works program with only modest recourse to external borrowing and without substantial increases in tax rates.[1/]

1.1.4 Agricultural Output

Although its relative importance in total GDP has declined, annual increases in agricultural output averaged 4.6 percent during the 1967-76 decade compared to 1.0 percent during 1961-67.

The agricultural export subsector has been particularly dynamic. Gross output of the major export crops--sugarcane, coffee, cacao, and tobacco--increased at an average annual rate of 6.1 percent during 1966-75 compared to declines of 4.0 percent annually during 1961-67. The share of export crops in gross agricultural output declined from 33.2 percent in 1961 to 24.9 percent in 1967 and then increased to 28.3 percent in 1975. These changes are due primarily to changes in sugarcane production and favorable world market conditions for agricultural exports in the 1972-75 period.

[1/] World Bank. Updating Report on the Economy of the Dominican Republic. Report No. 611-DO. Washington, D.C., 1975.

Livestock production accounts for approximately one-third of total agricultural production. The annual growth rate for livestock has been fairly consistent for the past 15 years. It averaged 5.2 percent annually during 1967-76 (Table 1.3).

Agricultural growth has been associated with increased use of purchased farm inputs. The use of purchased inputs rose 9.6 percent annually for crops and 7.1 percent for livestock during 1966-75. Fertilizer accounts for much of the increased use of purchased inputs for crops. An estimated 55 percent of total chemical fertilizer inputs is used in sugar-cane production. Rice production is the most important use of chemical inputs for domestic food crops.[1/]

1.2 Foreign Trade

Sugar is the major export product produced by the Dominican Republic, and the country ranks among the top five cane sugar exporting nations of the world. Sugar and derivative by-products have long accounted for more than half the value of total exports (Table 1.5). Annual increases in the volume of sugar output have averaged 3.5 percent since the end of the 19th century. During 1950-74, annual increases in sugar production averaged about 3.0 percent. These growth rates reflect steady growth in world demand for sugar and the Dominican Republic's ability to maintain a significant share in the world supply.

However, annual fluctuations in the production of sugar and in world sugar prices are major sources of short-term instability in the Dominican economy, particularly in the public sector which depends on sugar profits and export taxes for revenue. The elasticity of GDP with respect to the

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[1/] Free, J. and Kresge, C. Dominican Republic Fertilizer Situation: A Descriptive Analysis and Recommendations. Muscle Shoals, Alabama: International Fertilizer Development Center, 1976.

price of sugar (η) has been estimated to be .06[1/]. That is, a ten percent change in the price of sugar, other things equal, leads to an average change in GDP of 0.6 percent. World price fluctuations for sugar can be substantial. For example, in 1973-74 the world price of sugar increased by 83 percent, which subsequently boosted GDP about five percent (based on the estimate of η = .06).

Exports of coffee, cacao, and tobacco also have experienced gains in value in recent years, though not so dramatically as for sugar. These traditional products account for about 20 percent of total export value (Table 1.5). Until recently, bauxite was the country's only mineral export. Exports of ferronickel began in 1972, and by the mid-1970s ferronickel ranked as the second most important export product. Dore, a silver-gold alloy by-product of ferronickel mining, also has become a major export. Mineral exports now account for more than 20 percent of total export value. Like sugar, minerals are subject to changing world market conditions. Unlike sugarcane growing, mining involves highly capital-intensive production methods, which means that relatively few jobs are created by increased mineral exports. Also, known reserves are relatively small, so that minerals are unlikely to replace traditional agricultural exports as the country's main earners of foreign exchange.

Exports of industrial manufactures do not yet play a major role in the earning of foreign exchange. They account for less than eight percent of total exports of goods. Recent industrial legislation has stimulated growth in several industrial "free zones". About 45 firms in

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[1/] Applegate, M. J. A Macroeconomic Analysis of the Economy of the Dominican Republic. USAID/DR Report, 1976.

TABLE 1.5

VALUE OF TOTAL COMMODITY EXPORTS
AND AGRICULTURAL EXPORTS, 1967-77

Year	Total exports of commodities	Agricultural exports	Agricultural Total (Percent)	Sugar and by-products	Coffee	Cacao	Tobacco	Other agricultural
			(millions of RD$)					
1967	156.2	141.1	90.2	94.2	17.0	12.0	10.5	7.4
1968	163.5	146.0	89.4	91.8	17.9	13.9	11.3	11.1
1969	184.1	163.9	89.0	98.9	21.3	20.1	12.7	10.9
1970	213.5	191.2	89.6	115.9	28.9	19.6	14.3	12.5
1971	240.7	216.9	90.1	145.0	23.8	13.0	20.7	14.4
1972	347.6	271.6	78.1	176.4	29.8	18.4	28.8	18.2
1973	442.1	332.8	75.3	205.8	46.4	24.2	30.3	26.1
1974	636.8	509.5	80.0	348.1	45.6	48.0	39.5	28.3
1975	894.3	725.9	81.2	594.5	43.2	29.0	35.6	23.6
1976	714.4	482.2	67.5	293.0	87.7	44.9	38.0	18.6
1977	778.4	550.1	70.7	248.6	160.8	93.7	28.1	18.9

Source: Central Bank

these zones import raw materials or semi-processed products for simple transformation or assembly and re-export the finished products. Because these firms are primarily attracted to the Dominican Republic by the availability of low-wage labor, their investment per worker is relatively low, about RD$2,100 including the cost of land, buildings, and machinery. Firms located in the free zones must sell the foreign exchange needed to finance their local costs to the Central Bank, which amounted to RD$15 million of foreign exchange earnings in 1976.

The Dominican Republic did not participate in the Caribbean tourist boom of the 1960s. In the 1970s, a significant expansion of hotel capacity took place. Recent growth in tourism has led to further public and private investment in hotels and tourist facilities. It is anticipated that tourism will become increasingly important as a source of foreign exchange.

Economic growth has been accompanied by substantial expansion in imports. Real imports of goods and nonfactor services increased at an average annual rate of 10.6 percent during 1967-74. Total imports amounted to 19-20 percent of GDP in 1974-77. The Dominican Republic imports practically all of its capital equipment and many manufacturing inputs; much of the recent import growth has consisted of machinery and industrial raw materials. Since 1963 the balance of payments has undergone continuing pressures. The value of import has consistently exceeded the value of exports, except for the period of high sugar prices. Foreign public and private capital inflows and credit have offset the current-account deficit and supplemented domestic resources mobilized for investment.

Scarcity of foreign exchange can constrain investment and lower output growth, especially when a country is highly dependent on imported capital goods and inputs. An investigation undertaken for this assessment showed that foreign exchange was a more binding constraint on the economy than domestic savings in the 1950-73 period.[1/] Reduced foreign exchange earnings due to lower sugar prices and volumes of mineral exports created large current-account deficits in 1977 and 1978. Thus, foreign exchange will continue to represent a constraint on investment and economic growth.

1.3 Population, Labor Force, and Employment

1.3.1 Growth of Population

Population has been growing at an average annual rate slightly above 3.0 percent. Total population increased from 3,049,100 persons in 1960 to an estimated 4,705,300 in 1975. Infant mortality is over 10 percent of live births, one of the highest mortality rates in Latin America and almost four times that of developed countries.[2/]

Total population is projected to reach 10,250,000 by year 2000 (Table 1.6). This is a medium projection based on the assumptions that family planning programs will be moderately successful and that the death rate will decline gradually. If the percentage of women practicing birth control does not increase from the current level of 6.5 percent of fertile women, total population could exceed 12,300,000 by year 2000 (high projection). Even with greatly expanded family planning programs,

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[1/] Applegate, Ibid.

[2/] World Bank, Population Project Department. Appraisal of a Population and Family Health Project: Dominican Republic, Report No. 752b - DO. Washington, D.C., 1976.

TABLE 1.6

MEDIUM POPULATION PROJECTIONS
1975 - 2000
(thousands of persons)

Year	Total	Urban	Rural
1975	4,705.3	2,110.2	2,595.1
1980	5,466.0	2,724.3	2,741.7
1985	6,368.5	3,493.8	2,874.7
1990	7,441.9	4,457.2	2,984.7
1995	8,784.5	5,662.6	3,021.9
2000	10,253.4	7,193.9	3,059.5

Source: Projections made for this assessment. For further details, see Appendix Tables A1.2, A1.4, and A1.5. Alternative projections are available. A new set, made by the Research Department of the National Commission on Population and Family (CONAPOFA), are somewhat lower than the ones shown in this table. They are given here for comparision:

Year	High	Medium	Low
1975	4,870.0	4,870.0	4,870.0
1980	5,628.9	5,578.2	5,470.5
1990	7,592.0	7,252.7	6,872.1
2000	9,932.0	9,089.7	8,327.1

For the basis for these projections, see "Nuevas Projecciónes de la Población Dominicana: 1970-2000," Población y Familia, 1:2, Junio-Julio-Agosto, 1978.

total population would reach 8,800,00 by the end of the century (low projection).

The number of Dominicans living in urban areas increased from 929,900 in 1960 (30.5 percent of the population) to an estimated 2,110,200 in 1975 (45 percent of the population). Rural-to-urban migration accounted for almost half of the increase in urban population. Basically, however, the Dominican Republic remains a "rural" society. Approximately 400,000 "urban" Dominicans reside in towns of less than 10,000 inhabitants and many of these persons depend on agriculture for their income (see Chapter 3).

If previous urbanization trends and the medium population projections hold, urban population will more than triple between 1975 and year 2000. By the end of the century, 70 percent of total population (7,194,000 persons) would be living in urban areas. Most of the increases in urban population will occur in the Central Zone, primarily in the city of Santo Domingo which has experienced population growth rates of over 6 percent annually in recent years. Rural population is projected to increase from 2,595,100 in 1975 to 3,059,200 in year 2000. Over 80 percent of the increase in rural population is expected to occur before 1990. Thereafter, rural population can be expected to stabilize. Only modest increases in the rural population are likely after a peak of 3 million or more is reached in the 1990s (Table 1.6).

Average population density was 97 persons/km^2 in 1975. Population densities ranged from 39 persons/km^2 in the south to 235 persons/km^2 in the Central Zone. The projected density by year 2000 is 212 persons/km^2 (Appendix Tables A1.2 and A1.3).

Half the projected increases in rural population during the 1975-2000 period will occur in the Northern Zone where most of the country's small farmers and landless rural workers live. A very modest increase of less than 40,000 rural persons is projected for the Southeast Zone, where many of the Dominican Republic's largest landholdings are located (Appendix Table A1.4). This situation could be changed if more land were irrigated and various agrarian reform settlement projects and crop diversification programs were implemented in the southeastern area.

1.3.2 Growth of Labor Force and Employment

Approximately 45 percent of the labor force was located in urban areas in 1975. This percentage is expected to increase to nearly 68 percent by the year 2000. The projections of urban and rural labor force shown in Table 1.7 are based on the medium population projections given in Table 1.6. Only persons over 15 years of age are included in the labor force estimates. In 1970, the proportion of urban and rural population fifteen years or older was 0.56 and 0.50, respectively. The urban-rural labor force projections used in this assessment are based on the assumption that the past high rate of rural-urban migration will continue.

The total number of new entrants to the work force is expected to average approximately 71,000 workers annually. Under the assumed conditions, about 50 percent of the total new job requirements during the 1975-2000 period will be in Santo Domingo, 35 percent in other urban areas, and only 15 percent in the rural sector. Even assuming considerably lower rates of rural-urban migration, only about 25 percent of the new job requirements during the 1975-2000 period would be in the rural sector.

TABLE 1.7

PROJECTIONS OF URBAN AND RURAL LABOR FORCE
1975 - 2000
(1,000 persons)

Year	Total	Urban	Rural
1975	1,378.9	610.9	768.0
1980	1,634.5	792.7	841.8
1985	1,932.8	1,021.7	911.1
1990	2,273.8	1,309.8	964.0
1995	2,662.3	1,672.0	990.3
2000	3,145.4	2,134.3	1,011.1

Source: These estimates are based on the population projections in Table 1.6. Also, the projections of the labor force are for adult workers, and are based on the assumption that the age structure of the population will remain constant during the projection period. Half the population was adult, aged 15 years or more, and about half the adults were economically active in 1970. (See: Oficina Nacional de Estadística, Departamento de Censos y Encuestos. V Censos Nacional de Población - 1970. Santo Domingo, R.D., 1975.) These projections allow for a gradual increase in the work force participation rates. The elasticities of the labor force with respect to changes in the adult population were estimated at 1.02 and 0.67 for urban and rural areas, respectively during 1960-70. (See: Oficina Nacional de Planificación. Bases Para Formular Una Políticia de Empleo en la República Dominicana. Plandes 19. Santo Domingo, R.D., 1974.)

However, rural underemployment is prevalent, as evidenced by low productivity and income in the rural sector. (See Chapter 3.)

1.3.3 The Unemployment Problem

There are no widely accepted estimates of the rates of unemployment and underemployment in the Dominican Republic. (The government does not even collect unemployment data on a regular basis.) Sample data from the 1970 national population census indicated that approximately 23 percent of the work force was totally unemployed. A 1973 ILO mission estimated that the unemployment and underemployment rate for the Santo Domingo urban zone was 34.2 percent.[1/] (The overall estimate for rural workers was 40.7 percent.) A new survey in 1977-78 for Santo Domingo estimated unemployment to be 24.2 percent.[2/]

The available data provide an adequate basis for two broad generalizations about unemployment. First, unemployment and underemployment rates are high, in the range of 30 to 40 percent. Second, the total rate of

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[1/] Oficina Nacional de Planificación. Bases Para Formular Una Política de Empleo en la República Dominicana. Plande 19. Santo Domingo, R.D., 1974.

[2/] Encuesta de Mano de Obra en la Ciudad de Santo Domingo, Cifras Preliminares. In contrast to these estimates, the 1976-77 household survey conducted by the Central Bank gave the following results:

	rural	urban	total
labor force	802,000	585,800	1,387,800
employed	751,600	524,400	1,276,000
unemployed	50,400	61,400	111,800
% unemployed	6	10	8

The much lower estimates of unemployment in this survey reflect the definition of employment. A person working for even one hour during the survey period was counted as employed. Unless public welfare programs or private income transfers are available, poor people do not have the option of open unemployment. For that reason, underemployment--that is, working in low-productivity jobs--is a more pervasive problem than open unemployment, especially in rural areas. Low productivity, and resultant rural poverty, is the feature of the rural economy that is emphasized in Chapter 3.

underemployment is higher in rural areas than in urban areas.

The demand for workers in the future (i.e., supply of jobs) will depend largely on the sectoral rates of growth and changes in output-per-worker in the major production sectors. The employment projections shown in Table 1.8 are based on a 5.5 percent growth rate in GDP and a 1.2 percent annual increase in output-per-worker. Although the projected rates are below those of the past decade, they are considered reasonable rates for expected long-term growth in the 1980s and beyond. The rates allow for modest improvements in the levels of living per capita as a result of productivity increases. Using these rates, total employment is projected to be 1,723,400 by 1990. The overall unemployment rate would be nearly 24 percent (based on the labor force projections in Table 1.7).[1/]

If the average rate of growth of GDP were only 4.4 percent annually, the 1990 unemployment rate would be about 35 percent. This is essentially no change compared to the existing situation. If output-per-worker were to grow at 1.7 percent per year, and GDP at 5.5 percent, total unemployment would still total about 31 percent of the labor force in 1990. Thus, without change in the underlying economic structure, the supply of jobs will not keep pace with demand for work by the growing labor force.

The average output of persons working in agriculture has increased only gradually since 1960. Output per economically-active person in manufacturing, commerce, and services is 3 to 5 times greater than output per worker in agriculture (Appendix Table A1.6). It is likely to prove

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[1/] Applegate, M. J., op. cit.

TABLE 1.8

EMPLOYMENT PROJECTIONS BY ECONOMIC SECTOR, 1975 - 1990
(based on overall GDP growth rate of 5.5 percent annually, and 1.2 percent rate of change in output-per-worker)

Economic Sector	Year 1975	1980	1985	1990
	(1000 work years)			
Agriculture, Livestock, Forestry & Fishing	401.6	504.8	584.6	684.5
Mining	1.9	1.9	1.4	1.0
Manufacturing	119.1	140.7	171.2	208.8
Construction	37.0	34.1	33.0	31.4
Commerce	92.1	112.3	137.9	168.9
Transportation	50.8	65.6	84.9	110.0
Electricity	1.2	0.8	0.5	0.4
Services and Other[a/]	230.1	278.0	376.6	517.9
Total Employment	933.8	1,138.2	1,390.1	1,723.4

[a/] includes communications, finance, housing, government, and others.

[b/] Sectoral employment (L_i) can be related to sectoral output as follows:

$$L_{it} = \frac{GDP_{it}}{GDP_{io}} L_{io} (1 + \lambda_i)^{-t}$$

where: GDP_{it} = gross domestic product in sector i at time t
GDP_{io} = gross domestic product in sector i during base year
L_{io} = employment in sector i during base year
λ_i = rate of growth of productivity in sector i

The base year for the employment projections is 1970. Employment is expressed in work-years of full-time work. For more details, see: Applegate, M. J. Macroeconomic Structure, Policies, and Performance. USAID/Dominican Republic Report, 1977.

difficult to reduce this difference by enough to have a large effect on rural-urban migration. If so, then part of the rural underemployment problem will be transformed into an urban unemployment problem during the next decade.

A high rate of growth of GDP is essential to reducing the levels of unemployment and underemployment during the remainder of the century. Even with a continuous real growth rate of GDP equal to 5.5 percent, however, unemployment will be a serious problem throughout the decade of the 80s. Family planning programs, although important in the long run, can contribute relatively little to reduce the absolute numbers of new job requirements before the year 2000 because most of the potential work-force entrants have already been born. (They could, however, reduce the requirements for schooling, health facilities, food, etc. needed to maintain a given level of living per capita.) Increased efforts will be necessary to raise the level of productivity and incomes in rural areas through programs and policies which increase agricultural output and improve the income distribution in order to reduce rural-urban migration. In the urban areas, increased emphasis will need to be placed on promoting the adoption of more labor-intensive production methods. Growth of the capital-intensive sectors such as mining and electricity will provide relatively few jobs compared to increased production in labor-intensive industries and the agricultural sector.

Even if growth and employment were successful in reducing open unemployment, the problem of rural underemployment would still remain. This problem will be analyzed in more detail in Chapter 3.
In fact, urban unemployment is unlikely to be reduced to acceptable

levels as long as serious underemployment persists in the rural sector and rural-urban migration is high. This is one of the key interactions between rural and urban development under labor-surplus conditions.

1.4 Income Distribution and Non-Monetary Indicators of Rural Levels of Living

1.4.1 Income Distribution

In 1976-77, the Central Bank conducted a national household income-consumption survey from which income distribution can be inferred. In this survey, income was defined as all earnings, imputed value of housing and subsistence consumption, and transfers in kind. (Cash transfers were excluded from the definition of income.) Average monthly family income was estimated to be RD$306.65 for urban families and RD$123.59 for rural families. The rural average was only 40.3 percent of the urban average.

The estimated national average annual per capita income was RD$662, but rural people received only RD$340 annually on the average. Of total national income, 54 percent went to the 19 percent of the households with incomes over 300 RD$ per month (Table 1.9). About 50 percent of the urban households and more than 75 percent of the rural households had monthly incomes below RD$200. More than 31 percent of all households had monthly incomes below RD$100, and three-fourths of these very low income families live in rural areas. Overall, urban income is more unevenly distributed than rural income (Table 1.10). While slightly more evenly distributed, rural income is only about one-half as large per capita as urban income.[1/]

A comparison of the recent survey data with data in the 1969 Santo Domingo household survey shows that the distribution of income in the

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[1/] Banco Central de la República Dominicana. National Family Income and Expenditure Survey, May 1976-April 1977. Preliminary unpublished data.

TABLE 1.9

INCOME DISTRIBUTION BY STRATA
IN THE DOMINICAN REPUBLIC, 1976-77

Household income strata	Percent households	Percent income	Cumulative percentage Households	Cumulative percentage Income
(RD$/month)		(percent)		
0-50	10.5	1.4	10.5	1.4
50.1 - 100	21.0	7.2	31.5	8.6
100.1 - 200	34.4	21.9	65.9	30.5
200.1 - 300	14.7	15.9	80.6	46.4
300.1 - 400	6.8	10.2	87.4	56.6
400.1 - 600	6.2	13.1	93.6	69.7
600.1 - 800	2.7	8.1	96.3	77.8
800.1 - 1,000	1.3	5.1	97.6	82.9
1,000 - 1,500	1.5	8.0	99.1	90.9
1,500.1 - 2,000	0.5	3.6	99.6	94.5
2,000.1 - 2,500	0.3	3.0	99.9	97.5
2,500.1 and more	0.1	2.5	100.0	100.0
Total	100.0	100.0		

Source: Preliminary data, National Family Income and Expenditure Survey, May 1976 - April 1977, Central Bank.

TABLE 1.10

RURAL AND URBAN INCOME DISTRIBUTION, 1976-77

Decile	Income (cumulative percentage)			
	Total	Rural	Urban	Santo Domingo
1	1.3	1.6	1.1	1.4
2	4.1	4.9	3.8	4.5
3	7.9	9.3	7.7	8.6
4	12.7	14.7	12.6	13.7
5	18.5	21.1	18.6	19.8
6	25.6	28.7	25.9	27.0
7	34.3	37.7	34.8	36.0
8	45.6	48.9	46.2	48.2
9	61.5	64.4	63.2	66.1
10	100.0	100.0	100.0	100.0

Source: Preliminary data, National Family Income and Expenditure Survey, May 1976-April 1977, Central Bank.

capital city has improved slightly in recent years (Fig. 1.1 and Table 1.11).[1/] It is widely believed that urban-rural disparities have increased, however.

1.4.2 Nutritional Status

Malnourishment is a serious problem among low income families in both rural and urban areas. It is a more serious problem in rural areas in the sense that rural incomes are on the average substantially lower than urban incomes and because there are more poor persons living in rural areas.

Surveys carried out by the Institute of Nutrition for Central America and Panama (INCAP) indicate that caloric and protein consumption levels in rural areas are, respectively, only 71 and 73 percent of minimum requirements. National surveys by the Pan American Health Organization in 1972 indicated that only 25 percent of the children under 5 years had a "normal" nutritional status. Only two countries in the Western Hemisphere--Haiti and Guatemala--had lower percentages of normally nourished children. A nationwide survey of 5,500 low and middle income persons conducted in 1969 found that the majority of the people examined had clearly been chronically undernourished almost from birth.[2/]

The 1975 USAID Health Sector Assessment for the Dominican Republic reported that 70 percent of the Dominican population suffers from some degree of malnourishment. Protein-calorie deficiencies were the most serious nutritional problems, particularly among children 0-5 years of age.

[1/] Banco Central, Estudio Sobre Presupestos Famliares, Santo Domingo, 1971.

[2/] These findings are summarized in: U.S. Agency for International Development/Dominican Republic Mission. Health Sector Assessment for the Dominican Republic. Santo Domingo, R.D., 1975.

Fig. 1.1 Lorenz Curves of Income Distribution in the Dominican Republic

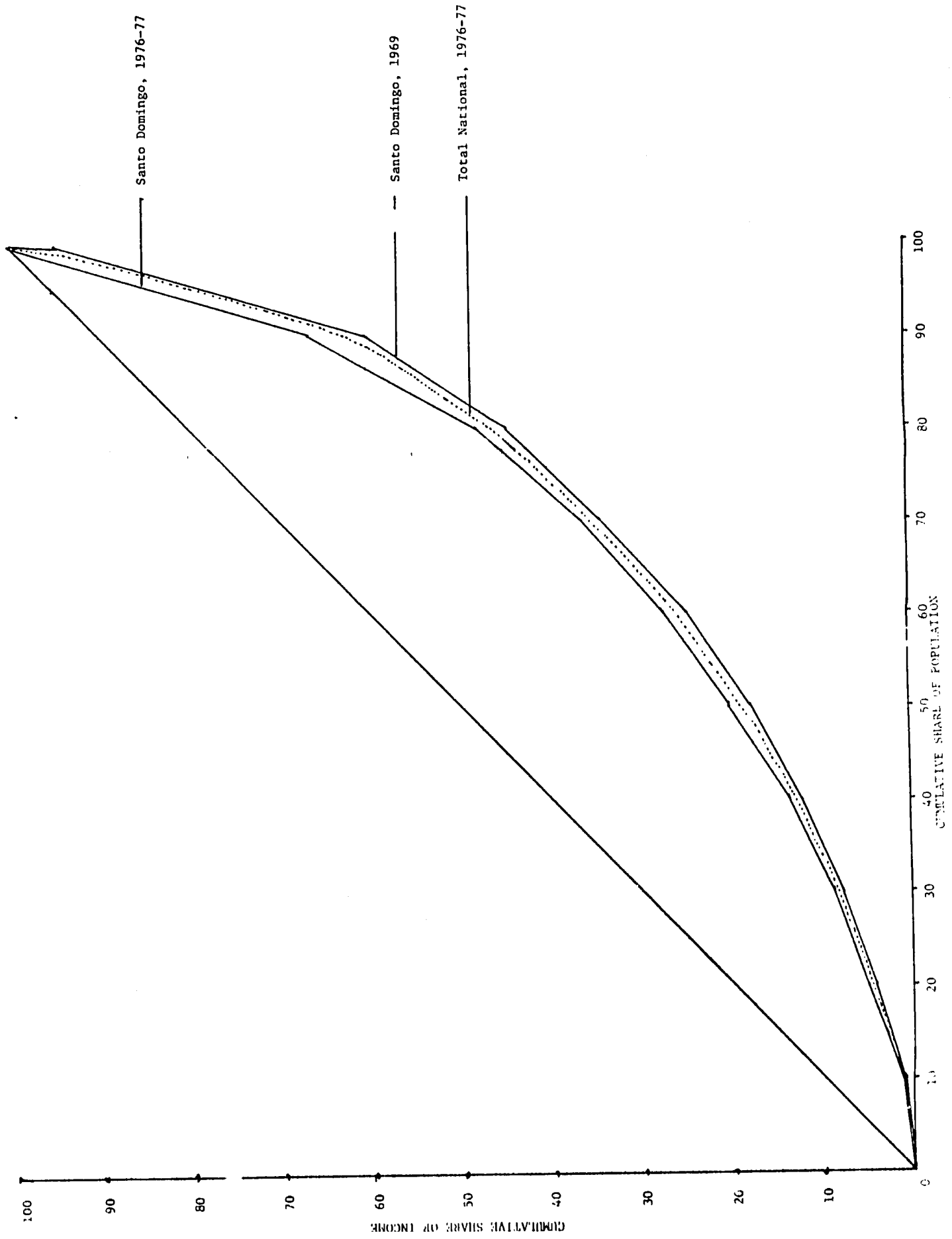

TABLE 1.11

INCOME DISTRIBUTION IN SANTO DOMINGO, 1969

Monthly Family Income Level	Cumulative Percentage	
	Families	Income
0-50	5.1	0.6
50.1-100	23.2	5.4
100.1-200	53.3	20.1
200.1-300	71.6	35.1
300.1-400	81.9	47.0
400.1-600	90.4	61.1
600.1-800	93.7	68.8
800.1-1000	95.8	75.5
1000.1-more	100.0	100.0

Source: Estudio Sobre Presupuestos Familiares, Vol. I, Central Bank, National Statistics Office and USAID, Santo Domingo, 1971.

Other significant dietary problems include Vitamin A, riboflavin, vitamin B_{12}, Vitamin E, copper, zinc, and magnesium deficiencies. The average daily calorie intake (1,634 cal.) and protein intake (45 grams) were, respectively, only 76 and 82 percent of that recommended by the Secretariat of Health. For families with RD$50 per month or less, daily per capita consumption of calories and proteins was estimated to be 1,424 calories and only 28 grams of protein. The USAID health sector study confirmed that more serious nutritional problems exist in the rural than in the urban areas, especially in the Southwestern Zone. Average calorie consumption in the rural sector was estimated at 94 percent of the national average and consumption of proteins at only 89 percent of the national average.

Efforts are being made to improve the nutritional situation of the nation's poor. The Secretariat for Health, with support from an AID loan, has established an Office of Nutrition. The most important programs are those administered by U.S. voluntary agencies using PL480 Title II foods, a GODR fresh milk distribution program, and a GODR subsidized-food program. The GODR is spending about RD$6.5 million, annually, on nutrition programs. Total efforts are estimated to reach approximately 12 percent of the population.

1.4.3 Health

Nearly 48 percent of the population is under 15 years of age, and it is predictable that infectious diseases, particularly gastroenteritis and the communicable diseases of childhood, respiratory infections, and prenatal disorders, will dominate the picture of morbidity. Given the extent of malnutrition, it is apparent that this will contribute to significantly elevated mortality rates from different infectious diseases due to the

synergistic effect of malnutrition and infection.

The Dominican Republic has one of the lowest physician-to-population ratios in the Americas. One of the contributing causes has been the emigration of medical school graduates to Puerto Rico and the United States, a trend that lasted around 15 years. More recently, the medical migration has shifted to Venezuela. The majority of the health professionals are located in the largest urban areas--Santo Domingo and Santiago--where most are engaged in curative and medical specialty services. (The GODR is taking steps to assign young graduates to serve in small communities before they get their medical license to practice.) Less than 5 percent of physicians have received any training in curative rather than preventive health services. The highest concentration of both hospital beds and ambulatory care facilities exist in the Santo Domingo area. The same holds true for ancillary services such as laboratory and X-ray facilities. Over half of these resources are located in the National District, which contains less than one-quarter of the population. A major portion of the investment in high quality health facilities is in medical equipment such as X-ray machines, laboratories, and surgical suite equipment. Most public health facilities are supplied with only the most basic equipment and services. Because these resources are mainly utilized for curative medicine, and even the equipment that exists is frequently inoperative, the result is poor efficiency in the use of assigned medical personnel. An AID Health Loan has provided assistance for the development of a low cost, preventive medicine (including family planning) program for the rural poor.

Nearly 40 percent of family health care expenditures are for medicines, primarily for prescription and related drugs. Drugs are imported and

distributed almost entirely through private channels. There is availability of medical and pharmaceutical supplies in many parts of the country. Public health facilities have very limited drug supplies. There is very little in the way of a low cost distribution system for medicines. As a result, the existing distribution is oriented primarily to the urban areas and to the upper-income groups.

Approximately 55 percent of the people in urban areas and only 20 percent in rural areas have access to public water systems. The Secretariat of Health has initiated a program for the development of a potable water, latrine, and health education, which during its five-year first phase will reach approximately 500 communities. Only the largest cities have sewer systems.

Access to water and adequate waste disposal systems are extremely important factors in community health. The lack of easy access to water in rural areas is undoubtedly one of the major reasons why the incidence of diarrhea is three times greater in rural compared to urban areas. An estimated 1,840,000 rural people need waste disposal services. An estimated 320,000 new latrines are required to provide minimal service. At present, public programs are resulting in the construction of only 8,400 latrines per year. Even with no population growth, it would require 39 years to satisfy the requirements of rural areas at this rate.

In summary, by almost any measure, the rural population of the Dominican Republic has very limited access to health services, medicines, water, or adequate waste disposal systems. Many doctors leave the country after being trained. Relatively few work in rural areas. Very few are trained in public health and preventive medicine. Add the inadequate

diets of the rural poor, and the seriousness of the health problems faced by the rural poor is readily apparent.

1.4.4 Education

In 1976, private and public sector educational expenditures accounted for approximately 3 percent of GDP and 12.9 percent of the central government's expenditures. The literacy rate in 1970 was estimated to be 68 percent for the nation (80 percent in urban areas and 57 percent in rural areas). During the 1974-75 school year, nearly 62 percent of the population 5-14 years of age was enrolled in school. The comparable figure for the 15-19 year age group was 38 percent.[1/]

There are substantial differences in the ability of the educational systems in rural and urban areas to retain students. In recent years, roughly 50 percent of the students who entered grade one in urban areas completed grade six. The comparable figure for rural areas was only 9 percent.

The number of students per teacher in rural areas is approximately 62 compared to almost 53 in urban areas. Most of the operating costs of schools is accounted for by teachers' and administrators' salaries. Relatively little public money is invested in school equipment or maintenance of school facilities. The rural population is effectively denied opportunity for secondary education (beyond grade six) because of the low rural primary retention rates and lack of secondary schools in rural areas.

1.4.5 Housing

Although there is an average of 4.7 persons per house in both rural and urban areas, there are substantial differences in the quality of

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[1/] Secretaria de Estado de Educación Bellas Artes y Cultos. Diagnóstico del Sector Educativo en la República Dominicana. Santo Domingo, R.D., 1977.

housing. More than half of the homes in the Dominican Republic have only one bedroom or less. The major part of these are located in rural areas. Approximately one-third of the nation's homes have dirt floors. Over 80 percent of these homes are located in rural areas. One-third of the homes are judged to have inadequate roofs. Over three-fourths of these are in rural areas.

It is hardly surprising that the quality of housing available to families is closely related their level of income. The construction boom of the past 10 years has had little affect on the quality of housing available to the rural poor.[1/]

1.5 Government Policies

1.5.1 Industrial and Foreign Exchange Policies

As noted in the section of foreign trade, exports and imports are important elements in the economy. Although the total value of agricultural exports other than sugar has continued to increase, their relative importance has declined as the result of the rapid growth of mineral exports since the early 1970s. Overall, the relative importance of agricultural exports has declined from approximately 84 percent of total exports in 1967 to 71 percent in 1974. This decline in relative importance has been due primarily to the rapid increase in mineral exports which in recent years have increased to approximately 20 percent of total exports.

Economic growth has been accompanied by a rapid increase in imports. Merchandise imports increased from US$278 million in 1970 to an estimated US$847 million in 1977. Leading imports in 1977 were petroleum products (US$248 million), machinery (US$123 million), motor vehicles (US$79 million),

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[1/] World Bank. Main Problems in the Economic Development of the Dominican Republic. Report No. 1705-DO. Washington, D.C., 1977.

iron and steel products (US$72 million), and cereals (US$60 million).

The government has attempted to encourage the growth of domestic manufacturing through industrial incentive laws which provide both tax and tariff exonerations to firms, depending on their product classification and location. The most important single industrial policy instrument is the investment incentive system created by Law 299 in 1968. The Dominican tariff structure provides an average effective protection level of over 100 percent for the industrial sector as a whole. Protection has been an important factor in encouraging import-substitution industries.[1/]

Estimates of the marginal propensities to import investment and consumption goods indicate that over half of the additional investment goods and raw materials, and approximately 20 percent of the additional consumption goods purchased each year, are imported. The proportion of additional consumption goods imported is falling by about one-half percent annually. The proportion of additional investment goods and raw materials imported is falling by more than one percent per year. This suggests that the government's efforts to promote import-substitution industries have had some--albeit limited--success.[2/]

Manufacturing is a major contributor to GDP (18.6 percent in 1978). Employment in manufacturing doubled during 1968-77. Production is concentrated in light, non-durable consumer goods for the domestic market. Exports of manufactures was 4.1 percent of manufacturing production, and 6.7 percent of total commodity exports in 1977. (Another 7 percent of exports came from the Export Processing Zones.)

[1/] World Bank, 1977, op. cit.

[2/] Applegate, M. J., op. cit.

In addition to fiscal incentives and protective tariffs, the government provides subsidized credit, infrastructure investments, and access to foreign exchange at the official rate to encourage manufacturing.

While the official exchange rate has long been fixed at a rate of one-to-one with the United States dollar, the Dominican peso is overvalued at the official exchange rate. As a result, a dual or "parallel" market for foreign exchange exists and has become an important feature of foreign transactions. The United States dollar is traded at a premium which rose from about 8 percent in 1973, to 20 or more percent by 1978. As much as 50 percent of foreign payments flow through the parallel market. Commercial banks have not been allowed to operate in the parallel market. Therefore, the demand for foreign exchange in the parallel market is for those foreign payments for which the Central Bank will not provide official exchange while the supply originates in tourism and the undervaluation of exports.

The present foreign exchange policies encourage the importation of merchandise, raw materials, and capital goods that can be imported at official exchange rates. It is difficult to assess precisely who has benefitted from the existing system for foreign exchange. Urban workers may have benefitted some through increased jobs in import-substitution industries and somewhat lower prices for merchandise that can be imported at official exchange rates. It seems very likely, however, that upper-income groups, particularly importers and investors who have access to foreign currencies at official exchange rates, have benefitted more than either the urban or rural poor.

The combined industrial incentive and foreign exchange policy measures have had several unfavorable effects on the economy. The introduction of capital-intensive technology has been encouraged. Profitability of high-cost production for the small domestic market has been enhanced. The use of foreign inputs has been subsidized. Food imports have been promoted. The present government has expressed concern with the strategy that has fostered high-cost industrial capacity, producing only for the protected and limited domestic market. It has stated its intentions to switch to a more export-oriented policy and to further develop industrial linkages to agriculture.[1/]

The public external debt at the end of 1977 was approximately US$596 million. This is not high compared to other developing nations. It remains in the manageable range with a debt-service ratio (share of annual export earnings required to service external public debt) of only 7.7 percent, one of the lowest in Latin America. Nonetheless, the Dominican Government continues to be concerned about its balance of payments situation and continues to impose import restrictions on more goods and to enlarge the list of items for which official exchange will not be made available. These actions have tended to "institutionalize" the parallel market for foreign exchange. The government intends to legalize use of the parallel market by permitting the proceeds from non-traditional exports to be sold in that market.

1.5.2 Monetary and Credit Policies

Prior to the 1970s a large portion of private banks' credit was

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[1/] World Bank. Current Economic Memorandum on the Dominican Republic. April 30, 1979, p. 8.

oriented to financing the commercial activities. In 1968, the Central Bank began to implement policies intended to reorient commercial banks' financing to promote investments in import-substitution and export-oriented industries. These efforts began to have a significant effect by the early 1970s.

The expansionary policies of the Central Bank have contributed to both the increased rates of growth and inflation. During the 1972-76 period, total commercial bank lending grew from US$317 million to US$835 million. Total deposits in commercial banks grew from US$367 million to US$811 million during the same period. Savings and time deposits usually account for about 60 percent of total deposits.

Concern over the rate of inflation in recent years has caused the Central Bank to implement somewhat less expansionary monetary policies. Nonetheless, the money supply in 1977 increased by over 12 percent and the price level increased by 24 percent.[1/]

At present, it does not appear that the growth of domestic industrial firms is severely constrained by credit shortages or high interest rates. The industrial sector has access to credit at relatively low interest rates from numerous sources. These include the Fondo de Inversiones para el Desarrollo Económico (FIDE), three private development finance corporations (DFCs), the private banking system, and the Corporación de Fomento Industrial (CFI). FIDE funds are available at 9 percent annual interest. Commercial bank loans have an interest charge of 12 percent, which after minimum deposit requirements and other charges is equivalent to approximately 18 percent. FIDE, CFI, and DFC funds are used mostly for long-term

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[1/] Central Bank, Monthly Bulletin.

fixed capital investments while commercial bank funds are used for both fixed and working capital. In addition to domestic credit sources, industrial firms have access to the Eurodollar market through the subsidiaries of multinational banks operating in the country. Most institutional credit goes to fairly large projects and plants. CFI's projects usually require financing of between US$150,000 and US$500,000.

1.5.3 Agricultural Credit

The nominal value of formal agricultural credit increased from RD$62 million in 1965 to RD$130 million in 1974, a total increase of nearly 110 percent. The prices of agricultural inputs increased considerably during this 10-year period, however. As a result, the increase of credit in real terms was only 37 percent. Measured in real terms, the Agricultural Bank supplied nearly 13 percent less credit in 1974 than it did in 1965, while commercial banks provided nearly 4.7 times more credit in 1974 than in 1965.[1/]

USAID, the Interamerican Development Bank (IDB), and World Bank have made a substantial contribution to the overall supply of public-sector agricultural credit in the Dominican Republic. Loans from these sources accounted for about 45 percent of the increase in agricultural credit between 1965 and 1974. It appears that the public institutions actually decreased their own contributions to agricultural credit because the foreign aid for credit exceeded the gain in loan volume by some RD$13 million. It is clear that the public sector was substituting foreign for domestic resources allocated to agricultural credit in this period. (See Chapter 5 for further analysis of the agricultural credit system.)

[1/] Adamm, D. W. and J. Ladman. Assisting Small Farmers Through Finance Markets in the Dominican Republic. USAID/DR Report, Sept. 1975.

Since 1969 commercial banks have, on the average, allocated about 8.5 percent of their loan portfolios to agriculture. It is obvious that the rapid growth of commercial bank loans for agriculture does not reflect a shift in the banks' portfolios toward agriculture but rather that the banks have maintained agriculture's share of rapidly growing total portfolios (Table A1.7). Most commercial bank credit goes to larger farmers. In the early 1970s, roughly 30 to 40 percent of commercial bank agricultural credit went for livestock and the remainder for crop loans.

Since 1970, about 25 percent of the total agricultural credit from formal financial institutions have gone to small-farmer loans (i.e., for loans up to RD$2,000.). This percentage has not changed significantly since 1965. Indeed, had it not been for credit programs funded through loans from USAID and IBD intended to reach small farmers, the total proportion of agricultural credit going to small farmers probably would have declined substantially. (The credit situation of small farmers is discussed more fully in Chapter 5.)

1.5.4 Consolidated Public Sector Expenditures

The Dominican public sector includes the Central Government, municipal governments, autonomous agencies, and government enterprises. The government is directly involved in industry, commerce, and agriculture, largely as a heritage of the Trujillo era. The State Sugar Council (CEA) is the country's largest enterprise. Some 35 enterprises are run by the State Enterprise Corporation (CORDE). In addition, the government has developed a number of state farms specializing in the production of food crops.

The consolidated revenue and expenditures of the public sector include

those of the Central Government, local governments, autonomous agencies, and those government agencies for which data are available. Consolidated public sector expenditures in 1975 were over RD$1,000 million, which was equivalent to 28 percent of GDP. In recent years, Central Government revenues and expenditures have been between 60 and 70 percent of the consolidated government totals. Local government expenditures are usually less than 2 percent of consolidated public expenditures. Autonomous agencies and government enterprises account for 25-35 percent of the consolidated totals.

Expenditures on social services such as education, health, housing, and water have accounted for about one-fourth of total government expenditures in recent years. Economic services for agriculture, industry, urban areas, banking, price controls, etc. have accounted for more than half of total expenditures. General services have accounted for about 20 percent of total expenditures. (Table 1.12 provides a functional classification of consolidated public sector expenditures for 1972-75.) In recent years, expenditures on food price programs have been of major importance. Such expenditures accounted for over 15 percent of total expenditures in 1975.

Total public investment during the 1966-75 period was RD$1,708.8 million. Public works including dams, public buildings, and roads accounted for over 27 percent of the total. Public investments in agricultural and irrigation projects accounted for over 19 percent. Industry and mining accounted for nearly 17 percent. Investments in education, health, and housing accounted for 4.1, 6.3, and 10 percent, respectively (Table 1.13).

The share of public-sector fixed investment (in real terms) in GNP grew from 4.3 to 8.3 percent during the 1968-73 period. This expansion

Table 1.12. Functional Classification of Consolidated Public Sector Expenditures, 1972-75
(RD$ Millions)

	1972			1973			1974			1975		
	Current	Capital	Total	Current	Capital	Total	Current	Capital	Total	Current	Capital	Total
Total Expenditures	271.8	188.5	460.3	329.5	211.0	540.5	509.9	278.5	788.4	526.0	478.2	1,004.2
Social Services	98.2	43.2	141.4	110.4	51.0	161.4	132.0	60.7	192.7	154.1	82.8	236.9
Education	41.3	6.1	47.4	46.0	13.1	59.1	51.4	12.3	83.7	60.5	10.4	70.9
Health	50.0	4.1	54.1	57.9	1.9	59.8	71.7	2.9	74.6	80.5	5.4	85.9
Housing	2.9	17.5	20.4	1.9	22.4	24.3	4.2	30.7	34.9	5.3	45.2	50.5
Sewage & Potable Water	1.7	14.4	16.1	2.0	13.1	15.1	15.1	14.1	16.0	5.4	20.9	26.3
Other	2.3	1.1	3.4	2.6	0.5	3.1	2.8	0.7	3.5	2.4	0.9	3.3
Economic Services	68.0	141.2	209.2	98.0	153.2	251.2	234.7	205.7	440.4	225.6	323.6	549.2
Agriculture	13.0	14.7	27.7	12.9	26.9	39.8	17.4	33.9	51.3	17.3	32.8	50.1
Irrigation	2.8	14.0	16.8	3.8	15.4	19.2	3.6	47.9	51.7	3.6	50.4	54.0
Industry & Mining	2.4	5.8	8.2	2.9	4.6	7.5	19.2	5.7	24.3	2.9	8.2	11.1
Transport and Comm.	12.6	37.5	50.1	13.5	29.0	42.5	14.7	29.1	43.8	16.6	36.5	53.1
Urbanism	0.7	30.0	30.7	0.7	38.3	39.0	0.9	32.1	33.0	0.9	35.8	36.7
Energy	0.9	23.4	24.3	0.3	25.5	25.8	0.6	42.7	43.3	0.5	68.8	69.3
Sugar	0.1	7.4	7.5	--	8.2	8.2	0.1	15.1	15.2	--	50.4	50.4
Banking	12.4	0.3	12.7	15.4	3.0	18.4	21.5	-7.2	14.3	27.2	26.4	53.6
Price Control	32.2	6.3	29.5	48.5	2.1	50.6	156.4	4.3	160.7	152.4	1.4	153.8
Other	-0.1	1.8	1.7	--	0.2	0.2	0.1	2.7	2.8	4.2	12.9	17.1
General Services	105.6	4.1	109.7	121.1	6.8	127.9	143.2	12.1	155.3	146.3	71.8	218.1
General Administration	28.8	2.7	31.5	33.2	4.0	37.2	38.1	4.0	42.1	35.3	9.0	26.5
Justice & Police	18.5	0.1	18.6	20.6	0.4	21.0	26.0	2.1	28.1	26.1	1.3	27.2
Defense	31.3	1.2	32.5	33.9	1.2	35.1	44.5	3.6	48.1	50.5	4.6	55.1
Local Government	20.6	--	20.6	22.2	1.1	23.3	24.3	2.1	26.4	24.1	2.4	26.4
Other	6.4	0.1	6.5	11.2	0.1	11.3	10.3	0.3	10.6	10.4	72.5	82.9

Source: USAID estimates based on data in Ejecucion del Presupuesto: 1972-75 National Budget Office.

Table 1.13 Public Investment by Sector, 1966-75[a]

Year	Total	Industry Mining & Power	Public Works b/	Agriculture and Irrigation	Education	Health c/	Housing c/	Other
				(millions of RD$)				
1966	45.8	6.3	16.0	11.8	2.6	1.8	2.7	4.6
1967	63.1	9.4	13.0	14.4	1.1	2.3	8.9	14.0
1968	74.7	9.7	15.7	15.4	2.6	3.3	6.5	21.5
1969	106.0	16.5	20.7	16.1	5.1	9.4	9.1	29.1
1970	126.6	25.8	31.0	17.7	7.5	11.0	10.4	23.2
1971	136.4	30.3	51.0	18.6	8.9	2.9	18.2	6.5
1972	188.5	29.2	67.5	28.7	6.1	18.5	17.5	22.6
1973	211.0	30.1	67.3	42.3	13.1	15.0	22.4	20.8
1974	278.5	48.4	61.2	81.8	12.3	17.0	30.7	27.1
1975	478.2	77.0	72.3	83.2	10.4	26.3	45.2	163.8
Total	1,708.8	282.7	415.7	330.0	69.7	107.5	171.6	332.2
Percent	100.0	16.6	24.2	19.2	4.1	6.3	10.0	19.5

Source: Statistical Data Book: Dominican Republic, USAID/DR, May, 1976.

a/ Public sector includes central and municipal governments and autonomous agencies.

b/ Includes transportation, communication, urbanization projects.

c/ Includes water and sewage projects.

was achieved at the expense of current outlays of the public sector. Real current outlays of the public sector declined at an average annual rate of 2.3 percent over the 1968-73 period.

The major effort of the past decade to improve the nation's physical infrastructure has not been matched by sufficient increases in funds for operating and maintaining the facilities constructed. Public health facilities lack adequate supplies and staff to the extent that some hospitals remain closed to the public for prolonged periods after being completed. The inadequate maintenance of some roads and bridges has made them nearly impassable. Irrigation systems experience waste of water due to the neglect of existing canals. Throughout the public sector, inadequate staffing and low wages have discouraged the formation of a competent, well-trained civil service.[1/]

1.5.5 Central Government Fiscal Policies

During the early 1960s, the Central Government was heavily dependent on external assistance, mainly from USAID. Since about 1967, however, its basic fiscal objectives seem to have been to: (1) reduce the nation's dependence on bilateral assistance, (2) keep real operating expenditures at a constant level, and (3) increase public capital investments designed to stimulate economic growth, reduce unemployment and improve urban infrastructure. It has followed a fairly conservative fiscal policy in pursuit of these objectives.

Central Government revenues increased from RD$189.4 million in 1968

[1/] World Bank, 1977, op. cit.

to RD$583.9 in 1976. This represented nearly a 68 percent increase in real terms. Import taxes have traditionally been the most important source of the Central Government's revenue. Their relative importance fell from 45 percent of total tax revenues in 1968 to 35 percent in 1976. The relative importance of excise and sales taxes increased slightly from 19 percent in 1968 to 22 percent in 1976, but in some years have accounted for less than 15 percent of total tax revenue. Taxes on income increased from RD$29.7 million to RD$123.8 during the 1968-76 period. Their relative importance increased from 17 to 23 percent of total tax revenues. Three-quarters of income tax revenues are from taxes on corporate profits. Personal income taxes have remained well below their potential yield and taxes on wealth, such as land, are almost negligible. Export tax revenues were only RD$9.5 million in 1968 or about 5.5 percent of total tax revenues. They increased to RD$153.5 million in 1975 and then fell to RD$62.4 million in 1976, reflecting the effects and special taxes imposed on sugar, coffee, and cocoa (Table 1.14).

Tax revenues have grown at a slower rate than national income. They declined from 16.3 to 13.1 percent of GDP during the 1971-76 period. With the decline in world prices of the nation's major exports and the Central Bank's efforts to reduce the rate of growth of imports, tax revenues are likely to grow very slowly, if at all, unless major tax reforms are implemented. Such reforms would have to place greater emphasis on income taxes, particularly personal income taxes, taxes on wealth (including land), and enforcement of existing tax laws.[1/]

[1/] World Bank, 1977, op. cit.

TABLE 1.14

CENTRAL GOVERNMENT REVENUES 1968-1976
(in RD$ millions)

	1968	1969	1970	1971	1972	1973	1974	1975	1976
Total Revenues	189.4	216.6	242.2	276.0	315.3	360.3	474.3	652.4	583.9
Tax Revenues	173.7	198.4	224.0	254.4	285.5	327.5	434.7	591.9	538.1
Taxes on Income	29.7	36.0	45.6	53.1	62.4	72.9	99.6	126.9	123.8
Taxes on Capital	7.6	8.1	8.6	8.4	9.0	10.4	12.2	14.8	16.3
Excise and Sales Taxes	33.5	38.6	44.2	48.0	51.2	51.7	61.6	84.8	118.4
Services Taxes	2.5	3.7	4.0	4.8	6.4	6.9	8.6	10.1	NA
Import Taxes	77.5	89.2	97.9	111.3	118.6	133.7	165.3	178.9	186.7
Export Taxes	9.5	9.2	9.0	12.7	19.7	30.4	64.8	153.5	62.4
Other Taxes	6.1	5.0	5.0	5.6	6.9	9.5	9.8	10.2	30.5
Fees	7.3	8.6	9.7	10.7	11.3	12.0	12.8	12.7	NA
Non-Tax Revenues	14.2	16.0	14.8	17.3	21.0	21.8	27.3	44.6	26.3
Services Receipts	0.8	0.8	0.8	1.0	1.1	1.1	1.2	8.9	0.9
Profit Transfers	9.6	11.4	12.0	13.7	17.8	18.6	24.0	32.6	22.7
Receipts from Sales	3.1	2.5	1.2	1.5	0.7	0.7	1.0	1.8	1.3
Fines and Other Recharges	0.7	1.3	0.8	1.1	1.4	1.4	1.1	1.3	1.3
Extraordinarily Receipts	1.5	2.2	3.4	4.2	8.8	11.0	12.3	15.9	19.5
Sale of Property	0.8	1.5	2.2	3.2	4.2	4.8	10.2	6.2	4.2
Other	0.7	0.7	1.2	1.0	4.6	6.4	2.1	9.7	15.3

Source: Ejecución del Presupuesto, ONAPRES.
ONAPLAN.

The Central Government's expenditures for operating expenses increased from RD$130.3 million in 1970 to RD$242.5 million in 1976, but remained almost constant in real terms. Expenditures for personal services during the period dropped by nearly 15 percent in real terms, in spite of an increase of RD$62.7 million in nominal terms. Expenditures on direct investments increased from RD$62.2 million to RD$167.8 million during the 1970-76 period. In real terms, this was nearly a 46 percent increase (Table 1.15).

An analysis of the structure of Central Government expenditures during the 1970-76 period suggests that substantially greater emphasis was given to social services during the period. Central Government expenditures on social services increased by 36 percent in real terms compared to only a 23 percent real increase in expenditures on economic services and a 4 percent decrease in real terms on general services.

There are indications that the present government will give higher priority to solving the problems of the rural poor. To accomplish that goal, future budgets would have to increase expenditures on rural social services, particularly health, education, extension, and sanitation programs. Public investment programs would have to place more emphasis on labor-intensive rural works such as feeder roads, small irrigation projects, and better maintenance and repair of existing infrastructure. Every peso spent on road maintenance, for example, is estimated to generate 2.5 times more employment than a peso spent on highway construction.[1/]

1.5.6 Foreign Economic Assistance

During the 1960s, the government relied heavily on foreign assistance to meet budgetary deficits. USAID was a major source of budgetary support

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[1/] World Bank, 1977, op. cit.

TABLE 1.15
CENTRAL GOVERNMENT EXPENDITURES
1970 - 1976

(RD$ millions)

		1970	1971	1972	1973	1974	1975	1976
I.	Current Expenditures	172.9	182.9	195.2	220.7	275.3	286.3	328.5
	Operating Expenses	130.3	136.4	145.3	163.8	197.9	220.6	242.5
	Personnel Services	109.0	113.4	118.9	127.5	143.6	161.3	171.7
	Other Operating Expenses	21.3	23.0	26.4	36.3	54.3	59.3	70.8
	Other Current Expenses	42.6	46.5	49.9	56.9	77.4	65.7	86.0
	Current Transfers	40.8	43.8	47.2	51.9	71.5	60.1	80.1
	Interest Payment	1.8	2.6	2.7	5.0	5.9	5.6	5.9
	Other Expenses	---	0.1	---	---	---	---	---
II.	Investment	91.9	122.1	139.1	166.7	233.5	378.7	243.4
	Direct Real Investment	62.2	86.3	103.9	124.2	122.5	240.4	167.8
	Constructions	48.9	71.1	91.3	107.8	105.3	153.4	150.8
	Equipment and Other	13.3	15.2	12.6	16.4	17.2	87.0	17.7
	Indirect Investment	29.7	35.8	35.2	42.5	111.0	138.3	75.6
	Capital Transfers	19.8	26.1	24.9	32.8	92.7	125.8	57.8
	Debt Amortization	9.9	9.7	10.3	9.7	18.3	12.5	17.2
	Total Expenditures	264.8	305.0	334.3	387.4	508.8	665.0	571.9

Sources: 1966-1975 - Ejecución del Presupuesto, ONAPRES.
1976 - ONAPLAN

during the 1963-68 period. The relative importance of USAID assistance declined after 1968 as the Interamerican Development Bank and the World Bank increased their financing of development projects. At present, USAID assistance emphasizes only the agricultural, health, and education sectors (Table 1.16).

USAID commitments to the Dominican Republic during the 1962-77 period totaled US$352.2 million. (This amount excludes PL480 Title I and II commitment of approximately US$142.5 million.) Of the total USAID commitment of US$352.2 million, US$211.9 million was supporting assistance. Besides these budgetary-support loans, an additional US$97.3 million in development loans was authorized during the 1963-76 period (Table 1.17).

1.6 Economic Growth: Prospects to 1990

The projections presented in this section are based on an econometric model of the Dominican Republic economy.[1/] Such models require that values for the independent (or exogenous) variables be determined first. These values are then used to derive the projected values of the dependent (or exogenous) variables which depend on the estimated parameters of the model.

Two sets of projections are presented. The first (Set I) is considered to be a set of "medium" projections. This set is based on the general assumption that, on the average, the Dominican Republic will be able to maintain an overall growth rate of real GDP of 5.5 percent under conditions similar to those observed during the past ten years. The second (Set II)

[1/] A complete description of the model is presented in a Ph.D. dissertation by Eric Graber entitled, "Strategy, Policies, and Programs for Economic Growth and Social Progress in the Dominican Republic: With Reference to Rural Development," Iowa State University, 1978.

TABLE 1.16

OFFICIAL EXTERNAL LOAN COMMITMENTS
1966 - 1976 ($000)

	U.S. - Total			International Donors				
	AID	PL 480[1]	Eximbank[2]	IMF[3]	IDB[4]	IBRD/IDA	Other Donors[5]	Total
1966	64,426	--	8,066	26,600	5,240	--	--	104,332
1967	21,636	--	5,826	23,200	2,950	--	--	53,612
1968	25,825	14,365	3,993	15,900	24,850	--	--	84,933
1969	8,000	6,884	5,479	21,200	7,360	--	--	48,923
1970	1,750	8,511	--	9,900	3,400	--	--	23,661
1971	--	6,811	--	11,700	4,100	9,000	--	31,611
1972	5,100	11,267	6,425	4,100	33,700	6,000	--	66,592
1973	--	4,888	28,128	--	39,000	13,000	--	85,016
1974	12,000	--	8,360	--	36,700	21,000	--	78,060
1975	4,800	--	30,810	--	35,500	8,500	20,000	99,610
1976	15,000	--	6,640	25,000	33,400	10,000	60,500	150,540
Total	158,537	52,726	103,727	137,600	226,200	67,500	80,500	826,790

[1]PL 480 Title I. Concessional sales of agricultural commodities.

[2]Source: Eximbank reports.

[3]International Financial Statistics.

[4]IDB representative reports.

[5]Represent $20.0 million agreement with government of Spain, $60.0 million with the government of Venezuela and $0.5 million credit program sponsored by the Latin American Agribusiness Development Corporation.

TABLE 1.17

TOTAL AID DOLLAR ASSISTANCE TO THE DOMINICAN REPUBLIC BY FISCAL YEAR
FY 1962 - FY 1977* (Thousands of $)

FY	Supporting Assistance Total (1)	Supporting Assistance Grants (2)	Supporting Assistance Loans (3)	Development Loans (4)	Technical Assistance Grants** (5)	Total AID Dollar Assistance (1+4+5=6)
1962	--	--	--	--	965	965
1963	48,520	23,800	24,720	2,097	1,680**	52,297
1964	--	--	--	--	927	927
1965	46,900	38,900	8,000	7,398	3,383	57,681
1966	95,382	45,400	49,982	14,444	8,253	118,079
1967	5,000	--	5,000	16,636	6,594	28,230
1968	16,098	--	16,098	9,727	5,624	31,449
1969	--	--	--	8,000	4,322	12,322
1970	--	--	--	2,075	3,405	5,480
1971	--	--	--	--	2,570	2,570
1972	--	--	--	--	1,755	1,755
1973	--	--	--	5,100	1,026	6,126
1974	--	--	--	12,000	563	12,563
1975	--	--	--	--	816	816
1976	--	--	--	4,800	904	5,704
1977*	--	--	--	15,000	201	15,201
TOTAL	211,900	108,100	103,800	97,277	42,988	352,165

* Through December 1976. Includes funds disbursed during transition quarter (July-September 1976).

** Adjustment of $2.2 million has been made so as to include transfers made between projects.

Source: USAID

is considered to be a set of "high" projections. Set II is based on fairly optimistic assumptions about the rate of growth of exports and terms of trade that would allow government expenditures for development to increase fairly rapidly. Although the "high" projections may be optimistic, they illustrate the macroeconomic performance that is needed if the Dominican Republic is to substantially improve the existing unemployment and income distribution situation by 1990.

All projections are in terms of 1962 RD$. The nominal values in terms of current dollars in 1980, 1985, and 1990 will depend on the rate of inflation. The multipliers presented in Table A1.8 can be used to convert the projections in 1962 RD$ to current RD$ assuming the rate of inflation to be 5, 10, or 15 percent annually.

Projection Set I is based on the assumptions that (a) public consumption will increase at an annual rate of 3.6 percent, (b) that exports will grow at their 1950-74 historical rate of approximately 5.4 percent, and (c) that the international terms of trade will be neutral. Under these assumptions, public consumption would increase from RD$169 million in 1980 to RD$242 million by 1990 measured in terms of 1962 RD$ (Table 1.18). Total exports would increase from RD$510 million in 1980 to RD$863 million in 1990.

For both sets of projections, industrial capital increases at a 4.8 percent annual rate and inventories are allowed to increase gradually. Two sets of projections for sectoral outputs are

TABLE 1.18

PROJECTIONS OF EXOGENOUS VARIABLES, 1980-1990
(millions of 1962 RD$)

Exogenous Variable	Projection Set	Growth Rate[a]	Year[b] 1980	1985	1990
1. Public Consumption (CG): Low	I	3.6	169	202	242
2. Public Consumption (CG): High	II	5.6	190	249	320
3. Industrial Capital (K)	I & II	4.8	615	778	983
4. Exports (E): Medium	I	5.4	510	663	863
5. Exports (E): High	II	6.4	540	736	1,004
6. Changes in Inventories (STX)	I & II	--	20	27	37
7. Terms of Trade (TT): Medium	II	--	15	36	72

[a] Average annual compound growth rate.

[b] 1973-75 is used as the base year for projections.

presented.[1/] Both use the same sectoral output elasticities. In other words, it is assumed that the ratio of percentage change in a sector's output divided by the percentage change in gross domestic income remains constant regardless of the rate of growth of GDP.

For projection Set I, GDY increases from RD$2,598 million in 1980 to RD$4,442 million in 1990. Per capita GDY increases from RD$475 to RD$596 during the same period. Under the more optimistic assumptions of projection Set II, per capita GDY increases from RD$513 in 1980 to RD$735 in 1990. In other words, if national income increased at an annual rate of 6.8 percent rather than 5.5 percent, per capita income would be 23 percent greater by 1990 (Tables 1.19 and 1.20).

The projections of the distribution of GDP by sectors under Set I and Set II assumptions are shown in Table 1.21. In both cases, the agricultural sector grows more slowly than any other sector of the economy. Mining and electricity, both of which are highly capital-intensive sectors, are the most rapidly growing sectors. The projections are based on the assumption that the mining sector can continue to grow at the rapid rate

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[1/] Total gross domestic product (GDP) is expressed as the sum of outputs in eight sectors. Sectoral outputs (GDP_i) can be related to total output by sector elasticities (e_i) as follows:

$$GDP_i = A_i GDP_t^{e_i}$$

where A_i = a constant

e_i = elasticity of output of sector i with respect to GDP.

Sectoral output elasticities for the Dominican Republic are available in: Applegate, M. J. A Macroeconomic Analysis of the Economy of the Dominican Republic. USAID/Dominican Republic Report, 1976.

Table 1.19. Projections of Gross Domestic Income and Components, 1980-1990 (millions of 1962 RD$)

Endogenous Variable	Year 1980	1985	1990
Projection Set I[a]			
1. Gross Domestic Income (GDY)	2,598	3,391	4,442
2. Private Consumption (CP)	1,794	2,603	3,423
3. Private Construction Investment (CTNP)	158	211	261
4. Government Construction Investment (GCTN)	196	270	370
5. Investment in Machinery & Equipment (IMCH)	247	335	434
6. Total Imports (M)	696	919	1,188
7. Direct and Indirect Taxes (TD & TI)	401	523	673
Projection Set II[b]			
1. Gross Domestic Income (GDY)	2,804	3,940	5,471
2. Private Consumption (CP)	2,152	3,031	4,199
3. Private Construction Investment (CTNP)	170	243	345
4. Government Construction Investment (GCTN)	203	293	428
5. Investment in Machinery & Equipment (IMCH)	259	373	537
6. Total Imports (M)	745	1,048	1,479
7. Direct and Indirect Taxes (TD & TI)	432	602	842

[a] Assumes low CG, medium E and TT = 0.

[b] Assumes high CG, high E and medium TT.

Note: Base year for lagged endogenous variables was 1973.

Table 1.20. Projections of Per Capita Gross Domestic Income, 1980-1990 (in 1962 RD$)

Endogenous Variable	Year 1980	1985	1990
	(RD$ per capita)		
Projection Set I			
1. Gross Domestic Income (GDY)	475	532	596
2. Private Consumption (CP)	328	409	460
3. Imports (M)	127	144	160
4. Direct and Indirect Taxes (TD & TI)	73	82	90
Projection Set II			
1. Gross Domestic Income (GDY)	513	618	735
2. Private Consumption (CP)	394	476	564
3. Imports (M)	136	165	199
4. Direct and Indirect Taxes (TD & TI)	79	95	113
Population (millions)	5,466	6,368	7,442

Table 1.21. Projections of Sectoral GDP, 1980-1990 (millions of 1962 RD$)

Economic Sector	Year 1980	1985	1990	Growth Rate
Projection Set I				
Agriculture, Livestock, Forestry and Fishing	475	583	723	4.5
Mining	236	353	515	7.4
Manufacturing	442	580	763	5.6
Construction	195	268	364	6.2
Commerce	465	607	790	5.4
Transportation	148	197	262	5.8
Electricity	49	68	93	6.3
Other Services[a]	590	736	932	4.8
Total GDP	2,598	3,391	4,442	5.5
Projection Set II				
Agriculture, Livestock, Forestry and Fishing	496	644	842	5.5
Mining	265	441	675	9.8
Manufacturing	437	671	929	6.9
Construction	215	316	454	7.8
Commerce	499	695	956	7.5
Transportation	159	230	319	7.2
Electricity	53	82	113	7.9
Other Services[a]	625	825	1,111	5.9
Total GDP[b]	2,789	3,904	5,399	6.8
Terms of Trade	15	36	72	--

[a] Includes communications, finance, housing, government and other.

[b] GDY = GDP + TT.

of the past ten years. To do so will require substantial increases in capital inputs.

Estimates of GDP per worker for the 1980-1990 period for projection Set I were obtained using the employment projections given earlier (Table 1.7). The GDP per agricultural worker increases slowly from RD$940 in 1980 to RD$1,056 in 1990 (Table 1.22). The extremely high values of GDP per worker in the mining and electricity sectors reflects the capital-intensive nature of these industries. They also suggest that the linear trend procedures used to project output and employment may tend to overestimate output and possibly underestimate future employment in these sectors. Per capita GDP in the services sector falls gradually over the 1980-1990 period. This is primarily due to the fact that the service sector has been the residual employer for the large number of persons migrating from rural to urban areas. As the gap narrows between the agricultural GDP per rural worker and the services GDP per urban worker, there is less economic incentive for rural-urban migration. The projected sectoral GDPs per worker suggest that if past trends continue through the 1980s there will be very little change in the current distribution of income. Real output of rural workers would increase by about one percent annually. Workers in the services industry would find their real outputs <u>declining</u> by nearly 2.5 percent annually. The agricultural and services sector account for nearly 70 percent of projected total employment in 1990 under Set I assumptions. The services sector alone accounts for 30 percent of total employment in 1990. These workers would experience a 25 percent decrease in real output during the 1980-1990 period. This compares with a projected

Table 1.22. Projected GDP Per Worker, 1980-1990[a]

Economic Sector	Year 1980	1985	1990
	Projection Set I	(RD$ per worker)	
Agriculture, Livestock, Forestry and Fishing	940	997	1,056
Mining	124,210	252,142	515,000
Manufacturing	3,141	3,388	3,654
Construction	5,718	8,121	11,592
Commerce	4,141	4,402	4,677
Transportation	2,256	2,320	2,382
Electricity	61,250	136,000	232,500
Services and Other[b]	2,122	1,954	1,720
Average GDP Per Worker	2,283	2,439	2,577

[a] based on employment projections in Table 1.6.

[b] includes communications, finance, housing, government and others.

increase in real output of over 100 percent for construction workers, who would account for less than 2 percent of total employment in 1990.

1.7 Agriculture's Terms-of-Trade

The domestic terms-of-trade between agriculture and nonagriculture is defined as the price index for agricultural goods divided by the price index of nonagricultural goods. If this ratio declines over time, the change can represent a real transfer of funds from agriculture to nonagriculture. Under these conditions, the agricultural sector could contribute significantly to the generation of investment funds to develop the nonagricultural sector of the economy.

The implicit prices and domestic terms-of-trade between agriculture and nonagriculture from 1966 to 1975 are shown in Table 1.23. The agriculture price index excludes export crops, and the nonagriculture price index excludes mining, which is an export sector. Column (5) includes only domestic crops while Column (6) includes domestic crops and livestock products. In neither case is there a strong indication of a significant change before 1975 in the terms-of-trade. While there have been fluctuations no significant trend occurred during 1966-74. In 1975, terms-of-trade moved against agriculture. This trend has probably continued, especially in 1978 when good crops led to declines in food prices. It appears therefore, that during 1966-74 there was no significant real flows of resources from the domestic agriculture to the domestic nonagricultural sector due to deteriorating terms-of-trade for agriculture. Since 1975, however, it is likely that a deterioration has taken place and that,

TABLE 1.23

IMPLICIT PRICES AND TERMS OF TRADE BETWEEN DOMESTIC

AGRICULTURE AND NONAGRICULTURE

(1962 = 100)

Year	Crops (Excluding Export Crops)	Livestock Products	Crops and Livestock (Excluding Export Crops)	Nonagriculture (Excluding Mining)	Terms of Trade Between Crops & Nonagriculture	Terms of Trade Between Agriculture & Nonagriculture
	(1)	(2)	(3)[a]	(4)	(5)[b]	(6)[c]
1966	115.5	93.3	108.8	108.9	1.06	1.00
1967	112.3	88.3	105.1	112.8	1.00	0.93
1968	118.0	90.7	109.3	117.0	1.01	0.93
1969	126.3	94.0	116.9	117.1	1.08	0.97
1970	134.5	100.6	123.3	122.1	1.10	1.01
1971	143.0	105.4	130.6	125.6	1.14	1.04
1972	145.6	108.9	133.9	134.3	1.08	1.00
1973	156.8	124.0	146.0	136.1	1.15	1.07
1974	162.1	139.5	154.6	158.4	1.02	0.98
1975	150.2	147.1	149.1	192.1	0.78	0.78

Source: Calculated from national income accounts data.

[a] Weighted sum of (1) and (2). Weights were percentage composition in real terms.

[b] Includes only domestic crops.

[c] Includes domestic crops and livestock.

except for drought years, lower relative prices have discouraged domestic food production and transferred capital to the urban sector.

1.8 External Terms-of-Trade

The terms-of-trade between exports and imports have usually been slightly favorable for the Dominican Republic since 1960 (Table 1.24). Import prices, which had increased at approximately 2 percent annually between 1962 and 1972, jumped by over 20 percent in 1973 and then increased by another 45 percent by 1976. Export prices began to increase in 1973 and then jumped by 50 percent in 1974 and an additional 80 percent in 1975 before declining by 83 percent in 1976. The large increases in 1975 reflect the high world prices for minerals and coffee as well as sugar which, together, account for over three-fourths of the value of total exports. By 1976, the terms-of-trade ratio had declined to less than 100, ending a short period of favorable external price trends. Given the dependence of the economy on imports of capital inputs and consumption goods, the rising prices of oil and other imports, and the relatively poor price prospects for sugar and some other exports, declining terms-of-trade in the future appear likely. The large deficit in the country's current account in 1977-78 is a reflection of this problem.

1.9 Summary

An important conclusion from this macro review is that while the economy has experienced high rates of growth in GDP during the past decade, the development process has been biased in favor of the nonagricultural, urban sectors of the economy. Although the typical pattern of structural change in a developing economy results in a relative decline in the agricultural share of GDP, at least part of this decline in the Dominican

TABLE 1.24. IMPLICIT PRICE INDEXES FOR IMPORTS AND EXPORTS AND TERMS-OF-TRADE: 1960-76 (1962 = 100)

Year	Export Prices (1)	Import Prices (2)	Terms of Trade (3) = (1)/(2)
1960	91.2	106.1	86.0
1961	86.7	102.0	85.0
1962	100.0	100.0	100.0
1963	112.8	103.0	109.5
1964	115.0	105.1	109.4
1965	100.6	107.0	94.0
1966	111.2	109.0	102.0
1967	109.8	111.0	98.9
1968	118.0	113.0	104.4
1969	125.0	115.0	108.7
1970	126.4	117.0	108.0
1971	126.7	119.0	106.5
1972	130.4	121.0	107.8
1973	140.5	143.7	97.8
1974	191.5	175.4	109.2
1975	270.4	186.1	145.3
1976[a]	186.8	189.5	98.6

[a] Preliminary.

Republic is due to government investment, trade, monetary and fiscal policies. The overvalued peso discourages nontraditional exports and encourages imports of capital and consumer goods. The industrial incentive policies, which combine cheap credit, subsidized imports of capital goods through access to "official" foreign exchange, and tax write-offs, favor industry over agriculture and encourage capital-intensive production.

The overall performance of the economy reflects some of the elements of a sustained development process. The significant structural transformation and increases in real per capita GDP indicate that a necessary condition for making major inroads into alleviating poverty is being met. However, it is now recognized that an increase in per capita income, while necessary, is not a sufficient condition for reducing poverty because of the question of the distribution of income. The distribution of income is closely related to employment and productivity, or the ability of the economy to fully employ the labor force in productive ways and absorb additions to the labor force resulting from population growth.

The distribution of income in the Dominican Republic has been shown to be highly unequal both with respect to its size distribution and to the urban-rural distribution. This unequal distribution of income manifests itself in undernourishment and poor health of the population, particularly in rural areas. High rates of growth of total GDP have led to little, if any, improvements in the distribution of income. What this means is that policies lacking emphasis on employment and income distribution are not sufficient to achieve significant increases in levels of living of the poor, in spite of considerable success in promoting high rates of overall

growth.

The importance of foreign exchange and its effects on growth and employment has been demonstrated. Also, the importance of biasing the development process in favor of labor-intensive production techniques is evident. Present government policy is biased at least in part against export-oriented activities and labor-intensive technologies.

The analysis of employment showed that a growth rate of over 6 percent will have to be sustained if unemployment is to fall significantly. Given prospects for declining sugar prices and restrictive monetary and fiscal policies, medium-term prospects for growth of GDP are not good. The virtual stagnation of the economy in 1977-78 made growing unemployment unavoidable. This situation stresses the need for the government to modify policies biased against exports and employment. It is tempting for policy-makers to want to reduce the country's dependence on sugar, but care is needed not to reduce dependence at the expense of decreased availability of foreign exchange that could further constrain growth in output and employment.

This analysis also supports basic agricultural policies in line with stated government goals: (1) to accelerate job creation in rural areas, (2) to improve income distribution, (3) to improve the nutritional levels of the poor through increased food production for domestic consumption, (4) to contribute to industrial development by providing a steady growing supply of raw materials, and (4) to expand the sector's balance-of-payments by producing more exportable raw and processed products and through import substitution.

It is clear that present policies with respect to foreign exchange, investments, taxation, and industrial incentives are not consistent with these stated policy objectives.

Further growth, if it is to help in any significant way to solve the problems of rural poverty in the Dominican Republic, needs to be conceived as an instrument for economic and social development of the rural sector and the nation as a whole. Increasing agricultural output is an important part of rural development, but growth and equity need to be pursued concurrently. Recent development thought provides a convincing rationale for assisting the poor elements of the rural sector first and emphasizes that this approach is based on economic reality as well as social justice.

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TABLE A1.1

GROSS DOMESTIC PRODUCT AND REAL INCOME PER CAPITA
(at constant 1970 prices)

Year	GDP (million RD$)	Real Income (million RD$)	Population (000 persons)	GDP Per Capita	Real Income Per Capita
1973	2,052.7	1,966.1	4,431.7	463	444
1974	2,175.9	2,182.6	4,562.3	476	476
1975	2,288.9	2,416.2	4,696.8	487	514
1976[a]	2,436.2	2,360.0	4,835.2	504	488
1977[a]	2,544.2	2,494.8	4,977.7	511	501

Source: National Accounts, Central Bank.

[a] preliminary.

TABLE A1.2

PROJECTIONS OF TOTAL POPULATION BY ZONE, 1975-2000

Zone	1960-70 Average Annual Rate of Growth of Population	Population Projections 1975	1980	1985 (1,000 Persons)	1990	2000
Northwestern	2.1	275.8	306.0	339.5	376.7	463.7
Northern	2.3	1,148.1	1,286.3	1,441.2	1,614.8	2,027.1
Northeastern	1.7	600.1	652.9	710.3	772.8	914.6
Southwestern	2.2	376.3	419.5	467.8	521.5	648.3
Southern	3.0	263.7	305.7	354.4	410.9	552.2
Central	4.5	1,600.5	1,994.5	2,485.5	3,097.4	4,810.1
Eastern	2.6	440.8	501.1	569.8	647.8	837.4
Total Republic	2.9[a]	4,705.3	5,466.0	6,368.5	7,441.9	10,253.4

[a] Not used for projection purposes; projections for Total Republic are sums of regional projections.

TABLE A1.3

POPULATION DENSITY IN 1960 AND 1970, AND PROJECTIONS BY ZONE, 1975-2000

Zone	Population Density 1960	Population Density 1970	Projections 1975	Projections 1980	Projections 1985	Projections 1990	Projections 2000
	(Inhabitants/Km.^{2})						
Northwestern	45	52	61	68	75	84	103
Northern	87	113	122	137	153	172	216
Northeastern	88	104	113	123	134	146	173
Southwestern	35	45	48	54	60	67	83
Southern	25	33	39	46	53	61	82
Central	121	189	235	293	366	456	707
Eastern	38	50	57	64	73	83	107
Total Republic	63	84	97	113	132	154	212

TABLE A1.4

PROJECTIONS OF RURAL POPULATION BY ZONE, 1975-2000

Zone	Rural Population Projections[a]				
	1975	1980	1985	1990	2000
			(1,000 Persons)		
Northwestern	168.8	176.9	184.3	191.7	204.0
Northern	733.6	762.8	788.3	809.0	829.1
Northeastern	456.7	477.8	499.3	520.9	563.4
Southwestern	291.6	312.5	339.2	367.7	431.1
Southern	139.2	150.1	160.9	171.3	189.4
Central	544.2	588.4	618.9	631.9	543.5
Eastern	261.0	273.1	283.8	292.2	299.0
Total Republic	2,595.1	2,741.7	2,874.7	2,984.7	3,059.5

[a] Assumes intercensus rate of urbanization remains constant.

TABLE A1.5

PROJECTIONS OF URBAN POPULATION BY ZONE, 1975-2000

Zone	Urban Population Projections[a]				
	1975	1980	1985	1990	2000
			(1,000 Persons)		
Northwestern	107.0	129.1	155.2	185.0	259.7
Northern	414.5	523.5	652.9	805.8	1,198.0
Northeastern	143.4	175.0	211.0	251.9	351.2
Southwestern	84.7	107.0	128.6	153.8	217.2
Southern	124.5	155.6	193.5	239.6	362.8
Central	1,056.3	1,406.1	1,866.6	2,465.5	4,266.6
Eastern	179.8	228.0	286.0	355.6	538.4
Total Republic	2,110.2	2,724.3	3,493.8	4,457.2	7,193.9

[a] Assumes intercensus rate of urbanization remains constant.

TABLE A1.6

ECONOMICALLY ACTIVE POPULATION AND OUTPUT PER ECONOMICALLY ACTIVE PERSON BY SECTOR OF ACTIVITY, 1960 AND 1970.

Sector	Economically Active Population				Output per Econ. Active Person	
	1960		1970 a/		1960	1970
	(1000 persons)	%	(1000 persons)	%	(1962 RD$/person)	
Agriculture[b]	540.9	65.9	623.2	54.9	470.5	503.5
Mining	2.6	0.3	1.0	--	4,653.8	18,122.4
Manufacturing	71.8	8.7	121.0	10.7	1,605.8	1,781.1
Electricity	3.8	0.5	2.1	0.2	2,310.9	9,358.0
Construction	22.2	2.7	34.5	3.0	964.3	1,862.3
Commerce	58.6	7.1	92.8	8.2	2,248.0	2,419.7
Transportation	23.0	2.8	52.9	4.7	1,405.4	1,412.6
Services	98.1	12.0	207.3	18.3	2,040.3	1,650.4
Total	820.7	100.0	1,134.9	100.0	945.1	1,121.3

Source: 4th National Population Census - 1960; 5th National Population Census - 1970; Banco Central, Cuentas Nacionales.

[a]Workers for whom a sector of activity was not specified have been distributed among sectors according to percentage distributions of economically active persons among sectors.

[b]includes livestock, forestry, and fishing.

TABLE A1.7

DISTRIBUTION OF COMMERCIAL BANK CREDIT
WITHIN ECONOMIC SECTORS, 1972-76.

	1972	1973	1974	1975	1976
			(1,000 RD$)		
Total Credit	275.8	375.7	561.7	661.7	763.2
Basic Production Sectors	162.6	222.7	348.2	421.8	459.6
Agriculture	21.1	34.5	46.9	61.9	61.9
Industry	114.0	147.9	231.9	277.9	292.7
Construction	15.6	25.3	43.7	49.1	64.8
Services	12.2	15.0	25.7	32.9	40.2
Other (Commerce, Consumers, Etc.)	112.9	153.0	212.5	239.9	303.2
			Percentage Distribution		
Total	100.0	100.0	100.0	100.0	100.0
Basic Production Sectors	59.1	59.3	62.0	63.7	60.2
Agriculture	7.7	9.2	8.3	9.3	8.1
Industry	41.3	39.4	41.3	42.0	38.3
Construction	5.7	6.7	7.8	7.4	8.5
Services	4.4	4.0	4.6	5.0	5.3
Other (Commerce, Consumers, Etc.)	40.9	40.7	38.0	36.3	39.8

Source: Central Bank

Table A1.8

INFLATION MULTIPLIERS: 10% ANNUAL INFLATION RATE

Variable	Base 1975[a]	Multipliers[e] 1980	1985	1990
Exogenous				
1. Public Consumption (CG)	185	2.46	3.44	5.03
2. Industrial Capital (K)	151	2.12	3.10	4.69
3. Exports (E)	170[b]	2.31	3.29	4.88
4. Change in Inventories (STX)	230	2.91	3.89	5.48
5. Terms of Trade (TT)	170[c]	2.31	3.29	4.88
Endogenous				
1. Gross Domestic Income (GDY)	162	2.23	3.21	4.80
2. Private Consumption (CP)	177	2.38	3.36	4.95
3. Private Construction Investment (CTNP)	191	2.52	3.50	5.09
4. Government Construction Investment (GCTN)	151	2.12	3.10	4.69
5. Investment in Machinery & Equip. (IMCH)	118	1.79	2.77	4.36
6. Total Imports (M)	170[d]	2.31	3.29	4.88
7. Direct and Indirect Taxes (TD & TI)	162	2.23	3.21	4.80
Sectoral GDP				
1. Agriculture, Livestock, Forestry and Fishing	214	2.75	3.73	5.32
2. Mining	110	1.71	2.69	4.28
3. Manufacturing	218	2.79	3.77	5.36
4. Construction	173	2.34	3.32	4.91
5. Commerce	161	2.22	3.20	4.79
6. Transportation	165	2.26	3.24	4.83
7. Electricity	90	1.51	2.49	4.08
8. Other Services	163	2.24	3.22	4.81

Explanatory Notes:

[a] Implicit price index for 1975 with 1962 = 100.

[b] Adjusted downward by 100 to adjust for unusually high prices of major exports.

[c] Set equal to price index for exports.

[d] Adjusted downward to equal price index for exports in 1975. With positive terms of trade for Projection Set II, import multipliers are 1980 = 2.26, 1985 = 3.16, and 1990 = 4.59.

[e] To convert the constant price projections in tables 1.15, 1.16, 1.17 and 1.18 to current DR$ multiply constant price projections by the current price multipliers. The multipliers are based on a constant 10 percent rate of inflation compounded annually beginning at the 1975 base price index. For example, Projection Set I GDY for 1985 in constant prices is RD$ 3,391 million. The current price projection would be (3.21)(3,391) = RD$ 10,885 million in 1985 RD$.

Note on Population Statistics

Census data and the implied intercensus rates of change for regional population groups were used in the development of the population projections in Tables A1.2-A1.5.

On the basis of Demographic Survey findings, Nelson Ramírez determined that there was underenumeration of females under the age of five in the 1970 census, and that there were other discrepancies in the reported age distribution.[1/] If Ramírez's recalculation of the 1970 census is correct, then the census underestimated actual total population by almost 150,000 persons. His estimate of total population in 1970 is 4,210,400 persons. Based on this figure, total population increased at an average annual rate of 3.3 percent over the 1960-70 period; not at 2.9 percent, the rate based on census figures.

Total population is estimated to have increased at an average annual rate of 3.6 percent over the 1950-60 period. A 3.3 percent average annual rate for the 1960-70 period would be more in line with the 1950-60 trend than would be a 2.9 percent rate. However, it is believed that there was under-reporting in 1950. Since unknown sources of error still remain in the 1970 census, and since other censuses have not been thoroughly evaluated yet, there is much uncertainty about the reliability of population statistics in the Dominican Republic.

Alternative Projections

Census data contained in Table A1.9 and the implied intercensus rates of change for regional population groups were used in the development of

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[1/] See: Ramírez, Nelson. Proyecciones de la Población de la República Dominicana por Sexo y Edad, 1970-1990. Asociación Dominicana Pro Bienestar de la Familia, Inc., Santo Domingo, 1975.

TABLE A1.9

TOTAL URBAN AND RURAL POPULATION BY REGION
1960 AND 1970

Region	1960 Total	1960 Urban	1960 Percent Urban	1960 Rural	1960 Percent Rural	1970 Total	1970 Urban	1970 Percent Urban	1970 Rural	1970 Percent Rural
Northwestern	202.9	57.6	28.4	145.2	71.6	248.6	87.7	35.3	160.9	64.7
Northern	816.1	182.0	22.3	634.1	77.7	1,024.7	323.2	31.5	701.4	68.4
Northeastern	464.3	70.4	15.2	394.0	84.9	551.6	115.8	21.0	435.8	79.0
Southwestern	270.4	47.4	17.5	222.9	82.4	337.5	72.6	21.5	264.8	78.5
Southern	169.5	61.1	36.0	108.5	64.0	227.5	99.0	43.5	128.5	56.5
Central	825.2	431.7	52.3	393.5	47.7	1,284.3	788.4	61.4	495.9	38.6
Eastern	298.6	79.7	26.7	219.0	73.3	387.7	140.1	36.1	247.6	63.9
Total	3,847.1	929.9	30.5	2,117.1	69.5	4,861.9	1,626.9	40.0	2,435.0	60.0

Source: 4th National Population Census - 1960, and 5th National Population Census - 1970, figures adjusted to mid-year.

the population projections contained in tables in Chapter 1 of the main text. These projections should be considered medium estimates.

Alternative population projections prepared by Ramírez for the 1975-1990 period and statistics reflecting the nature of important assumptions underlying these are presented in Table A1.10. Total population is projected to be between 7,842,800 persons and 8,505,200 persons in year 1990. Population growth accelerates over much of the projection period due to the assumption that there will be a more rapid decline in the death rate than in the fertility rate. Ramírez's projections are also based on the assumption that 10,000 Dominicans will migrate to other countries each year. In the past, external migration has contributed to reduce population growth in the Dominican Republic. All of the projections contained in Table A1.10 are higher than those used in this assessment. The projected total population for 1990 given in Chapter 1 is 7,441,900 persons, which is 400,000 persons less than Ramirez's lowest projection. Ramírez's calculations indicate the urgent need for continued expansion of family planning programs.

As indicated in Chapter 1, a new set of projections has now been published that place the projected 1990 population at 7,592,000, a figure that is very close to the projections used in this study. However, the CONAPOFA projections for the year 2000 are somewhat lower, based on a belief that birth rates are falling somewhat more rapidly than had been expected.

TABLE A1.10

ALTERNATIVE PROJECTIONS OF TOTAL POPULATION
AND SELECTED DEMOGRAPHIC STATISTICS, 1975-1990

Year	Projection I				Projection II				Projection III			
	Total Pop. (1000 persons)	Gross Births per 1000	Gross Deaths per 1000	Natural Growth per 1000	Total Pop. (1000 persons)	Gross Births per 1000	Gross Deaths per 1000	Natural Growth per 1000	Total Pop. (1000 persons)	Gross Births per 1000	Gross Deaths per 1000	Natural Growth per 1000
		(av for 5-yr period)				(av for 5-yr period)				(av for 5-yr period)		
1970[a]	4,210	46.3	13.2	33.1	4,210	45.8	13.1	32.7	4,210	45.4	13.1	32.3
1975	4,917	47.9	11.6	36.3	4,904	46.4	11.5	34.9	4,895	45.2	11.5	33.7
1980	5,843	48.3	10.0	38.3	5,787	45.6	9.8	35.8	5,742	43.2	9.6	33.6
1985	7,028	47.6	8.3	39.3	6,871	43.4	8.1	35.3	6,742	39.4	7.9	31.5
1990	8,505				8,147				7,843			

Source: Ramirez, Nelson. Proyecciones de la Población de la República Dominicana por Sexo y Edad, 1970-1990. Asociación Dominicana Pro Bienestar de la Familia, Inc., Santo Domingo, 1975.

[a] recalculation of 1970 population census.

Chapter 2

LAND AND WATER RESOURCES AND UTILIZATION

This chapter describes and analyzes the implications of current patterns of land and water use in Dominican agriculture.[1/] Its purpose is to provide a basis for identifying policies and programs to modify land and water use to improve the performance of the agricultural sector. Some attention is also given to forest resources.

2.1 Agricultural Zones and Planning Regions

The Secretariat of State for Agriculture (SEA) uses seven agricultural zones for programming purposes (Fig. 2.1). These agricultural zones are subregions of three major planning regions defined by the National Planning Office.[2/] Geographical features largely determine the boundaries of the planning regions (Fig. 2.2). For this study, statistical data are mainly organized according to the seven agricultural zones and the three planning regions.[3/]

The Northern Region [frequently referred to as the Cibao] contains the country's best agricultural land and most of the irrigation. Santiago, the Dominican Republic's second city, is the commercial hub of this region.

[1/] A good deal of information for this chapter was taken from the AID-USDA project "Comprehensive Resource Inventory and Evaluation System" (CRIES). In Spanish, this project is referred to as "Sistema de Inventario y Evaluación de Recursos Agricolas" (SIEDRA). The project is identified in this document as CRIES or as CRIES/SIEDRA.

[2/] Regionalización de la República Dominicana, Oficina Nacional de Planificación, Unidad de Estudios Regionales, Santo Domingo, 1966.

[3/] Some statistical data in the Dominican Republic are available by province. There are 27 provinces including the National District. For administrative purposes, provinces are subdivided into a total of 97 municipalities.

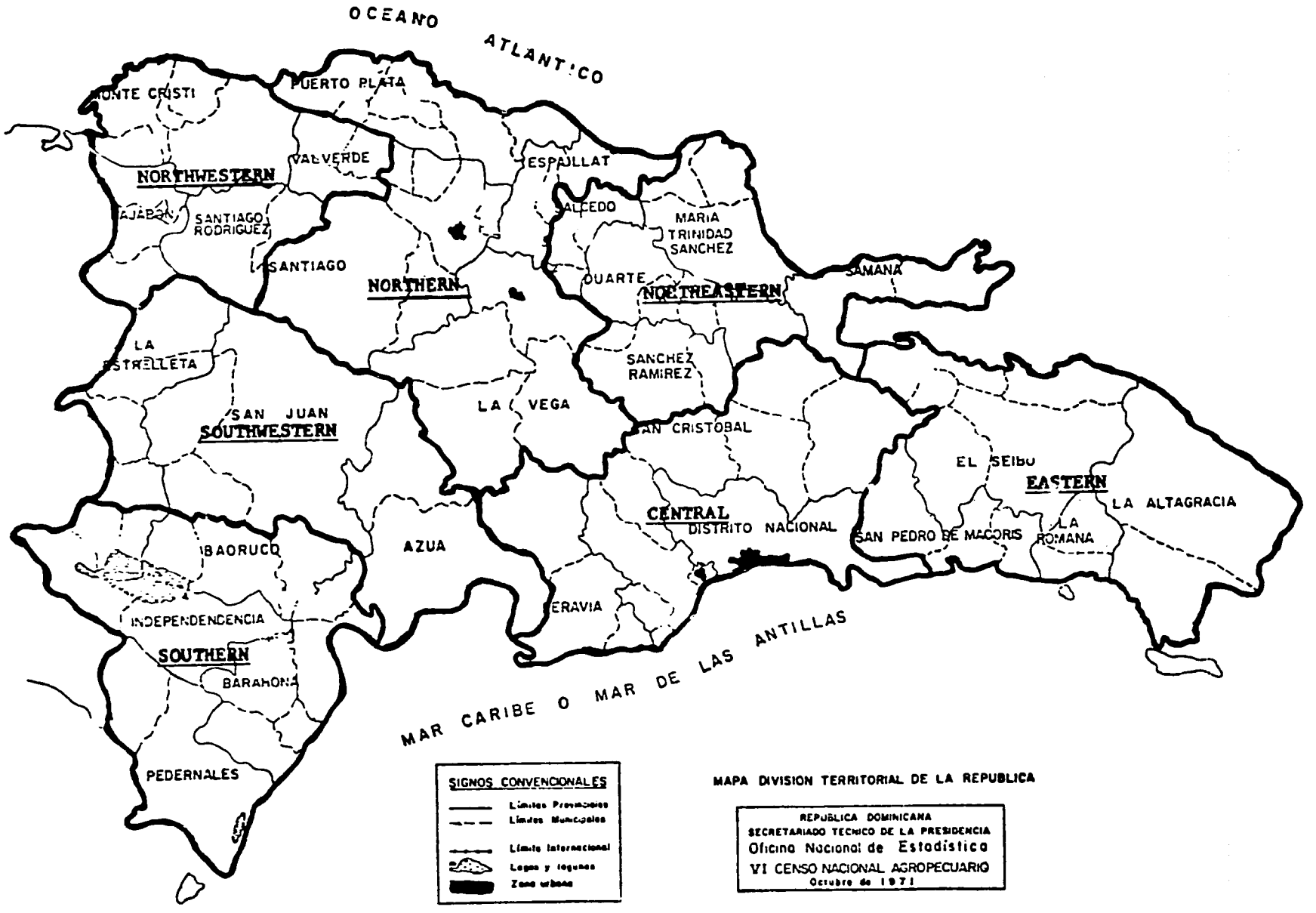

Figure 2.1 Agricultural Zones of the Dominican Republic

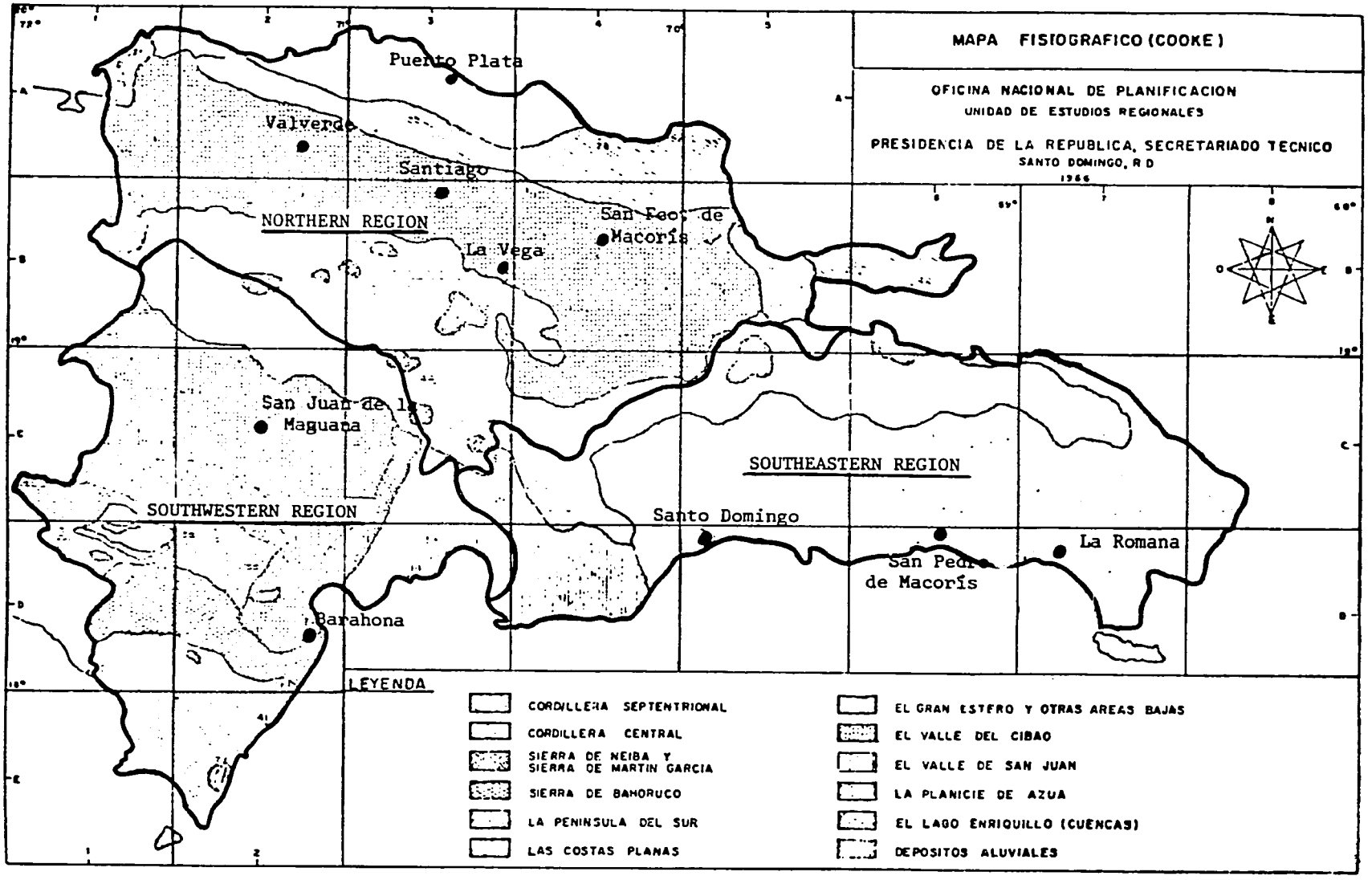

Figure 2.2 Major Planning Regions of the Dominican Republic

Currently 43 percent of the total population lives in the Northern Region. It includes the Northwestern, Northern, and Northeastern Agricultural Zones.

The Southwestern Region is bimodal. A mountain range separates the Neyba VAlley in the Southern Zone, which is largely arid, and the San Juan Valley, which is partially irrigated. Much of this region's territory is not suited to agriculture since it is arid and mountainous. The Southwestern Region includes the Southern and Southwestern Agricultural Zones. Agricultural production in the Southern Zone is based on coffee, sugarcane, and coconuts. The Southwestern Zone's major products are rice, corn and beans.

The Southeastern Region contains the National District and most of the country's large-scale industry. Like the Cibao, the Southeastern Region has about 43 percent of the population. Many of the Dominican Republic's largest land holdings are in this region. These large farms specialize in sugarcane and livestock production. The Southeastern Region includes the Central and Eastern Agricultural Zones.

The major transportation network within and between regions is generally well developed with the exception of the Southwestern Region. The road network in that region is poor. Secondary and feeder roads connecting villages to the major roads are considered inadequate in most of the country.

2.2 Land in Farms

The decade of the 1960s was a period of rapid incorporation of land into farms.[1/] Land in farms grew from 2,257,600 hectares in 1960 to 2,736,200 hectares in 1971, an increase of more than 20 percent (Table 2.1). (This increase was offset by a comparable increase in rural population during the

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[1/] Includes land in cattle ranches.

period.) By 1971, 57 percent of the total land area was in farms, a high percentage in comparison to many other countries. The Northeastern Agricultural Zone had 88 percent of its area in farms, whereas the Southwestern and Southern Agricultural Zones had less than 30 percent of their area in farms (Table 2.1).

The possibilities for increasing land in farms are now limited. The National Planning Office (ONAPLAN) estimates that a maximum of 1,085,000 hectares are suitable for intensive cultivation and practically all of this land already is in farms.[1/]

The purpose of land classification is to indicate something about the potential utilization of the land. The soil classification used for the data given here considers: a) erosion and runoff, b) wetness and drainage, c) root zone and cultivation limitations, and d) climatic factors. The better quality crop land (963,000 ha) consists of land classified as Class I through Class IV (Table 2.2). The remainder of the land considered suited to intensive cultivation (121,200 ha) is land with Class V soils. These soils are heavy, poorly drained clays but they can be successfully used for rice production. In addition, some of the land with Class VI soils can be used less intensively for tree crops.

As is often the case, land in production is not limited to land that is "suitable" on the basis of agrophysical characteristics. Small farmers usually have no option but to use the limited land available to them, whatever its quality. In contrast, farmers with large holdings may choose to use some land below its productive potential. This is a key policy issue. While the

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[1/] ONAPLAN, Posibilidades del Desarrollo Economico-Social de la Republica Dominicana: 1976-86, Plandes 26, Santo Domingo, 1976.

Table 2.1. TOTAL LAND AREA AND LAND IN FARMS BY AGRICULTURAL ZONE, 1960 and 1971.

Zone	Total Land Area	1960 Land Area in Farms	1960 Percent of Total	1971 Land Area in Farms	1971 Percent of Total
	(1,000 ha)	(1,000 ha)		(1,000 ha)	
Northwestern[a/]	476.9	188.0	39.4	195.3	41.0
Northern[b/]	906.5	553.2	61.0	604.9	66.7
Northeastern[c/]	532.4	364.6	68.5	469.5	88.2
Southwestern[d/]	750.3	124.0	16.5	203.1	27.1
Southern[e/]	689.0	115.2	16.7	136.8	19.9
Central[f/]	698.3	443.6	63.5	509.0	72.9
Eastern[g/]	774.5	469.0	60.6	617.6	79.7
Total Republic	4,827.9[h/]	2,257.6	46.8	2,736.2	56.7

Source: CRIES, SIEDRA, USDA, and Secretariat of Agriculture, Rural Resources Base Report, August 1977; Fifth National Agricultural Census, 1960; Sixth National Agricultural Census, 1971.

a/ Includes Monte Cristi, Valverde, Dajabon and Santiago Rodriguez.

b/ Includes Puerto Plata, Espaillat, Santiago, and La Vega.

c/ Includes Salcedo, Maria Trinidad Sanchez, Samana, Duarte, and Sanchez Ramirez.

d/ Includes La Estrelleta, San Juan, and Azua.

e/ Includes Bahoruco, Independencia, Barahona, and Pedernales.

f/ Includes Peravia, San Cristobal, and Distrito Nacional.

g/ Includes San Pedro de Macoris, El Seibo, La Altagracia, and La Romana.

h/ Excludes 16,291 ha in islands.

Table 2.2 Land Capability Classification for the Dominican Republic

Class	Area	Percent	Productive Capacity
	(1,000 ha)		
I	53.7	1.1	Crops (highly intensive)
II	235.0	4.9	Crops (intensive)
III	311.2	6.4	Crops (moderately intensive)
IV	363.9	7.5	Crops (non-intensive)
V	607.1	12.6	Pasture (intensive)
VI	561.1	11.6	Pasture (moderately intensive)
VII	2,516.1	52.1	Forestry, Pasture (non-intensive)
VIII	120.2	2.5	Wildlife, Recreation
Other	59.6 a/	1.2	Bodies of Water and other
Total Republic	4,827.9 h/	100.0	

Source: ONAPLAN, Plataforma para el Desarrollo Económico y Social de la República Dominicana (1965-1985), Santo Domingo, 1968, and Survey of the Natural Resources of the Dominican Republic, General Secretariat of the Organization of American States, Washington, D.C., 1969

a/ estimated
h/ excludes 16,291 has. in islands; source: República Dominicana en Cifras, 1971.

problem of land utilization will be discussed in this chapter and elsewhere in this report, much more analytical work is needed to provide answers about productive potential and optimal utilization of land.

For planning purposes, it is reasonable to assume that total land in farms will not be increased above the level of 1971. Expanding irrigation and improving drainage could result in some addition to the agricultural land base. But, if the over-cultivation of marginal land and consequent erosion in other areas are not stopped, total agricultural land in the Dominican Republic could well decrease on balance in the future. Soil erosion and the incidence of flooding in lowlands have become especially serious in mountainous areas of the Northern and Southwestern Regions. Over-cutting in forests has contributed to this problem (see Section 2.5).

The scarcity of new agricultural land has important implications for rural development in the Dominican Republic. Production per hectare will have to be increased if food supplies per-capita are to be maintained, let alone increased, and export production is maintained. Alternative sources of food, such as fishing, have considerable scope for expansion, but are highly underdeveloped. Moreover, increasing the productivity of land can be extremely important for increasing employment and improving rural levels of living. Projected population increases will reduce the number of hectares of farmland per person from an estimated .59 has. in 1975 to about .27 has. by the end of the century (Table 2.3).

A somewhat different picture emerges if the balance of farmland and the rural population is considered. In Chapter 1, projections that showed that the rural population would increase until 1985 and level off thereafter were presented, assuming a continuation of rapid rural-urban migration.

Table 2.3. Projections of Farmland Per Person, 1975-2000

Zone	1975	1980	1985	1990	2000
			(hectares)		
Northwestern	.67	.60	.54	.49	.40
Northern	.55	.49	.44	.39	.31
Northeastern	.78	.72	.66	.60	.51
Southwestern	.56	.50	.45	.40	.33
Southern	.49	.42	.36	.31	.23
Central	.31	.25	.20	.16	.10
Eastern	1.40	1.25	1.09	.96	.75
Total Republic	.58	.50	.43	.37	.27

Source: population projections in Chapter 1; land in farms from Table 2.1; assumes total land in farms will remain at 1971 level.

Based on these projections, farmland per rural person will decline from 1.1 ha. in 1971 to about 0.9 has. in 1985 and beyond (Table 2.4). By zone, farmland per person in 1985 will range from 0.6 has. in the Southwestern Zone to 2.2 has. in the Eastern Zone.

2.3 Agricultural Land Utilization Patterns

A general consensus concerning broad trends in land use in Dominican agriculture exists on the following: (1) the total amount of land devoted to agriculture (cropland and pasture) has increased over the last 10 to 15 years; (2) the amounts of land in both annual and perennial crops has increased; (3) some of the increase in annual cropland was made possible by a decline in the amount of land in fallow; and (4) much of the increase in land in pasture occurred through the conversion of land previously in nonagricultural uses (e.g., forestry).[1/]

With respect to present use, it is estimated that more than one crop is cultivated annually on about 25 percent of the land in annnual crops, with roughly one-third to one-half of rice land double-cropped. Intercropping is also practiced on large percentages of land in corn, red beans, yuca, plantain, sweet potato, cacao and coffee. In Table 2.5 overall land-use estimates are presented. Tables 2.6 and 2.7 contain "current normal" estimates for land use for annual and perennial crops, respectively.[2/]

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[1] Appendix Tables A2.1 and A2.2 contain data on land utilization in 1960 and 1971 based on the agricultural censuses. For more analysis of land use trends, see Statistical Analysis of the Agricultural Sector, USAID/Dominican Republic Report, January, 1976.

[2] "Current normal" refers to mid 1970s. All data in this section are taken from CRIES/SIEDRA reports and unpublished working documents.

Table 2.4

AGRICULTURAL LAND PER RURAL PERSON, 1960 AND 1971,

AND PROJECTIONS BY REGIONS 1975-2000[a]

Zone	Farmland per Rural Inhabitant		Projections [b]				
	1960	1971	1975	1980	1985	1990	2000
			(hectares)				
Northwestern	1.3	1.2	1.1	1.1	1.1	1.0	1.0
Northern	0.9	0.9	0.8	0.8	0.8	0.7	0.7
Northeastern	0.9	1.1	1.0	1.0	0.9	0.9	0.8
Southwestern	0.6	0.8	0.7	0.6	0.6	0.6	0.5
Southern	1.1	1.1	1.0	0.9	0.9	0.8	0.7
Central	1.1	1.0	0.9	0.9	0.8	0.8	0.9
Eastern	2.1	2.5	2.4	2.3	2.2	2.1	2.1
Total	1.1	1.1	1.1	1.0	0.9	0.9	0.9

[a] based on population projections assuming rapid rural-urban migration.

[b] assumes total land in farms will remain at level of 1971.

Table 2.5

Current Normal[1/] Major Land Use Estimates

Zone	Crop[2/] land	Pasture[3/]	Other[4/]	Total Area[5/] in Farm	Not[6/] in Farms	Total Area
			Hectares			
Northwestern	84,800	84,500	25,900	195,200	281,700	476,900
Northern	201,100	312,600	91,200	604,900	301,600	906,500
Northeastern	229,400	211,300	38,900	469,600	62,800	532,400
Southwestern	133,600	51,100	18,400	203,100	547,200	750,300
Southern	75,700	36,700	19,700	132,100	556,900	689,000
Central	264,900	160,500	87,300	512,700	185,600	698,300
Eastern	216,900	330,100	70,600	617,600	156,900	774,500
Total Republic	1,206,400	1,186,800	352,000	2,735,200	2,092,700	4,827,900

1/ Current normal refers to mid 1970s.

2/ The sum of "Sugar Cane Area," "Area in Annual Crops--Not Intercropped," "Area in Annual Crops--Intercropped," "Area in Perennial Crops," and "Area in Fallow," Cenus Table 12, Vol. I.

3/ "Total Area in Pasture," Census Table 13, Vol. I.

4/ The sums of "Total Area in Farms in Mountains or Forests" and "Total Other Area in Farms" columns, Census Table 13, Vol. I.

5/ "Total Area in Farms," Census Table 13, Vol. I. Also the sum of the "Cropland," "Pasture," and "Other" columns, this table.

6/ This column is the residual of the "Total Area" less "Area in Farms" columns, this table.

Table 2.6

Current Normal[a/] Annual Land Use by Zone (Ha)

Crop	NW	N	NE	S	SW	E	C	TOTAL
Rice	17,847	18,261	36,648	972	9,054	3,348	3,870	90,000
Corn	4,044	13,860	12,215	1,504	8,514	3,504	6,359	50,000
Beans	498	5,806	517	1,505	8,528	975	2,671	20,500
Yucca	2,475	6,455	2,945	493	3,794	1,842	4,496	22,500
Sweet Potato	568	2,791	1,739	397	1,736	951	2,817	11,000
Pigeon Pea	772	534	334	401	3,199	516	3,243	9,000
Peanut	10,605	4,142	4,166	1,143	14,746	3,750	2,698	41,250
Tobacco	3,413	15,386	1,721	434	1,459	536	1,051	24,000
Other Roots	542	2,665	1,660	379	1,657	908	2,689	10,500
Total	40,764	69,902	61,945	7,228	52,687	16,330	29,894	278,750

Source: CRIES/SIEDRA

[a/] Current normal refers to mid 1970s.

Code: NW - Northwestern
N - Northern
NE - Northeastern
S - Southern
SW - Southwestern
E - Eastern
C - Central

Table 2.7

Current Normal[a] Perennial Crop Area by Zone (Hectares)

Crop	NW	N	NE	S	SW	C	E	Total
	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)
Coffee	5,076	56,034	35,316	28,872	12,708	37,368	4,626	180,000
Cacao	200	12,098	40,710	14	--	5,037	10,941	69,000
Plantain	3,654	22,925	15,673	6,069	7,658	8,687	5,334	70,000
Banana	2,314	5,151	1,066	4,423	8,104	4,365	575	26,000
Coconut	47	734	15,639	943	319	2,759	6,559	27,000
Subtotal:	11,291	96,942	108,404	40,321	28,789	58,216	28,035	372,000
Sugar	3,285	13,783	4,076	12,350	--	87,463	126,043	247,000
Total:	14,576	110,725	112,480	52,671	28,789	145,679	154,078	619,000

Source: CRIES/SIEDRA

[a] Current normal refers to mid 1970s.

(Sugar breakdowns derived by application of sugar-map derived area percentages by region to current normal planted area: other crop breakdown derived by application of Census-derived regional area percentages of land both in and not in production to revised current normal total areas, by crop.)

Code: NW - Northwestern
N - Northern
NE - Northeastern
S - Southern
SW - Southwestern
E - Eastern
C - Central

With increasing population in rural areas, rising demand for crops, and a fixed land base, land-intensive technologies will become increasingly attractive. If cattle production in fact is, and remains, profitable -- maintaining the demand for pastureland -- the opportunity cost of land for crop production will tend to rise, further increasing the economic attractiveness of land-intensive crop production technologies.

This point highlights the importance of identifying the reasons for the relatively large amounts of land in pasture in the Dominican Republic. If the reasons are primarily economic, reflecting the profitability of livestock, then a development strategy emphasizing more intensive use of the land by shifting from pasture to crops would have an opportunity cost determined by the loss of income from livestock. If, on the other hand, the amount of land in pasture is due to the existing land tenure and management situation, then a land-intensive strategy might promote production and income objectives at little opportunity cost.

Another issue in land-use strategy concerns the appropriate mix of annual and perennial crops. The total amount of land in both annual and perennial crops has increased. The amount of land in sugarcane apparently increased substantially in the Central and Eastern Zones between 1971 and 1974 (some of this expansion was on land previously in rice). In 1975, a government decree stipulated that no additional land should be planted to sugarcane in order to keep land available for food crops. Later a commission was appointed to consider converting some existing caneland to other uses. These actions by the government reflect a policy to increase domestic food production. The fact that application of the policy in this

case could exact a cost to the economy in terms of lower exports and greater balance of payments pressure suggests that the policy is taken seriously. A land-intensive strategy, stressing food production gains by increasing yields per unit of land, would put less pressure on the scarce land resources, permitting more production of both export and domestic food crops.

An important reason for adopting a land-intensive strategy is that present average yields of major crops are generally below the yields which could be attained with good management, suggesting much potential for increased production. Rice yields, for example, are in the neighborhood of 2,000 kg per hectare or less, where with better management 3,000-5,000 kg/ha could reasonably be achieved. Yields of red beans, pigeon peas, peanuts and corn are even lower relative to potential yields with known technology and good management.[1/] A strategy designed to narrow the differences between average and potential yields could have high payoff in production and employment, and would economize on increasingly scarce land resources.

A land-intensive strategy for annual crop production, especially one that incorporates increased double-cropping, would also promote the objectives of increasing employment and income for the rural population as well as raising food production. Increasing yields raises labor requirements. Double-cropping reduces seasonality in the demand for farm labor, thus making increased utilization of the available labor supply

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[1] Joe Free, Conrad Kresge and Thomas H. Foster, Dominican Republic Fertilizer Situation, Tennessee Valley Authority, 1976.

possible. As noted earlier, the present ratio of harvested land to land in crops is about 1.25 in the Dominican Republic. (In rice it may be 1.33 to 1.50.) These ratios suggest that there may be substantial potential for increased double-cropping if the structural, economic, and technological conditions favoring double-cropping can be created.

In summary, key policy questions concerning land use are easily identified but less easily answered on the basis of available information. Over the last decade or so, the country has moved toward more intensive use of its land resources. Yet, large areas remain in pasture under extensive systems of cattle production. Would some of this land provide more output, income and employment if used for crop production? Should some land in sugarcane be converted to other uses? Are there nontraditional export crops that can replace sugar and cattle production so that conversion does not worsen the country's foreign exchange deficit? Can cropping systems be devised that expand multiple-cropping? The data base and analytical capacity for providing policy guidance on these questions is improving. The need to address these policy issues is fully acknowledged by the new administration. Thus, there is optimism that a deeper understanding of the productive potential of the land base and its socially efficient utilization will soon be possible. The role of land tenure in the country's productivity "puzzle" is considered further in Chapter 3.

2.4 Irrigation

A land-intensive strategy for crop production, particularly one that stresses increased double-cropping, inevitably brings irrigation to the center of attention. An adequate and reliable supply of irrigation water can create the conditions needed to induce farmers to invest in land-intensive

technologies and use inputs such as fertilizer, pesticides, and improved seed varieties that are complementary to water. Where rainfall is highly seasonal, irrigation based on stored water is a necessary condition for double-cropping. In thinking about a land-intensive strategy for the Domincan Republic, therefore, it is essential to consider the role of irrigation, and the conditions for increasing its contribution to agricultural development.

Conflicting estimates of the amount of irrigated land exist but the CRIES/SIEDRA estimates are perhaps the most accurate.[1/] This source gives 192,900 hectares as the total irrigated area (Table 2.8). This figure refers to land under the command of irrigation canals. However, no indication of whether or not there are probabilities of land actually receiving water in a given year is available with the various area estimates.

2.4.1 Irrigation Systems

Most of the irrigated area listed in Table 2.8 receives water from INDRHI irrigation canals, although a small number of farmers pump water from rivers and an even smaller number use groundwater. Water storage is provided by three dams, but most of the water in the canals is diverted from rivers. The storage and diversion systems are not distinct. It is not possible to determine at this time the amount of land served by diversion as compared to the amount served by storage to reservoirs.

[1/] The SEA's Plan de Mediano Plazo 1977, pp. 25-26, contains data that imply that the total irrigated area is either 122,500 hectares or 118,276 hectares. INDRHI's Plan Nacional, Tomo III, shows 194,805 hectares. INDRHI, the National Institute for Water Resources, is the agency with major responsibility for construction and operation of irrigation works. Its role is discussed in more detail in Chapter 6.

Table 2.8 Irrigated Land in the DR, by Zone and Major Crops (000 Hectares)

Crop	NW	N	NE	S	SW	C	E	Total
Beans	-	-	-	-	5.3	-	-	5.3
Rice	21.3	30.4	22.7	-	13.0	6.9	3.0	97.3
Other Annuals	12.5	7.1	0.2	8.8	14.1	8.2	1.2	52.1
Intercrop Annuals	1.5	3.0	-	0.9	5.8	0.7	-	11.9
Idle Land for Annuals	0.1	2.4	-	1.5	3.2	-	-	7.2
Total Harvest Area in Annuals	35.4	42.9	22.9	11.2	41.4	15.8	4.2	173.8
Multiple Cropped Area	4.5	8.9	1.8	1.5	10.4	3.0	1.3	31.4
Total Physical Area in Annuals	30.9	34.0	21.1	9.7	31.0	12.8	2.9	142.4
Coffee	-	-	-	0.2	-	-	-	0.2
Bananas	-	-	-	3.8	5.5	-	-	9.3
Sugar Cane	1.7	-	-	13.8	-	5.6	-	21.1
Other Perennials	-	5.0	-	2.2	2.3	0.5	-	10.0
Intercropped Perennials	-	1.5	-	4.9	-	-	-	6.4
Idle Land for Perennials	0.9	-	-	2.5	-	-	0.1	3.5
Total Physical Area in Perennials	2.6	6.5	-	27.4	7.8	6.1	0.1	50.5
Total Physical Area Irrigated	33.5	40.5	21.1	37.1	38.8	18.9	3.0	192.9

Source: These estimates were made from data sets made available by the CRIES/SIEDRA Study. This study estimated the land under the command of irrigation canals in each region through measurements taken from an OAS map. Estimates of the percent of irrigated land in each crop in a region were available from SEA farm survey data. However, the survey did not pick up data on irrigated sugar cane. Consequently, this table overstates the amount of irrigated land in other crops to the extent that some irrigated land is in cane. The amount in cane is very small, however, and mostly in the Eastern zone. Hence, the error in estimates for other crops is small. Because the data come from various sources with different dates, the table is considered to represent

Clearly diversion dominates. The existing dams are the Valdesia on the Nizao River, the Tavera on the Yaque del Norte, and Las Damas on the Yaque del Sur. Dams under construction are the Sabana Yegua on the Yaque del Sur, the Sabaneta on the San Juan, and the Rincón de Jima on the Jima River.

An extensive network of irrigation canals exists -- 116 in all -- ranging in length from less than 1 km to 343 km and irrigating from 9 hectares to 16,875 hectares. In addition to these existing facilities, eight projects (dams and irrigation canals) are under construction at a cost of US$238,500,000. These projects are expected to irrigate 53,000 hectares of new land and improve the supply of water on 33,700 hectares. For the country as a whole, it has been estimated that approximately 158,000 hectares of land could be irrigated and 49,200 hectares under irrigation could be improved over the next 20 years at a cost of more than US$300,000,000. This expenditure would pay for 1,013MW of increased hydroelectric generating capacity, besides providing for the irrigation of agricultural land.[1/]

Most of the off-farm distribution system -- main canals and lesser structures carrying water to the farms -- was built and is maintained by INDRHI. Water management procedures, however, do not appear to be based on crop needs. Canals apparently have been sized according to some rule such as one liter per second per hectare. In operation, the water in the canals appears to flow at a rate dependent only on the river flow and the condition of the canal. In general, canal maintenance, especially on the larger canals, appears to be good.

[1/] See Plan Nacional, op. cit.

Water is controlled by gates at all headworks and at secondary and tertiary outlets. These gates are padlocked; an INDRHI employee is responsible for dividing the flow among the various laterals. Water is measured only in the primary canals, but the purpose of measurement seems to be an indicator of whether the canal is full or less than full rather than a record of water flow. No measuring devices are used at the farm level, and apparently no supervision of how the group of farmers on a turnout share their water is exercised.

As shown in Table 2.8, slightly more than half the total irrigated land area is used for rice, which requires far more water per hectare than any other crop. Hence, while there are no estimates of the total amount of irrigation water applied, it can confidently be stated that substantially more than half of it is applied to rice land. (Water requirements for crops are given in Table 2.9.)

The method of applying water on rice land is basin inundation, with water flowing from one diked, or bunded area, on the farm to another, thus filling each basin. Most diked areas are hand constructed and individually they appear to be reasonably well leveled. However, in order to obtain precise spreading of water in each one, very small diked areas are built, even in areas on the farm where topography appears to be level. Field ditches placed at various intervals (50 to 200 meters) are commonly used to distribute water from the individual farm turnout throughout the planted area. The fields are not necessarily level between these ditches; there may be as many as 30 diked areas between ditches. Water moves through these areas by passing from dike to dike.

Table 2.9 Water Use Coefficients for Crops

	Crop	Coefficient[a/] (k)
Low	Oranges	0.45
	Lemons	0.45
Use	Truck Crops	0.60
	Beans	0.60
	Tomatoes	0.65
Intermediate	Potatoes	0.65
	Tobacco	0.70
Use	Cacao	0.70
	Coffee	0.70
	Corn	0.75
High	Sugar Cane	0.80
	Bananas	0.80
Use	Rice	1.00

[a/] The k factor is used in a formula to compute the seasonal water use (U) (in millimeters): U = kF

where F = (mean monthly temperature) (monthly percent of daytime hours of the year)/100

Source: Organization of American States, Survey of the National Resources of the Dominican Republic, Washington, D.C., 1969, p. 141.

Little control over the amounts of water applied to rice land (or to other crops) exists, and little is known about how much is actually applied at any given period of time. The amounts clearly are highly variable among canal systems, among laterals on a specific canal, and among field plots with a given farm. Of course, variability among areas is to be expected because of variable river flows, limited storage, regional precipitation differences, and differences in permeability of soils.

In most of the irrigated area, surface topography is such that surface drainage is not a serious problem. In the western part of the Yaque del Norte, however, high water tables have caused salinity problems. Several open drains have been constructed in that area, but they do not work well due to excessive amounts of water from the high surface runoff from rice fields. It is highly unlikely that these salinity problems can be solved without a substantial reduction in this runoff, which could best be achieved by applying less water to the rice land in that area.

In the Hoya de Enriquillo Basin in the Southern region, salinity problems are also found due to natural soil conditions. The problem there, however, is aggravated because small farmers are using poor quality irrigation water coming from the sugarcane fields of the Barahona sugar area. That water is not going to the Enriquillo lake, thereby causing a drying out of the lake. The ecological impact of this practice on water balance and soil quality in the basin could be catastrophic for the area.

2.4.2 Water Resources: Scarcity and Security

The two aspects of water use most relevant to the question of its role in Dominican agriculture are: (1) the scarcity of water to the individual

farmer and to society, and (2) the security of water supply to users. Each aspect will be discussed in turn.

Dealing first with water scarcity, it is logical to begin by exploring the conditions whereby water might be considered scarce by individual farmers; here it is necessary to discuss the operation of the current irrigations systems in the country. Consider three types of farmers: (1) those on an irrigation system who regularly receive water, (2) those on a system who only sometimes receive water, and (3) those with irrigable land near a system who receive no water. Clearly, for the latter two groups water is indeed scarce. However, it is necessary to distinguish between nominal scarcity and real scarcity. And this is where attention is focused on water use by farmers in the first group. Agronomic research has determined -- for a variety of climatic conditions -- water "requirements" for virtually all irrigated crops. While an economist might be interested in the optimal application of water vis-a-vis other inputs, it must be recognized that plant stress gives some lower limit on water application. Once some reasonable lower level of water has been provided to the irrigated crop, it is possible to begin to explore the extent to which farmers apply more than this amount.

However, as part of that determination, it is necessary to bear in mind other aspects of the production process. For example, an effective method of weed control on rice is flooding, in which water is applied in excess of direct plant requirements as a substitute for other inputs such as herbicides or manual weeding. Or consider the issue of leveling fields for rice. An array of "minimum water applications" can be conceived under

various assumptions regarding field leveling. Here, "extra" water is a substitute input for the time and resources necessary to level individual paddies. The same technique applies to ditches that are ill-designed or badly maintained. If water is cheap to the individual farmer, then it becomes a viable substitute for other inputs. This situation, referred to as nominally scarce water, occurs when an irrigation system provides cheap water to those fortunate enough to receive it regularly which then replaces the use of other inputs. The price paid by other farmers is either less water for lands that are irrigable, or infrequent water for those on land served by a distribution network. To the extent that water is absolutely scarce to these latter two groups of farmers, they tend to adopt crops and/or cultural practices that do not require irrigation. The private cost of this situation is the foregone income to the individuals from the lack of water. The social cost is the lower aggregate output from the total land and water resources available. As an example, consider the situation where an irrigation system is designed and constructed to serve a certain area and a specified number of users. In any system design, there is a presumption of efficiency of water delivery within given conditions of field leveling. If, in practice, these conditions differ from the design assumptions, water will be scarce for those at the end of the system, which could be compounded if the water allocation scheme allows those near the head of the system to assure themselves of their water "needs." The result is a public investment that was designed on the basis of one set of production possibilities, and realized on an entirely different -- and lower -- set.

Another social cost identified above is the use of water to replace labor in leveling and weeding operations. If labor is relatively abundant -- as is often the case -- this substitution of a socially scarce factor (water) for an abundant factor (labor) may represent a serious social loss of efficiency.

Yet another aspect of social cost is the aggregate production foregone by those producers near an irrigation system who were not included in the system because of an apparent lack of water to serve their needs. This point relates to the set of design assumptions involved in determining the command area of the system. Or, it is possible that there is an abundance of irrigable land near an existing system which is now unused because it will not support unirrigated agriculture. This aspect is even more serious if -- as in the Dominican Republic -- steep-slope agriculture is present. That is, if farmers are limited to steep slopes because of an apparent lack of irrigable land upon which they might be settled, then they produce less, and the country pays twice. The farmer is impoverished because of his poor resource base (and one likely to get worse), and the country is foregoing the increased production that could result from production under irrigation. Moreover, the erosion and resource depletion brought on by steep-slope agriculture not only makes the nation's land base poorer but also causes erosion siltation that may damage existing irrigation systems.

In summary, water is only scarce in a real sense if irrigation systems are designed and operated with a high degree of efficiency, and much attention is devoted by those organizations responsible for irrigated

agriculture to assure an efficient allocation of water on lands with irrigation potential.

Thus, the issue of scarcity has both a private component and a social component. Nominal scarcity refers to those situations in which water is apparently scarce, yet that scarcity derives from the particular way in which water is currently managed, or in which individual fields are leveled and utilized. Social scarcity refers to situations where "good" water management and irrigated agriculture are practiced and yet there exists irrigable land which might be cultivated if more storage facilities were constructed. Water is not scarce if existing irrigation systems are being operated efficiently, and there are no additional lands that might be irrigated. This is certainly not the case in the Dominican Republic, here water is a scarce resource.

The issue of water security involves farmers of two classes: (1) those regularly receiving adequate water, and (2) those irregularly receiving inadequate water. "Regularly receiving" water involves two conditions: (1) the approximately desired quantity of water arrives, and (2) it arrives approximately at the desired time. Here, it is the second group of farmers that are of interest -- those for whom water receipts are insecure in that they receive water in less than desired quantities or at the wrong time.

An abundant literature on the response of LDC farmers to insecurity of water receipts exists.[1/] The major findings indicate that water

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[1/] For a detailed summary of this literature see: Bromley, Daniel W., Donald C. Taylor, and Donald E. Parker, The Economics of Water Reform: Institutional Design for Improved Water Management in the LDC's, Madison: University of Wisconsin, Center for Resource Policy Studies, Working Paper #8, October, 1977.

supply -- which must include some notion of reliability and security -- is the most important factor in determining which crops to grow and what areas will be planted. Moreover, water supply is often the dominant variable in determining yield differences among crops. Furthermore, water supply is found to be a dominant factor in the adoption of new inputs -- including high-yielding varieties. In addition to the production implications, serious equity concerns arise from water security. The least-advantaged farmers are usually the ones to pay the highest price for insecure water. With a loose organization controlling water allocation, the poor and powerless are the least able to influence water distribution, and they are also the ones least able to mobilize an imaginative response to the insecurity of water receipts.

As with the scarcity issue, there is a private cost of an irrigation system which cannot insure secure deliveries, and there is a social cost. One of the private costs has already been discussed -- that of the reduced production from those farmers who do not adopt improved technologies. But the aggregate cost of this failure to improve cultural practices is that total production is less than it could be with improved management of the systems. Given the risk aversity of poor farmers, the insecurity of water deliveries is possibly the only reason they need to continue their traditional cropping patterns and methods. If part of the agricultural strategy of a country is to spread improved technology among a large number of small farmers, then the degree of water security becomes an important potential constraint on its success.

2.5 Forest Resources

Forests constitute a renewable natural resource that may offer great opportunities for an expanded contribution to the economy. At the time of European discovery, forest may have covered almost all of the island of Hispaniola. Indeed, the Organization of American States (OAS) Natural Resources Survey of 1967 indicates that Class VII soils, which are best suited to forestry, make up the largest single soil class by area (2.5 million hectares) and constitute over half of total soils.[1/] However, in the OAS Survey, it was estimated that only 557,000 hectares remained in forest in 1967, and much of this was not of commercial quality. Generally, there are four major forest types in the country: coniferous, mixed, broadleaf, and low broadleaf.

The most extensive areas of coniferous forest are located in the Cordillera Central and the Sierra de Bahoruco, at elevations from 200 to 3,000 meters. Coniferous forests cover about 215,000 hectares and are estimated to contain from 27 to 67 cubic meters of wood per hectare. Mixed forests (pine and broadleaf) cover about 83,000 hectares, mostly in the Cordillera Central at elevations of from 600 to 1,600 meters. Broadleaf forests cover over 188,000 hectares between sea level and 2,000 meters, mostly in the spurs of the Cordillera Central and in the area of "Los Haitises" near Samana Bay. The low broadleaf forest covers over 69,000 hectares between sea level and 400 meters evaluation. The most extensive stands of low broadleaf forest are in the coastal plain of the Southeast Region.

[1/] OAS, Reconocimiento y Evaluacion de los Recursos Naturales de la Republica Dominicana, Washington, 1967.

The large extent of soils best suited to forest use and the much smaller present extent of land in forests indicate that much of the land cleared of forests[1/] is not suitable for cultivation or pasture. Some, perhaps much, of this land probably should be returned to forest.

As a response to drastic decreases in forest reserves by the mid-1960s[2/], the government modified forestry legislation (Law 206) in 1967. Initially, private lumber mills were closed (and compensated) and forest resources were placed under Armed Forces administration. Forest exploitation and management thereby became a government monopoly. At the same time, the government requested the Food and Agriculture Organization (FAO) of the United Nations to provide technical assistance for the inventory of forest resources, a review of forest policy and legislation, and the development of a series of recommended changes in policy and legislation.

In 1974, FAO presented an inventory, policy recommendations, and a detailed forestry law proposal to the government.[3/] The recommendations included:

- Granting of constitutional powers to those parties responsible for forest policy and law; and submission to the Congress for approval of the proposed forestry law.
- Reinforcement of the technical staff responsible to the General

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[1/] By direct exploitation (prior to 1967), and slash and burn agriculture, which continues.

[2/] And perhaps due also to the increasingly obvious detrimental effects of uncontrolled deforestation in neighboring Haiti.

[3/] FAO, Politica y Legislacion Forestal: Revision del Proyecto de Ley Forestal, Informe Tecnico 6. Inventario y Fomento de los Recursos Forestales, Rome, 1974.

Directorate of Forestry.

- Evaluation of the forested area under government and private control.
- Establishment of an effective and rigorous control in the exploitation and marketing of forest products (such as a state monopoly or state business firm).
- Establishment of an effective reforestation policy.

There are indications that the government is interested in moving toward implementation of the FAO recommendations. However, efforts are apparently hampered by a lack of committed funds. Conservation, fire control, and replanting activities are still being carried out almost exclusively by the Army. Although private commercial harvesting of lumber is banned, there seem to be no government initiatives in forest exploitation. The resulting loss of forest land productivity and potential rural employment constitutes a strong argument for increased government attention and funding for forest management. Some efforts at reforestation have been undertaken in recent years, but it is likely that significant progress in this area also will require a more energetic official position.

2.6 Implications for Policies and Programs

The agricultural sector can make an important contribution to achievement of several Dominican development objectives: increased income and employment among the rural poor and for the nation as a whole, and better nutrition for lower income people in both rural and urban areas. Improved management of forests and fisheries has a role to play, but crop and livestock production offer the greatest overall potential. A

land-intensive strategy is needed to achieve this potential. Trends in land use suggest that land has become increasingly scarce relative to labor and other agricultural resources. Prospective growth in population and in demand for agricultural products indicates that this trend will likely be accentuated over the next two decades. Conversion of pasture land to annual crops is possible, but the extent and costs of this conversion are unknown. The apparent profitability of perennial crops, and the contributions these crops make to exports, suggests a similar conclusion about conversion of land from perennial to annual crops. These issues urgently need further study as a basis for coherent public policies affecting land use.

The rudiments of a proposed strategy for more rational use of land and water resources in Dominican agriculture will be outlined here. As a preface to that discussion, it must be emphasized that these recommendations are offered with great caution; no assessment can fully account for the multitude of factors that must be considered before action is taken or advice offered to a nation. Nonetheless, the economist/analyst -- just as the medical doctor -- is competent to search for signs, signals, symptoms, and the like, which might suggest problems and possibilities ahead.[1/]

2.6.1 Water Use

There is abundant evidence that water is being used excessively by

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[1/] This discussion will focus on crop and livestock production and will ignore the forestry and fisheries sub-sectors.

some farmers, and not at all (or in insufficient quantity) by other farmers. Much of the issue for those with too little water is related to the expectations of water receipts. The major findings indicate that water supply -- which must include some notation of reliability and security -- is an important factor in determining which crops to grow and what areas will be planted to what crops. Moreover, water supply is often the dominant variable in determining yield differences among crops. Furthermore, water supply is an important factor in the adoption of new inputs -- including high-yielding varieties.

In addition to the production implications, there are serious equity concerns in water security. The least-advantaged farmers are usually the ones to pay the highest price for insecure water. As discussed earlier, with a weak organization controlling water allocation, the poor and powerless are the least able to influence water distribution, and they are also the ones least able to mobilize an imaginative response to the insecurity of water receipts.

As with the scarcity issue, there are both private costs and social costs of an irrigation system that cannot insure reliable deliveries. One of the private costs is the reduced production and income for those farmers who do not adopt improved technologies. But the aggregate cost of this failure to improve practices is that total sector production is less than it could be with improved management of the systems. Given the risk aversity of poor farmers, the insecurity of water deliveries is a good reason for them to continue their traditional methods. If part of the agricultural strategy of a country

is to spread improved technology among a large number of farmers, then the degree of water security becomes an important potential limiting factor.

A number of actions could be taken to improve the operation of existing and new irrigation systems. Those that appear to offer the highest payoffs are:

1. A program to obtain better data on production practices and water use by crop and by region;
2. An assessment of drainage and salinity problems in the irrigation areas in relation to water delivery policies;
3. An accurate assessment of ground water resources in the Dominican Republic;
4. Pilot projects to demonstrate good water management practices on rice;
5. A program to create greater coordination between INDRHI, the Agrarian Reform Institute, and the Secretariat of Agriculture with respect to water deliveries to farmers;
6. Policies to assure that water deliveries within an irrigation system are not biased toward the large and wealthy farmers;
7. Investigations in areas where excessive water is being applied to determine policies for encouraging a more efficient level of water application;
8. Plans to make new and surplus water available to farmers who heretofore have been denied irrigation, or have received it only sporadically.

2.6.2 Land Use

Before taking up problems of current land use in terms of utilization patterns, soil erosion problems will be discussed. A recent report by Manuel Paulet shows that the Dominican Republic has one of the highest intensities of kinetic energy from rainfall in the world.[1/] With this high level of energy from rain drops, erosion is a serious problem wherever the natural vegetation has been disturbed or removed; this is compounded by the presence of any slope, no matter how gentle. The Soils Department of the Secretariat of State for Agriculture, in collaboration with IICA (Instituto InterAmericano de Ciencias Agricolas), has developed a detailed map depicting the erosive capacity from rainfall. This map of iso-erodability curves is an annex to the publication cited in footnote number one below, and is part of the technical document DT-50 of the IICA-SEA-FEDA.[2/] This map reveals that while mountainous regions are the most susceptible, the low lands in the eastern part of the country are equally subject to severe erosion. The places where erodability is low relative to the rest of the country are the flood plain of the Rio Yaque del Norte, and the area northwest of the Rio Yuna between Santiago and San Francisco de Macoris. Also, erosion is less of a problem in the southwest on a line between Bani, Azua, and Jimani.

1/ Manuel Paulet, La Erosion y La Conservacion de Los Suelos en La Republica Dominicana, Instituto Inter-Americano de Ciencias Agricolas, A/D-14/78, Santo Domingo, R.D., March, 1978.

2/ Departmento de Suelos, Intensidades Maximas y Erosividad de las Lluvias en La Republica Dominicana, Documento Tecnico DT-50. Covenio IICA-SEA-FEDA. Pidagro. SubSecretaria de Investigacion Extension y Capacitacion de la SEA. San Cristobal, R.D., 1978.

Paulet identifies two necessities for the development of a sound program for minimizing soil erosion and these are reproduced here as general recommendations:

1. Develop legislation which would establish responsibility on the part of the farmer for sound land use practices;
2. Establish government services to assist the farmer in complying with respect to land use, and provide education, credit, technical assistance, and necessary inputs.

These two general recommendations would require work at both the national level and at the local level. In a second publication[1/], Paulet has presented a more detailed outline of the program for improving land and water use in the Dominican Republic.

This excellent program is summarized here in the form of more specific recommendations:

1. Develop a program to understand the role and productivity of soils as a function of their natural properties and the micro-environment in which they are located. This would permit a more rational program for treating soils to improve their productivity -- or at least to minimize their role as limiting factors on increased production.
2. Develop a program to understand the optimal production relationships among soils, water and plants, plus other factors of production.

[1/] Manuel Paulet, Lineamientos Para el Establecimiento de un Programa de Conservacion de Suelos y Aguas en La Republica Dominicana, Instituto InterAmericano de Ciencias Agricolas, A/D-12/77, Santo Domingo, R.D., Noviembre, 1977. (en colaboracion con Sub-Secretaria de Recursos Naturales, y Sub-Secretaria de Investigacion, Extension, y Capacitacion).

3. Develop a program to classify and describe the soils of the country and to categorize their suitability for various uses, with special emphasis on agriculture.
4. Develop a program to understand the characteristics and the behavior of the principal sources of water for agriculture, so that programs for their improvement, maintenance, control, transfer and management at the farm level can be developed.[1/]
5. Study and understand the comparative advantages and disadvantages for the average Dominican farmer of the various methods, materials, and equipment for controlling and managing water at the farm level.[2/]
6. Develop a program to gain an understanding of the various aspects of the adoption and management of plants for the protection of riverbanks, canals, and laterals to complement control measures and to inhibit seepage.
7. Create an effective organization and functioning of government services with the technical capacity to provide the average Dominican farmer with assistance in promoting: (a) the rational use of land and water; (b) demonstrate the economic advantages of rational land and water use; and (c) provide assistance to the rural community for the development and execution of plans for conservation, for analysis of land and water conditions, production programs, and the necessary infrastructure for rational management of land and water resources.

[1/] This recommendation is consistent with those discussed earlier with respect to water resources.

[2/] This recommendation, too, is implicit in the earlier discussion of water programs.

Up to this point the emphasis has been improving the management of land and water resources taking current cropping patterns as given. The development program of the type outlined previously is not necessarily very controversial, nor does it hold a very serious threat for many farmers. Indeed, farmers would generally tend to be the primary beneficiaries of all of the above recommendations. However, as indicated in several places in this assessment, the Dominican Republic faces a serious challenge of increasing its total food production capacity. This growth can, in part, come from increased yields on currently cropped land, but over the next 10-15 years it will be virtually impossible to provide ample employment for the rural people -- and to grow adequate food -- without beginning to seriously assess the social and economic implications of current land use.

The best available data show a total of 2.7 million hectares in farms, of which some estimates indicate no more than 1.1 million hectares should be intensively farmed. Of the total land which could be intensively cultivated, only 26 percent is now devoted to food crops such as rice, corn, peanuts, beans, plantain, sweet potatoes, and pigeon peas. On the other hand, of the 2.7 million hectares in farms, 1,433,800 hectares -- or 53 percent -- are currently (normally) devoted to sugar or pasture.

While the importance of sugar production for foreign exchange earnings is significant, it is also true that sugarcane receives approximately 55 percent of the total applications of fertilizer. As efforts are intensified to increase yields of food crops -- and as fertilizer becomes a more expensive input -- the question of fertilizer allocation

as a constraint on Dominican food production can become as important as the question of land utilization.

The economics of conversion of land to food crops is related to the possibilities for increasing the productivity of land that remains in pasture and sugar. No quantitative assessment of these possibilities is feasible with data currently available. To better understand the alternatives and their implications, the following are needed:

1. Detailed investigations of potential productivity increases in livestock and sugar production, and identification of lands currently in pasture and sugar that can profitably be converted to the production of food crops with a high ratio of labor to total output. This assessment should recognize the foreign exchange costs as well as the benefits of conversion;

2. Determination of area now in production with slopes too steep for rational land use practices and a program to return this land to less intensive use;

3. Investigations of lands near irrigation systems to determine areas suitable for more intensive cultivation with irrigation and evaluation of the possibilities of delivering water to this land.

2.6.3 Program Focus

The CRIES/SIEDRA system can provide the basis for a more comprehensive analysis of land and water resources. This analysis should proceed simultaneously with the SEA/USDA efforts to get the CRIES/SIEDRA model operational. But the land and water program envisioned here should

proceed by being concerned with two basic questions. These are: (1) where, why, and to what extent does the absence of suitable land constrain attainment of the country's agricultural development objectives; and (2) where, why, and to what extent does the absence of adequate water (both quantity and timing) constrain attainment of these objectives?

To analyze the above questions it would seem most logical to narrow the focus -- at least initially -- to a subset of the nation as a whole. The northern, northeastern, and southwestern zones are recommended as the areas for initial concern. This selection is based on four criteria: (1) rural population; (2) land tenure arrangements; (3) current irrigation; and (4) land resource quality. These three selected zones contain almost 50 percent of the nation's people, and almost 58 percent of its rural people. Thus, efforts to improve land and water resources in them would be consistent with the objective of reaching a large segment of the rural population.

The three zones contain 60 percent of the farms and 47 percent of the land in farms; thus farm size on the average is below the national average. Over 60 percent of the owner-operated farms, and over 75 percent of the nation's rented/share-cropped farms, are found in these three zones. One-half of the agrarian reform parcels, 40 percent of the occupied public lands, and 63 percent of the land of mixed tenancy is found in these three zones. With the exception of sugarcane in the

East, some vegetables in the South, and some rice in the Northwest, there is little doubt but that these three zones dominate Dominican agriculture.

There are an estimated 192,900 hectares of land in the DR which are "normally" irrigated according to the most recent CRIES/SIEDRA data, and 100,400 hectares (52 percent) of it is located in these three zones. As for rice, there are an estimated 97,900 hectares of it irrigated, and approximately 65,000 hectares are located in these regions. If the upper reaches of the Yaque del Norte rice areas are included, the three zones plus the eastern end of the Northwestern Region account for 88,000 hectares of irrigated rice -- 90 percent of the national crop.

There is ample evidence that water and land development and use policies are important priorities for the new Government. But how should these policy objectives be pursued? An approach that recognizes four stages in a program for improving land and water use is outlined in Chapter 7, after the planned organization of the public sector in agriculture is reviewed in Chapter 6.

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Table A2.1

Utilization of Land in Farms by Zone, Dominican Republic, 1960.

Zone	Area in Farms	Annual Crops Area	Annual Crops Percent	Perennial Crops Area	Perennial Crops Percent	Fallow Land Area	Fallow Land Percent	Pasture [a] Area	Pasture [a] Percent	Other Land Area	Other Land Percent
	(ha)	(ha)		(ha)		(ha)		(ha)		(ha)	
Northwestern	187,979	33,060	17.5	19,122	10.2	33,221	17.7	57,794	30.7	44,783	23.8
Northern	553,165	77,658	14.0	80,016	14.5	72,589	13.1	249,688	45.1	73,214	13.2
Northeastern	364,644	54,327	14.9	79,748	21.9	55,644	15.2	127,782	35.0	47,143	12.9
Southwestern	124,032	40,501	32.7	20,246	16.3	20,410	16.5	29,191	23.5	13,684	11.0
Southern	115,162	10,793	9.4	31,904	27.7	17,479	15.2	22,331	19.4	32,650	28.4
Central	443,622	42,176	9.5	87,409	19.7	72,024	16.4	184,405	41.6	57,008	12.9
Eastern	468,952	21,174	4.5	133,106	28.4	63,999	13.6	195,515	41.7	55,159	11.8
Total	2,257,557	279,693	12.4	451,551	20.0	335,967	14.9	866,705	38.4	323,641	14.8

Source: 5th National Census of Agriculture - 1960.

[a] includes improved and natural pasture

Table A2.2

Utilization of Land in Farms by Zone, Dominican Republic, 1971.

Zone	Area in Farms	Annual Crops[a] Area	Annual Crops[a] Percent	Perennial Crops Area	Perennial Crops Percent	Fallow Land Area	Fallow Land Percent	Improved Pasture Area	Improved Pasture Percent	Natural Pasture Area	Natural Pasture Percent	Other Land[b] Area	Other Land[b] Percent
	(ha)	(ha)		(ha)		(ha)		(ha)		(ha)		(ha)	
Northwestern	195,344	52,329	26.8	12,890	6.6	18,904	9.7	48,082	24.6	37,279	19.1	25,860	13.2
Northern	604,929	78,115	12.9	87,895	14.5	32,480	5.4	211,575	35.0	103,690	17.1	91,174	15.1
Northeastern	469,542	90,916	19.4	96,720	20.6	41,129	8.8	133,485	28.4	78,182	16.6	29,110	6.2
Southwestern	203,119	88,528	43.6	22,495	11.1	23,861	11.7	29,772	14.7	21,455	10.5	17,007	8.4
Southern	136,788	18,757	13.7	42,327	30.9	13,874	10.1	28,657	21.0	13,069	9.6	20,104	14.7
Central	508,957	71,924	14.1	113,382	22.3	43,472	8.6	114,477	22.5	79,993	15.7	35,709	16.3
Eastern	617,557	40,384	6.6	122,288	19.8	31,782	5.1	283,695	45.9	68,879	11.2	70,529	13.4
Total	2,736,236	440,953	16.1	497,998	18.2	205,502	7.5	849,743	31.1	402,547	14.7	339,493	12.4

Source: 6th National Agricultural Census - 1971.

a/ includes 12,778 ha prepared for planting
b/ includes 1,811 ha in 5,053 microfarms for which land use information was not available

A Preliminary Examination of Possibilities for Improved Utilization of Land and Water[1/]

The CRIES/SIEDRA Project has classified the total area of the Dominican Republic according to 37 Resource Production Units (RPUs).[2/] RPUs represent "land areas that are sufficiently similar with respect to soil, climate, water, plant adaptability, productivity and potential to be reliable units for regional and national land use planning." An RPU may contain several noncontiguous geographic areas. The concept of an RPU is complex because it involves consideration of numerous agrophysical variables in addition to soil subgroups.

Table A2.3 shows the amount of land in each zone and national totals for each RPU. Table A2.4 gives a summary of the characteristics of each RPU from the standpoint of agricultural production potential. Major land use, reflecting "normal" conditions in the mid-70s, is given by RPU for each zone in Tables A2.5 through A2.11.

1/ This section is based on data developed in the CRIES/SIEDRA Project. See: CRIES/SIEDRA, Land Resource Base Report, August, 1977.

2/ Land under water is classified as RPU #38.

Table A2.3. Estimated Area of RPU by Zone (Square Kilometers)

Zone	RPU 1	2	3	4	5	6	7	8	9	10	11	12	14
1 Northern	-	4,283	-	212	-	-	-	-	-	-	-	-	213
2 Northeast	-	730	-	589	-	-	-	-	633	223	-	-	917
3 Northwest	-	867	-	-	-	-	-	-	-	93	-	-	-
4 Central	337	2,740	-	-	-	22	1,171	-	567	-	358	28	-
5 Southwest	-	3,236	-	-	-	-	-	-	-	-	-	-	-
6 Southern	-	1,189	-	-	-	104	-	-	-	22	131	-	-
7 Eastern	525	1,269	438	174	1,715	19	237	98	271	-	1,407	1,432	-
National Total	862	14,314	438	975	1,715	145	1,408	98	1,471	338	1,896	1,460	1,130

Zone	14	15	16	17	18	19	20	21	22	23	24	25	26
1 Northern	1,359	-	253	580	27	-	-	227	-	-	-	-	27
2 Northeast	561	351	494	422	285	69	55	-	-	-	-	-	-
3 Northwest	-	-	756	-	-	-	-	-	-	-	-	-	-
4 Central	-	-	99	-	-	183	324	28	285	290	8	543	-
5 Southwest	419	-	-	-	-	-	-	-	-	-	-	1,254	-
6 Southern	1,389	-	191	-	-	-	-	-	-	-	-	1,188	-
7 Eastern	-	-	-	-	-	-	-	-	-	125	35	-	-
National Total	3,728	351	1,793	1,002	312	252	379	255	285	415	43	2,985	27

Zone	27	28	29	30	31	32	33	34	35	36	37	Water	Regional Total
1 Northern	-	-	-	-	781	693	-	-	-	-	410	-	9,065
2 Northeast	-	-	-	-	-	-	-	-	-	-	-	-	5,329
3 Northwest	-	-	-	-	1,004	655	-	-	725	633	36	-	4,769
4 Central	-	-	-	-	-	-	-	-	-	-	-	-	6,983
5 Southwest	198	-	-	-	478	806	340	342	430	-	-	-	7,503
6 Southern	-	567	287	1,135	-	347	-	-	-	-	-	335	6,885
7 Eastern	-	-	-	-	-	-	-	-	-	-	-	-	7,745
National Total	198	567	287	1,135	2,263	2,501	340	342	1,155	633	446	335	48,279

Source: SIEDRA, 1977.

Table A2.4. Detail for Agricultural Production, by RPU

RPU #	Remarks	Agricultural Potential	Limiting Factors
1	Highly Productive	Moderately High	60% Clayey, 20% Slope, Shallow
2	Forest	None	None
3	Pasture	Low/Subsistence	None
4	Generally Productive in Rice, Coconuts, and Pasture	Moderately High	Clayey; Flooding
5	Unproductive	Very Low	Rock; Slopes; Shallow
6	Good for Cotton	Moderately High	Clay; Slope; Shallow
7	Sugarcane; Pasture	Moderate to Moderately High	Wet; Acid; Slope
8	Sugarcane; Rice; Coconuts; Cacao	Moderately High to High and Unsuited	Wet; Some Sandy
9	Valueless	Very Low	None
10	Limited Potential	Unsuited	Wet; Acid
11	Sugar Now, but Better for Pasture	Moderate	Slope; Shallow
12	Sugar and Pasture, but Steep Slope Farming by Poor	Moderately High	Clay; Shallow; Slope
13	Suited for Perennials	Low	Slope; Shallow
14	Best for Watershed	Very Low	Slope; Shallow
15	Floods	Moderately High to High	Flooding
16	Periodic Flooding	Moderately High to Moderate	Wet; Saline
17	Most Productive in Dominican Republic	High	Clay
18	Present Use Optimum	Moderate to High	Wet; Slope; Shallow

Table A2.4. (continued)

RPU #	Remarks	Agricultural Potential	Limiting Factors
19	Sugar (rain) but Best for Pasture	Moderately High & Low	Wet; Slope; Shallow
20	Pasture; Sugar (rain); Subsistence	Moderate to High	Slope; Clay
21	Intensive Cultivation, High Productive Valleys Rice and Sugar	Moderately High to High	Drainage
22	Best for Pasture Some Sugar	Moderate to Moderately High & Low	Acid; Slope; Wet; Shallow
23	Little Potential	Very Low	Rock
24	No Potential	Very Low	Rock
25	Has Most of Major Irrigated Crops; Some Native Vegetation	Low or Moderate to Moderately High With Irrigation	Droughty; Coarse; Slo
26	Vegetables	Moderately High to High	Drainage
27	Some Poor Farming	Low to Very Low	Slope; Shallow
28	Saline; Needs Irrigation	Moderate to Moderately High	Droughty; Saline
29	Little Value	Low	Slope; Dry
30	Bad	Low	Slope; Dry
31	Highly Variable, Needs Irrigation	Moderately Low	Slope; Dry; Shallow
32	Good Perennial, Annuals Without Irrigation	Moderately Low	Slope; Dry; Shallow
33	Lack of Rain Throughout Year; Seasonally Variable	Moderate to Moderately High	Clay; Slope; Dry
34	Intensive Agriculture	Moderate to Moderately High	Clay; Slope
35	Variable Rain	Moderate	Dry; Slope
36	Naturally Unproductive	Low to Moderate With Irrigation	Dry; Slope
37	Highly Mixed	Moderately High & Low	Wet; Slope; Shallow

Source: SIEDRA, 1977.

Table A2.5. Major Land Use by RPU. Northern Zone (000 hectares)

RPU	Cropland	Pasture	Other	Land in Farms	Nonagricultural[a] Land	Total[b] Area
2	67.9	129.6	59.7	257.2	171.1	428.3
4	6.0	11.6	1.1	18.7	2.5	21.2
13	8.5	8.5	0.5	17.5	3.8	21.3
14	44.7	68.5	5.1	118.3	17.6	135.9
16	7.9	3.7	2.8	14.4	10.9	25.3
17	19.5	15.1	6.5	41.1	16.9	58.0
18	-	-	-	-	2.7	2.7
21	-	6.7	4.5	11.2	11.5	22.7
26	-	-	-	-	2.7	2.7
31	16.3	20.6	5.2	42.1	36.0	78.1
32	17.2	25.6	4.1	46.9	22.4	69.3
37	13.1	22.7	1.7	37.5	3.5	41.0
Total	201.1	312.6	91.2	604.9	301.6	906.5

a/ Residual.

b/ From digitization of political boundary maps and RPU map.

Table A2.6. Major Land Use by RPU. Northeast Zone (000 hectares)

RPU	Cropland	Pasture	Other	Land in Farms	Nonagricultural[a/] Land	Total[b/] Area
2	29.8	27.2	4.7	61.7	11.3	73.0
4	17.5	26.7	4.5	48.7	9.9	58.6
9	24.1	17.5	5.7	47.3	16.0	63.3
10	8.4	7.7	1.7	17.8	4.5	22.3
13	38.7	42.5	5.2	86.4	5.3	91.7
14	27.3	24.1	2.3	53.7	2.2	55.9
15	15.1	14.9	1.2	31.2	3.9	35.1
16	30.2	16.9	1.2	48.3	1.1	49.4
17	19.8	14.4	1.1	35.3	6.9	42.2
18	12.8	13.6	0.9	27.3	1.2	28.5
19	5.7	1.0	-	6.7	0.2	6.9
20	-	4.8	0.4	5.2	0.3	5.5
Total	229.4	211.3	28.9	469.6	62.8	532.4

a/ Residual.

b/ From digitization of political boundary maps and RPU map.

Table A2.7. Major Land Use by RPU. Northwest Zone (000 hectares)

RPU	Cropland	Pasture	Other	Land in Farms	Nonagricultural[a] Land	Total[b] Area
2	18.3	18.8	4.0	41.1	45.6	86.7
10	-	0.9	0.5	1.4	7.9	9.3
16	26.0	2.3	4.6	32.9	42.7	75.6
31	18.3	18.5	6.5	43.3	57.1	100.4
32	8.0	18.2	3.0	29.2	36.3	65.5
35	8.1	18.1	3.4	29.6	42.9	72.5
36	6.1	7.7	3.9	17.7	45.6	63.3
37	-	-	-	-	3.6	3.6
Total	84.8	84.5	25.9	195.2	281.7	476.9

a/ Residual.

b/ From digitization of political boundary maps and RPU map.

Table A2.8. Major Land Use by RPU. Central Zone (000 hectares)

RPU	Cropland	Pasture	Other	Land in Farms	Nonagricultural Land[a/]	Total Area[b/]
1	10.3	8.9	1.8	21.0	12.7	33.7
2	104.1	59.3	46.1	209.5	64.5	274.0
6	-	0.5	0.3	0.8	1.4	2.2
7	51.3	28.3	7.8	87.4	29.7	117.1
9	23.4	12.7	4.5	40.6	16.1	56.7
11	13.6	9.1	2.1	24.8	11.0	35.8
12	-	0.7	0.2	0.9	1.9	2.8
16	-	2.5	0.6	3.1	6.8	9.9
19	7.6	4.1	1.4	13.1	5.2	18.3
20	13.3	7.2	2.6	23.1	9.3	32.4
21	-	0.6	1.0	1.6	1.2	2.8
22	11.4	6.4	2.3	20.1	8.4	28.5
23	10.3	8.0	1.3	19.6	9.4	29.0
24	-	-	-	-	0.8	0.8
25	19.6	12.2	15.3	47.1	7.2	54.3
Total	264.9	160.5	87.3	512.7	185.6	698.3

a/ Residual.

b/ From digitization of political boundary maps and RPU map.

Table A2.9. Major Land Use by RPU. Southwest Zone (000 hectares)

RPU	Cropland	Pasture	Other	Land in Farms	Nonagricultural[a/] Land	Total[b/] Area
2	67.3	22.4	8.2	97.9	225.7	323.6
14	8.0	2.5	0.6	11.1	30.8	41.9
25	17.6	10.1	5.5	33.2	92.2	125.4
27	-	0.5	0.2	0.7	19.1	19.8
31	-	4.0	1.3	5.3	42.5	47.8
32	40.7	5.5	1.3	47.5	33.1	80.6
33	-	2.9	0.6	3.5	30.5	34.0
34	-	2.1	0.5	2.6	31.6	34.2
35	-	1.1	0.2	1.3	41.7	43.0
Total	133.6	51.1	18.4	203.1	547.2	750.3

a/ Residual.

b/ From digitization of political boundary maps and RPU map.

Table A2.10. Major Land Use by RPU. Southern Zone (000 hectares)

RPU	Cropland	Pasture	Other	Land in Farms	Nonagricultural[a/] Land	Total[b/] Area
2	14.4	5.8	3.4	23.6	95.3	118.9
6	-	0.5	0.3	0.8	9.6	10.4
10	-	-	-	-	2.2	2.2
11	-	1.7	0.9	2.6	10.5	13.1
14	27.1	11.4	5.9	44.4	94.5	138.9
16	-	2.4	1.4	3.8	15.8	19.6
25	15.9	6.2	3.3	25.4	93.4	118.8
28	-	1.9	1.3	3.2	53.5	56.7
29	-	0.8	0.2	1.0	27.7	28.7
30	-	2.7	1.2	3.9	109.6	113.5
32	18.3	3.3	1.8	23.4	11.3	34.7
Water	-	-	-	-	22.5	33.5
Total	75.7	36.7	19.7	132.1	556.9	689.0

a/ Residual.

b/ From digitization of political boundary maps and RPU map.

Table A2.11. Major Land Use by RPU. Eastern Zone (000 hectares)

RPU	Cropland	Pasture	Other	Land in Farms	Nonagricultural[a/] Land	Total[b/] Area
1	16.6	16.0	5.3	37.9	14.6	52.5
2	33.9	66.2	9.2	109.3	17.6	126.9
3	19.2	20.0	3.3	42.5	1.3	43.8
4	-	9.2	1.2	11.4	6.0	17.4
5	28.7	61.9	13.9	105.5	66.0	171.5
6	-	0.8	0.1	0.9	1.0	1.9
7	7.6	6.7	2.5	16.8	6.9	23.7
8	-	5.6	0.6	6.2	3.6	9.8
9	8.3	15.3	1.9	25.5	1.6	27.1
11	40.4	69.8	11.4	121.6	19.1	140.7
12	54.5	55.4	19.0	126.9	16.3	143.2
23	7.7	2.5	1.7	11.9	0.6	12.5
24	-	0.7	0.5	1.2	2.3	3.5
Total	216.9	330.1	70.6	617.6	156.9	774.5

a/ Residual.

b/ From digitization of political boundary maps and RPU map.

A preliminary evaluation of the agricultural potential of farmland was carried out on the basis of subjective estimates of agricultural potential for each of the RPUs and census estimate of land in farms by land use category and agricultural zone (Table A2.12). These data provide a simplified overview of agricultural land in the Dominican Republic based on the more detailed data in Tables A2.5 through A2.11 that show major land uses by RPU and by agricultural zone. Note that over 95 percent of the land judged to have high agricultural potential is in the Northern and Northeastern Zones. (Land of moderately high potential is found in all zones.) Irrigated area, and the areas in pasture and crops are also shown in the table. In all zones, land in farms amounted to more than 100 percent of land with moderate to high agricultural potential. This finding supports the view that while additional crop land may be available in some zones from conversion of pasture, little good quality land remains to be incorporated into farms.

This finding that the country has 517,000 hectares of land with moderate to high agricultural potential is in contrast to the indication in Table 2.2 that soils in 963,000 hectares are suitable for crop production (590,000 for intensive production). It is indicative that land classification is still very much an art. A detailed assessment of land and water resources and current production practices will be necessary before more definitive conclusions can be reached. It should be recognized, however, that agrophysical information will never establish

optimum land utilization. That question can only be answered by interactive analysis that considers domestic and foreign demand, marketing costs, and input prices, as well as agronomic production possibilities and alternative production techniques.

Table A2.12. Characteristics of Agricultural Land, by Potential and by Zone (000 Hectares)

Zone	Total Land Area	Land in Farms	Cropland	Pasture	Irrigated	High Potential Land	Moderately High Potential Land
North	906.5	604.9	201.1	312.6	40.5	53.5	27.2
Northeast	532.4	469.6	229.4	211.3	21.1	54.0	41.6
Northwest	476.9	195.2	84.8	84.5	33.5	0	31.8
Central	698.3	512.7	264.9	160.5	18.9	0.8	51.6
Southwest	750.3	203.1	133.6	51.1	38.8	0	77.5
South	689.0	132.1	75.7	36.7	37.1	0	83.9
East	774.5	617.6	216.9	330.1	3.0	4.4	91.1
Total	4,827.9	2,735.2	1,206.4	1,186.8	192.9	112.7	404.7

Source: Based on CRIES/SIEDRA data.

Chapter 3

LAND TENURE, AGRICULTURAL PRODUCTION AND RURAL INCOME DISTRIBUTION

The ability of agriculture to contribute to broad national and rural development objectives depends not only on the sector's endowments of agricultural land and water but also on institutional arrangements that affect the efficient utilization of resources on farms. Farm size, tenure, and rural institutions in general, need to be considered in relation to population and natural resources. The sugar industry is of special significance because of its enormous influence on rural life and its dominant role in the Dominican economy. Several laws passed in 1972 have widened the Dominican Agrarian Institute's (IAD) agrarian reform program. Other laws provide for the purchase of underutilized farmland by the government and the recovery of public land settled without permission by private farmers. This chapter discusses the institutional organization of the farm sector and analyzes production, employment, and income in the major subsectors. Some attention is also given to nonagricultural rural occupations.

3.1 Number of Rural and Small Town Households and Farms

There were an estimated 475,000 rural and small town households in 1975.[1/] Each household contained 6.3 persons and 1.9 economically active

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[1/] We have estimated that there were 745,700 Dominican households in 1975; 413,900 households were rural, 61,500 households were in towns of less than 10,000 inhabitants, and 270,300 households were in the cities. These estimates are based on the population projections in Chapter I and the assumptions that urban households have 6.4 persons and rural households have 6.3 persons, on the average. The inhabitants of small towns are considered as part of the rural population. Farming is the most important occupation for persons living in small towns; more than 20 percent of the heads of households in small towns are farmers. (continued next page)

adults on the average. Small towns are defined to have 10,000 inhabitants or less, and they accounted for about 13 percent of the combined rural and small town population. Approximately 309,000 rural and small town heads of households (65 percent) were farmers (Table 3.1). The remainder, 166,400 heads of households (35 percent), were economically active in the following nonagricultural occupations: professionals, administrators, and office workers (5.3 percent); marketing, sales, and transport (9.6 percent); a variety of artisans and skilled workers (10.5 percent); personal services (3.6 percent); and landless laborers (5.9 percent). The landless laborers work primarily as hired hands on farms. Overall, heads of households make up about 53 percent of the total rural labor force. Data on the occupational distribution of the other members of the rural labor force are not available but, presumably, they are economically active mainly in agriculture. (Agricultural employment and incomes are analyzed in Section 3.5 of this chapter.)

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According to the demographic survey, urban households had 5.2 persons and rural households had 5.4 persons, on the average, in 1971. About 84 percent of the heads of households were economically active and 16 percent were considered as outside the work force. Most of the latter (75 percent) were women and one-third were elderly; i.e. 65 years or older.

The concept of a "household" used in this study is based on the notion that the head of a household should be economically active, though not necessarily employed. Therefore, the members of the households considered as outside the work force have been allocated to the households with economically active heads. This has the effect of increasing the average size of households in urban and rural areas to 6.4 persons and 6.3 persons, respectively. This procedure does not count a retired person or a non-employed parent as a separate household. As a result, the total number of households estimated for this study may be lower than other estimates but our figures on employment will not be affected. There was an average of 6.7 persons per farm household estimated by the agricultural sector farm survey. The farm survey definition of household included family members, friends, and relatives living with the family.

Table 3.1. Number of rural and small town households, 1975.

Type of household[a]	Number of households	Percent
	(1,000s)	
Total number of households[b]	475.4	100.0
Farmers, fisherman, forestry[c]	309.0	65.0
Other households:	166.4	35.0
Professional, administrators, office workers	25.3	5.3
Marketing, sales, transport	45.8	9.6
Craftsmen, construction, mechanics, artisans, and rural industry	49.8	10.5
Personal services[d]	17.3	3.6
Landless laborers; other	28.2	5.9

[a] Refers to the principal occupation of the household head.

[b] Based on population data in Table 1 and the assumption of 6.3 persons per household (see text).

[c] Does not include an estimated 16,100 farmers living in cities with 10,000 inhabitants or more.

[d] Mainly female servants.

The outstanding feature of land distribution in the Dominican Republic is the existence of a few very large farms and a multitude of small farms. The number of intermediate sized farms is relatively small. Farms have been grouped according to five size classes: less than 0.5 ha., 5.0 - 49.9 ha., 50 - 499.9 ha., and 500 ha. and more (Table 3.2). Farms in the two smallest size classes generally do not have sufficient land to fully occupy the farm families under traditional production systems. Farms in the 5.0 - 49.9 ha. class are considered to correspond to family farms in that a farm of this size will utilize most of the labor available from the family. Larger farms have enough land to fully employ more than one family, especially at times of peak labor requirements.

In 1975, the largest number of farms were in the 0.5-4.9 ha. size class. This class contained 57 percent of the farms but only 12.4 percent of the land in farms. If microfarms, the smallest size category, are considered along with the 0.5-4.9 ha. size class, 78 percent of the farms contained less than 17 percent of the total land in farms. In both of these size classes, land resources are so limiting that the farm family usually depends on off-farm employment to implement its subsistence food production and meager cash sales. Intermediate sized farms (0.5-49.9 ha.) accounted for 19 percent of the farms and 30 percent of the land in farms. The two largest size categories (50-499.9 ha. and 500 and more ha.) accounted for slightly more than 2 percent of the farms and 54 percent of the land in farms.[1/]

[1/] Published data on the number of farms and land utilization are suspect. Recent field work by the Cadastral Survey in 68 municipios found far more farm units that were reported in the 1971 census--an average of 28% more for the surveyed area. This may mean that the rural population and labor force are also underestimated.

Table 3.2. Number and size of farms, 1975.

Farm size class	Number of farms	Percent	Area	Percent
	(1,000s)		(1,000 ha)	
Total	324.1	100.0	2,736.2	100.0
500 ha and more	0.4	0.1	1,465.7	53.6
50-499.9 ha	6.7	2.1		
5-49.9 ha	62.8	19.4	819.2	29.9
0.5-4.9 ha[a]	204.6	63.1	439.1	16.0
Less than 0.5 ha	49.6	15.3	12.2	0.5

Sources: Instituto Agrario Dominicano, Departamento de Estadistica, Unpublished data. Santo Domingo, R.D., 1977.

Oficina Nacional de Estadistica, Departamento de Censos y Encuestas. Sexto Censo Nacional Agropecuario, 1971, 2nd Edition, Vol. I., II. and III. Santo Domingo, R.D., 1976.

[a] The 1971 census of agriculture figures were adjusted to account for agrarian reform settlements during September, 1971 to July, 1975. Both individual parcels and collective farms are included in the 0.5-4.9 ha size class. This does not cause serious distortions. See Table 4.7 for figures about collective farms. Also, assumes agrarian reform land was taken out of the largest farms. The State farms are included in their respective size categories.

3.2 Land Tenure

Farms were classified according to five tenure situations in the 1971 census of agriculture: owner-operator, renter, sharecropper, agrarian reform "parcelero", and squatter. About 60 percent of the farms, including 77 percent of the land in farms, were owner-operated. Owner-operators have titles to land. "Parceleros" or "asentados" (beneficiaries of agrarian reform land redistribution projects) do not have legal titles to land but receive "provisional" certificates from the IAD that allow them to farm their parcels indefinitely. By 1971, agrarian reform parcels accounted for 4 percent of the farms and less than 3 percent of the land in farms. Almost 36,500 squatters with a total of 210,132 hectares were on public land. Many of these squatters are settled on land formerly belonging to the Trujillo family that was taken over by the State after Trujillo's death in 1961. Squatters on public land with 6.3 ha. or less and no other means are considered as residents and usually are not resettled. They are eligible to receive provisional certificates of title to the land they occupy from the Dominican Agrarian Institute (IAD).

In addition to squatters on public land, 24,596 farms with 51,969 hectares were classified as occupied private land. Few, if any, of the operators in this category have title to land, and their status as farmers is especially precarious.[1/]

[1/] Many of the smallholders who have settled on public land feel their possession is secure even though they do not have a legal title. Title can be obtained after 30 years of possession but the procedure is slow, time-consuming and expensive. Lack of a title can become a problem if a dispute arises or if the occupant seeks credit. For more information on land titling see Strasma, J. Assessment of the Status and Problems of Cadastral Survey, Land Titling, Property Registration, and Land Taxation in the Dominican Republic, 1979, USAID/DR, draft report, March 1979.

Perhaps 40 percent of the land in the large farm subsector is owned by the state. Government land includes sugar estates managed by the State Sugar Council (CEA), land held by the IAD for redistribution and settlement in agrarian reform projects, and land in state farms.

Summary information on land holdings by institutions is given in Table 3.3. Sugar companies administered 181,839 hectares planted in sugarcane, equivalent to 25-30 percent of the total land in the large farms. This figure does not include extensive holdings of pasture and other land owned by the sugar companies. Perhaps 40 percent or more of the total land in large farms is owned by the government. This is not clear, however, and should be clarified. Completion of the rural cadaster now in progress would supply this information. Action to complete the cadaster as soon as possible for the most important agricultural areas is suggested.[1/]

3.3 The Sugar Subsector

Sugar is the most valuable agricultural product produced by the Dominican Republic; sugarcane production accounts for almost 20 percent of the value of the country's gross agricultural output. The bulk of the country's sugar industry is concentrated in a large government company (CEA) and two private companies, one of which, Central La Romana, is owned by the Gulf and Western Corporation of America (G&W). (Casa Vicini is the other private firm.) These companies own the sugar mills (16 factories) and related by-product processing facilities. Sugar policies are regulated by the Dominican Sugar Institute (INAZUCAR), which formulates

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[1/] Strasma, J. Assessment of the Status and Problems of Cadastral Survey, Land Titling, Property Registration, and Land Taxation in the Dominican Republic, 1979, USAID/DR, draft report, March 1979.

Table 3.3. Land Distribution by Institution, 1975

Type of Institution	Area	Percent
Total Land in Farms - 1971	2,736,236	100.0
Area Administered by Sugar Mills - 1974 [a]	181,839	6.6
CEA Mills	113,273	4.1
Private Mills	68,566	2.5
Land in Agrarian Reform Asentamientos - 1975 [b]	305,462	11.2
Land in State Farms - 1975 [c]	33,677	1.2
Land Held by the Agricultural Bank - 1975 [d]	1,049	-
Occupied Public Land - 1975 [e]	126,562	4.6
Other Land Accumulated by the State - 1972-75 [f]	127,393	4.7
Other Land in Private Farms [g]	1,960,254	71.6

Sources: 6th National Agricultural Census - 1971, State Sugar Council, Dominican Agrarian Institute - Dept. of Statistics and State Farm Administration, Commission for the Application of Agrarian Laws, Agricultural Bank.

[a] Source: Consejo Estatae de Azúcas, La Industria Azucarera Dominicano, Santo Domingo, 1976.

[b] Source: Instituto Agrario Dominicano, Departamento de Estadistica, Santo Domingo, 1977.

[c] Source: Instituto Agrario Dominicano, Departamento de Administración de Fincas, Santo Domingo, 1977.

[d] Source: Legal Dept., Agricultural Bank (represents repossessed land).

[e] Estimated: occupied public lands 1971 = 210,132 ha, less recovered public land 1972 - june, 1975 = 83,570 ha (figures based on 6th National Census of Agriculture - 1971 and IAD Dept. of Statistics data).

[f] Estimated: total land acquired by the State 1972 - June 1975 = 226,135 ha, less land distributed through agrarian reform = 93,648 ha, less land placed in State farms = 5,094 ha. Since the end of 1971 the Government has acquired: recovered public land 83,570 ha, land purchased from private individuals 30,482 ha, idle land 36,534 ha, latifundio 71,451 ha, and special quota 4,097 ha.

[g] Calculated residual.

domestic sugar production policies, conducts product and marketing research, and recommends export quotas for the various mills.

In 1974, almost 250,000 hectares were planted to sugarcane, equivalent to more than one-fifth the total land in crops. Most of the land planted to sugarcane is in the central and eastern agricultural zones (Table 3.4). Government-owned sugar land accounted for 43 percent of the land planted in sugarcane and the private companies controlled 27 percent of the land planted in sugarcane. In addition, some 3,000 sugar colonos with an average of 25 hectares each grew almost 30 percent of the sugarcane crop in 1974. Previously, sugar colonos seldom planted more than 15 percent of the sugarcane crop. Colonos sell their sugarcane to the sugar companies.[1/]

The sugar companies reported 102,460 workers employed in sugarcane production and sugar processing in 1974. Many of these workers are employed on a part-time or seasonal basis only. Approximately 80 percent of the sugar company workers are field hands. Data on employment on colono farms are not available. Also, Haitian laborers migrate seasonally to or reside in, the Dominican Republic for work in the sugarcane harvests. Statistics on the number of these migrants are not available, but most estimates range between 40,000 and 60,000 workers annually. Haitians, among other things, are hired to avoid paying social benefits, which, by law, would have to be paid to Dominican workers.[2/]

[1/] Both CEA and Central Romana utilize colonos. Casa Vicini does not buy cane from colonos.

[2/] Both CEA and La Romana depend importantly on Haitian workers to cut cane, a growing proportion of which reside permanently in the country. Casa Vicini makes greater use of Dominican workers, especially small farmers located adjacent to its cane fields.

Table 3.4. Area planted to sugarcane, harvested area, and production by region, crop year 1973-1974

Region and name of sugar mills	Area planted to sugarcane			Total harvested area	Production	Average yield
	Sugar mills	Colonos	Total			
	(1,000 ha)			(1,000 ha)	(1,000 MT)	(MT/ha)
Northern						
Esperanza (CEA)	2.2	--	2.2	2.2	174.1	78
Amistad (CEA)	0.8	0.8	1.5	1.2	82.3	67
Monte Llano (CEA)	2.8	3.5	6.3	5.9	302.4	51
Region total	5.8	4.3	10.1	9.4	558.8	60
Southwestern						
Barahona (CEA)	11.2	--	11.2	11.2	912.2	82
Southeastern						
Catarey (CEA)	6.1	--	6.1	5.5	272.8	50
Rio Haina (CEA)	37.2	12.0	49.2	34.5 [a]	1,644.0	48
Ozama (CEA)	9.1	11.7	20.8	13.7	706.0	52
Boca Chica (CEA)	5.3	5.3	10.7	10.7	587.4	55
Consuelo (CEA)	11.5	4.8	16.4	16.2	754.1	47
Porvenir (CEA)	7.4	2.5	10.0	10.0	386.2	39
Quisqueya (CEA)	7.4	4.7	12.1	9.5	400.0	42
Santa Fé (CEA)	7.1	2.8	10.0	8.4	386.7	46
Caei (Vicini)	4.9	--	4.9	3.8	163.0	43
Cristóbal Colón (Vicini)	13.2	--	13.2	8.0	331.7	42
Angelina (Vicini)	4.9	--	4.9	4.9	209.0	42
Romana (G&W)	43.9	27.4	71.3	64.4	2,590.8	40
Region total	158.1	71.3	229.5	189.4	8,432.0	45
Total Republic	175.2 [b]	75.6	250.8	210.0	9,902.9	47

Source: Consejo Estatal del Azucar (CEA), La Industria Azucarera Dominicana, Santo Domingo, R.D., 1976.

[a] Source figure adjusted to include colonos.

[b] Excludes 6,700 ha administered by the mills but not planted to sugarcane.

Unlike the manufacturing sector, labor's share in output varies substantially from year to year in the sugar industry. In 1960, labor's share amounted to only 27.3 percent of value added. Apparently, the sugar companies sustained losses in 1964-66, when the total wage bill amounted to more than 100 percent of value added. Wages and profit shares paid to labor in the sugar industry are regulated by the government. Thus, although labor's share in output fluctuates substantially, annual changes in the total wage bill are moderate, and sugar workers' incomes are considerably insulated from price swings for sugar. In 1974, field hands earned RD$482 in wages and bonuses, on the average, and refinery personnel earned RD$1,821. For the most part, sugar workers do not work full time. Many own a little land on which they grow food crops. As a result, a large proportion are counted as small farmers in the data on rural occupational distribution (see Table 3.1).

Annual increases in employment by the sugar companies averaged more than 4.0 percent during 1950-73, with the exception of 1962-66 when increases in employment did not reach one percent per year. Capital per worker in the sugar industry (defined to include sugarcane growing and sugar processing) amounted to RD$2,090 per worker in 1973, which was equivalent to about one-fourth the capital per worker in the manufacturing sector. Net real capital formation in the sugar industry has been minimal for more than a decade. During 1962-73 annual increases in the real value of the sugar companies' capital stock averaged only 0.5 percent. The last major investments in sugar processing were made in the late 1950s when the Esperanza mill was built.

Overall, the sugar sector appears to have been fairly successful in providing increasing numbers of workers with incomes at relatively low capital cost per worker. In the short run, the sector can continue to absorb labor provided that sugar workers do not organize to restrict employment and the cane harvest is not mechanized. With current technology and organization and given the limited land base for expansion of sugarcane growing, the ability of the sector to absorb additional labor is limited. Eventually, productivity per worker must increase to provide for a rising standard of living. This probably cannot occur if idle labor sits by while heavy machinery is used in large-scale field operations. A socially desirable organization of the sugar industry should consider the opportunity cost of labor released through mechanization.[1/]

There is considerable ambivalence about sugar policies in the Dominican Republic. Fluctuations in the production of sugar and in world sugar prices are major sources of short-term instability in the economy, particularly in the public sector which depends on sugar profits and export taxes for revenue. Recent increases in sugar prices and Law 314 of 1972, which exempts sugarcane land from agrarian reform, have encouraged expansion in

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[1/] Several factors raise doubts about future employment in the sugar industry. The land area devoted to sugar cane is not likely to increase and may well decrease as yield-increasing technology is utilized. Efforts to shorten the cutting season as a means of increasing sugar yields make mechanization of the harvest more attractive. Many observers feel that the large investment program of which World Bank financing has been requested would result in displacement of labor. See OIT, Technología, Empleo, y Distribución de ingresos en la Industria Azucarera de la República Dominicana, documento de trebajo, Septiembre, 1978.

sugar production, especially in the colono subsector. On the other hand, a Government Decree was issued in 1975 that stipulates that additional land could not be planted to sugarcane in order to free land for needed production of staples.

The sugar companies are targets of many persons who advocate expanded programs of agrarian reform. Both the CEA and G&W are distributing parts of their land holdings to farmers whom they train in production of sugarcane and other crops. G&W reportedly plans to distribute up to ten percent of its land to small holders but no time table has been set. The redistribution of sugar land is not a part of the Dominican Republic's formal agrarian reform program.

Historically, throughout the world sugar industries mainly have been organized around large plantations to facilitate coordination and control of field operations and refining. Clearly, the Dominican Republic is not an exception to this general rule. Jamaica, a nearby island, may be a good example of a sugar industry where small farmers produce the bulk of the sugarcane. In Jamaica in 1966, more than 28,700 farmers produced 51 percent of the sugarcane delivered to factories. Regulation and control of the industry seems to proceed efficiently and smoothly.[1/] Jamaica may be a relevant example for the Dominican Republic to consider.

[1/] Barnes, A. C., The Sugar Cane, 2nd Ed., New York: Wiley, 1974.

3.4 Agrarian Reform

During 1962 to 1975 the Dominican government acquired 318,250 hectares in its land redistribution programs. This land was acquired as follows: 46,359 hectares were purchased from private landholders; 147,873 hectares were recovered public land; 48,465 hectares were idle or vacant land; and 75,553 hectares were expropriated latifundios or "special quota" land.[1/] Acquisition of land by special quota occurs when the government makes an improvement on land; that is, the improvement is paid for in land. Land acquired by the government is either turned over to the IAD for distribution in agrarian reform projects, or placed in state farms, or placed in experimental farms, or left with the previous tenants until it can be absorbed in government programs.

3.4.1 The Dominican Agrarian Institute (IAD)

The IAD is an autonomous agency charged with carrying out agrarian reform. Since 1962, the IAD has settled 36,353 families on 179,200 hectares, equivalent to about 50 percent of the estimated total increase in rural households for the period. Most of the IAD's program is in the Northern Region (57 percent of the families settled). Besides administering these recent settlements, the IAD also administers 140,770 hectares distributed in "Colonatos" during Trujillo's administration prior to 1962 (Tables 3.5 and 3.6). Colonatos are small colonies located mainly along the Haitian border. In total, almost 320,000 hectares in settlements are

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[1/] Figures taken from USAID/Dominican Republic Mission, Statistical Data Book, Santo Domingo, R.D., June 1977.

Table 3.5. Agrarian reform settlements: Number of persons and land area settled, 1961-1976

Year	Number of families	Number of persons	Land area	Land area per family	Land area per person
			(ha)	(ha)	(ha)
1961[a]	11,451	84,526	140,771	12.3	1.7
1962	863	6,184	3,848	4.5	0.6
1963	719	5,441	3,985	5.5	0.7
1964	2,214	16,639	11,533	5.2	0.7
1965	--	--	--	--	--
1966	321	1,961	2,496	7.8	1.3
1967	1,991	14,797	10,179	5.1	0.7
1968	1,447	10,745	6,903	4.8	0.6
1969	2,057	16,087	9,765	4.7	0.6
1970	1,243	10,037	4,766	3.8	0.5
1971	3,670	27,251	17,568	4.8	0.6
1972	6,498	48,078	37,539	5.8	0.8
1973	8,324	63,510	40,461	4.9	0.6
1974	1,800	13,634	9,105	5.1	0.7
1975	2,044	15,330	9,946	4.8	0.6
1976	3,162	23,715	11,098	3.5	0.5
Cumulative total	47,804	357,935	319,963	6.7	0.9

Source: Instituto Agrario Dominicano, Departamento de Estadistica

[a]Total through 1961.

Table 3.6. Numbers of agrarian reform districts, land area in districts, and families settled by zone, 1975

Zone	No. of settlement districts	Total area in districts	No. of families[b]	Colonization prior to 1962			Settlements 1962-1975[a]		
				Area	No. of families	Area per family	Area	No. of families[b]	Area per family
		(ha)		(ha)		(ha)	(ha)		(ha)
Northwestern	23	29,504	5,073	16,125	1,715	9.4	13,379	3,358	4.0
Northern	24	26,370	5,465	1,927	838	2.3	24,443	4,627	5.3
Northeastern	18	113,224	14,214	60,863	3,510	17.3	52,361	10,704	4.9
Southwestern	16	25,970	4,791	17,839	2,741	6.5	8,131	2,050	4.0
Southern	19	25,776	2,391	19,590	888	22.1	6,186	1,503	4.1
Central	23	34,356	5,077	1,439	163	8.8	32,917	4,914	6.7
Eastern	14	50,263	6,993	22,989	1,596	14.4	27,274	5,397	5.1
Total	137	305,462	44,004	140,771	11,451	12.3	164,691	32,553	5.1

Source: Instituto Agrario Dominicano, Departamento de Estadistica.

[a]Executed through July, 1975; includes collective farms.

[b]At date of settlement.

administered by the IAD, which is equivalent to about 11.5 percent of the total land in farms. In addition, the IAD manages state farms that contain an estimated 33,770 hectares.

3.4.2 Collective Farms

IAD settlements were made entirely on an individual family basis until 1972. Recent acquisitions of riceland by the IAD under Law 290 of 1972 have been organized into collective farming units. Group farming is viewed by public officials as an improved way of providing landless rural families with employment and access to supporting services. It is anticipated that increased productivity will be achieved, also. All too often individual settlements have not resulted in increased output. Partly, this stems from the inability of the SEA and IAD technicians to provide services and technical assistance to agrarian reform beneficiaries. The hope is that economies of scale can be realized in the provisions of technical services through group farming.

"Asentados" in collective farms receive provisional certificates to a part of the land in their farms but are expected to work the land in common. Collective members receive monthly subsistence advances (ranging from RD$2.00 - RD$4.00 per day) from the IAD and a share of the profits after harvest after production loans and advances have been repaid. Collective farms tend to be highly dependent on flows of public resources and services, especially management. The Agricultural Bank is playing a key role in the financing of production activities on these farms. Marketing is contolled tightly by the Price Stabilization Institute,

which imports rice and is the sole wholesaler of domestic rice.[1/] The ultimate success of collective farms in raising productivity and living standards of rural people is dependent on group solidarity of the collective members.[2/]

There are 92 collective rice farms with memberships ranging from 3 to more than 100 members (Table 3.7). Less than ten percent of the land distributed in agrarian reform projects during 1972-75 went into collective rice farms. Law 290 provides for all privately owned rice land in farms over 31.4 hectares in size and irrigated by government-built canals to be turned over to the IAD. In addition to rice collectives, there are five collectives devoted to fruits and one collective is devoted to livestock. Collective farms have about three hectares per member, on the average.

3.4.3 State Farms

In addition to administering agrarian reform projects, the IAD manages eight state farms with a total of 33,677 ha. (Table 3.8). Two of the farms, Oviedo and Isabela, have been owned by the Government since the mid-1950s and are devoted mainly to cotton production. Six farms were recently acquired from private landholders and are devoted to the production of domestic food. The IAD operates the state farms with two important objectives in mind: (1) to achieve rapid increases in the

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[1/] See Chapter 5.

[2/] Hatch, J., Flores, A., and Scofield, R., Group Farming in the Dominican Republic, USAID/DR Report, 1977.

Table 3.7. Collective Farms - Location, Cultivable Area, Number of Families, 1976.

Location	No. of Farms	Cultivable Area	No. of Families	Area per Family
		(ha.)		(ha.)
Cotui	22	3,073	1,016	3.0
La Vega	18	2,010	627	3.2
Valverde-Esperanza	18	1,336	454	2.9
Villa Vasquez	12	437	137	3.2
San Juan	1	44	15	2.9
Limon del Yuna	16	1,371	372	3.7
La Estrella	2	127	33	3.8
Nagua	5	428	136	3.1
Limon de Jimant	1	66	83	0.8
Angostura	1	143	106	1.3
La Vanesa	1	233	80	2.9
Total	97	9,266	3,059	3.0

Source: Instituto Agrario Dominicano, Documentacion Sobre Algunos Aspectos Generales de la Reforma Agraria en la Republica Dominicano, Santo Domingo, May, 1977.

Table 3.8. State farms administered by the Dominican Agrarian Institute, 1975

Name of farm	Year[a]	Province	Area	Principal crops
			(ha)	
Manzanillo	1970	Monte Cristi	12,578	Sorghum, bananas, corn, tomatoes
Banegas-La Canela	1974	Santiago	1,446	Plantains, cassava, sweet potatoes
Batey-Ginebra	1973	Espaillat	2,516	Plantains, corn, red beans
Anzonia	1968	Azua	6,603	Plantains, peanuts, tomatoes
Vicente Noble	1971	Barahona	283	Plantains
San Ramón	1975	Bahoruco	1,132	In development
Oviedo	Prior 1960	Barahona-Pedernales	7,547	Cotton
Isabela	Prior 1960	Puerto Plata	1,572	Cotton
Total			33,677	

Source: Instituto Agrario Dominicano, Dept. de Administracion de Fincas.

[a] Refers to year taken over by the state.

supplies of basic foods, and (2) to create new sources of employment. Relatively little is known about how the state farms are contributing to long-term social developmental objectives in the Dominican Republic.

Most of the land in the state farms appears to be in intensive cultivation. Machinery is employed in production processes, but its use is intended to complement creation of jobs for rural people. An estimated 6,000 farmers are employed in state farms. The Banegas - La Canela and Batey Ginebra farms in the Sabaneta de Yasica area of the northern zone are producing annual and perennial crops on land which was in pasture until 1974. This has contributed to increased employment in the area. Further increases are expected as plans to place additional pasture in crops are implemented. Shortages of water for irrigation is a critical limiting factor in some areas.

3.5 Production and Resource Utilization in the Major Farming Subsectors

Basically, three major farming subsectors can be distinguished: a small-farm subsector, medium-sized farms, and large farms. The small farm subsector can be considered as all farms with 5.0 hectares or less (including farms with less than 0.5 ha) plus the recent IAD collective farms. The medium-sized farm subsector consists of farms with 5.0 - 49.9 hectares, and the large farms have 50.0 hectares or more. This section discusses output and resource utilization in these three major subsectors in 1975.

3.5.1 Land Utilization by Size of Farm

Most of the country's pastureland (64.4 percent) and almost half the cropland (46.5 percent) is in the large farm subsector. The medium-sized farms have about 28 percent of the cropland and pastureland. Small farms have 25.2 percent of the cropland and only 7.2 percent of the pastureland (Table 3.9). A prominent feature of land use patterns in Dominican farms is the decreasing proportion of total land in crops as the size of farm increases. About 68 percent of the land in small farms is in crops, whereas less than 40 percent of the land in large farms is in crops. Normally, land in crops is more work-intensive than land in other uses, such as livestock pasture. Unfortunately, little is known about the distribution of land by its potential productivity within the different farm size classes. The large farms may have more than their share of low quality land. On the other hand, there may be some areas of good soils in large farms now in pasture that could be used more intensively if access were given to landless workers or small farmers. A frequently noted contrast is that land under cultivation by small farmers should be returned to pasture or other extensive use while some land in large farms apparently suitable for intensive cropping is idle or used for pasturing livestock.

Most of the cattle are distributed in some 20,000 farms with 10 head or more each. In addition, some 70,030 small and medium-sized farms have between 1-10 head each. Pork production has been more widespread, and it is estimated that in the past half the farms had at least one pig. Most of the pigs were on small and medium-sized farms. Unfortunately, the swine population will be eliminated under the African Swine Fever Eradication Program (see Chapter 4).

Table 3.9. Estimated total land use patterns by size of farm, 1975.

Farm size class	Number of farms	Average farm size	Area in farms	Cropland		Pasture		Other	
				Area	Percent	Area	Percent	Area	Percent
(ha)	(1,000s)					(1,000 ha)			
Less than 5.0	254.2	1.8	451.3	304.6	25.2	85.3	7.2	61.4	17.9
5.0-49.9	62.8	13.0	819.2	340.8	28.3	336.7	28.4	141.7	41.3
50.0 and more	7.1	206.4	1,465.7	561.0	46.5	764.8	64.4	139.9	40.8
Total	324.1	8.4	2,736.2	1,206.4	100.0	1,186.8	100.0	343.0	100.0

Source: Estimates of the number of farms are based on 1971 agricultural census data, adjusted for recent agrarian reform settlements. Estimates of land use by farm size class are based on CRIES data and land use information in the Agricultural Sector Survey. Data for the largest farm size class are calculated residuals.

(The analysis of agricultural sector resource use in the Dominican Republic is handicapped by an inconsistent and inadequate data base. Statistics in Tables 4.9 - 4.12 were pieced together from data in the Agricultural Sector Survey, CRIES Land Resources Inventory, and National Income Accounts. Unfortunately, a framework for documenting inconsistencies and identifying inadequacies in data is not available, and the reader is cautioned about the low reliability of statistics in this study.)

3.5.2 Gross Agricultural Output by Subsector

Agricultural production statistics reflect how effectively the agricultural sector utilizes its total resources to product output. Gross agricultural output was defined as the farm-level value of all crops, livestock, and processed raw agricultural products produced on farms, including production destined for market and for on-farm use. This section examines total, per farm, and per hectare production for the three farm subsectors.

In 1975, total gross output of agricultural products amounted to an estimated RD$844.6 million in current 1975 prices. The large-farm subsector produced an estimated RD$457.1 million, equivalent to 54 percent of total agriculture output. The figure for the large farms was influenced by unusually favorable prices for export products, especially sugarcane. The small-farm and medium-farm subsectors accounted for an estimated 21 percent and 25 percent of total output, respectively.

On a per farm basis, output in the large farms averaged more than RD$64,000, whereas output per small farm averaged only RD$695. Medium-sized farms produced an average output of RD$3,360, almost five times the average output of small farms. (Some of the output of large farms accrues to the government, which owns sugar estates and the state farms.)

Small farmers utilize their land more intensively than medium and large-sized farms. Based on data in Tables 3.9 and 3.10, we estimated that gross output per hectare of utilized land in the small farms amounted to RD$452, compared to RD$311 for medium farms and RD$345 for large farms. (Utilized land is defined as the sum of cropland and pastureland.)

Table 3.10. Agricultural sector gross production and value added by farm size class, 1975

	Crops excluding sugarcane	Sugarcane[a]	Livestock	Total
		(1,000 DR$)		
Gross production				
Farms with 4.9 ha or less[b]	119,281.4	--	57,151.0	176,432.4
Farms with 5.0-49.9 ha[b]	98,931.7	59,623.0	52,525.2	211,079.9
Farms with 50.0 ha and more[c]	191,570.9	169,412.0	96,104.6	457,087.5
Total[d]	409,784.0	229,037.0	205,780.8	844,601.8
Inputs[d]	35,582.4	35,582.4	24,430.4	98,595.1
Value added[d]				
Crops and livestock	374,201.6	193,454.6	178,350.4	746,006.7
Forestry and fishing				19,064.6
Total				765,071.3

[a]Based on CRIES and INAZUCAR data, and assumption that half the total inputs were used in sugarcane.

[b]Based on Agricultural Sector Survey and CRIES data.

[c]Calculated residual.

[d]Based on national income accounts.

Basically, the small farmers apply more labor per hectare than the medium and large farms. Many of them produce mainly for subsistence and, therefore, are strongly motivated to use their limited land resources for maximum food production and marketable surplus. About 30 percent of total output in small farms is attributable to livestock products, particularly small animals, poultry, and pigs.

To compare gross production of crops per hectare of cropland, we estimated that in 1975 small farms averaged RD$392 per hectare, medium farms averaged RD$465 per hectare, and large farms averaged RD$643 per hectare -- substantially more than the small and medium farms. The large farms are relatively specialized in production for export, and have the best access to fertilizers, credit, and other agricultural imputs (including technical assistance).[1/]

3.5.3 Labor Supply and Employment

On an annual basis, there is widespread underemployment of rural labor in the Dominican Republic. The total rural and small town work force was estimated at 881,300 economically active persons in 1975, exclusive of child labor (Chapter 1). Total employment in farms amounted to an estimated 94.9 million work-days (Table 3.11). Assuming 210 work-days per year, 451,900 work-years were utilized in agriculture in 1975.[2/]

[1/] 1975 may not be a fair year for comparison since sugarcane prices averaged RD$24.53/MT, which is three times their more normal level. It is estimated that each hectare in sugarcane provided an average output of RD$927 in 1975, which compares to RD$358 per hectare in other crops for medium farms and RD$506 per hectare in other crops for large farms.

[2/] Any assumption regarding days of labor that constitute one work year in Dominican agriculture is open to question. The SEA's Office of Planning uses 130 days for persons 65 years and older, 210 days for males between 15 and 64 years, 60 days for females between 15 and 64, and 25 days for children less than 15 years.

Table 3.11. Total employment in agriculture by size of farm, 1975

Farm size class	Crops excluding sugarcane[a]	Sugar-cane[b]	Live-stock[a]	Admin. Maint. and other[a]	Total
			(1,000 man-days)		
4.9 ha or less	18,641.5	--	5,220.4	8,538.8	32,400.7
5.0 ha-49.9 ha	12,940.2	3,280.0	4,612.8	5,894.3	26,727.3
50.0 ha and more	19,369.0	9,320.0	2,447.4	4,640.3	35,776.7
Total	50,950.7	12,600.0	12,280.6	19,073.4	94,904.7[c]

[a]Based on per hectare labor use coefficients in Agricultural Sector Survey and major land use data in Table 4.9.

[b]Estimates for sugarcane are based on the assumptions that 80,000 laborers worked 157.5 days each, on the average.

[c]Assuming 210 man-days per man-year, 451,900 man-years were employed in agriculture in 1975.

That is, if work were distributed evenly throughout the year, 451,900 workers could have been employed full-time. However, agricultural work is not distributed evenly throughout the year and many farmers work part-time.[1/] Moreover, child labor accounted for almost 13 percent of the available labor in farm households.[2/] Consequently, less than 45 percent (393,600 work-years) of the available adult labor in small towns and rural areas was employed in farming.[3/] Work in other occupations possibly accounted for an additional 30 percent of the available labor, but evidence on this is weak. The large farm subsector accounted for an estimated 38 percent of total agricultural employment, and the medium-farm and small-farm subsectors accounted for 28 and 34 percent of employment, respectively.

According to the Agricultural Sector Farm Survey, small farm households (farms with 0.5 - 4.9 ha) were estimated to have an average of 538 work-days per year of available household labor. Employment on these farms, including hired labor, amounted to 163 man-days per farm, which

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[1/] Monthly indices of employment in crops are available for the small-farm and medium-farm subsectors. Peak labor requirements occurred in November and December, when employment was 18 percent and 21 percent, respectively, above average requirements. (Unfortunately, these indices do not reflect employment in the sugar subsector.) Consequently, data are not available to estimate peak and slack period labor requirements for the total agricultural sector. Using available data and the monthly indices for small and medium farms provided an estimated employment rate of only 71 percent in December 1975, a month of peak labor requirements. Seasonal employment should be further studied.

[2/] See Dominican Republic Agricultural Sector Analysis, Stat. Working Document No. 6, Capital, Fertilizer, Tenancy and Use of Land, USAID and Secretariat of State for Agriculture of the Dominican Republic Dec. 1977.

[3/] The estimate of 393,600 work-years, which is based on farm survey data and statistics about the sugar subsector, is gratifyingly close to the estimated 401,600 work-years in Table 3.11.

is equivalent to only 30 percent of the estimated labor available in small-farm households. Small-farm households were found to have an average of 1.6 adult males. Even if all of the work in small farms had been performed by the adult males in small-farm households, without any hired labor and assuming only 210 work days per man-year, the on-farm employment rate for adult males in small farms would not have reached 50 percent in 1975. Members of many of the small-farm households have to look for work off the farm to supplement meager farm production and sales. They, along with members of landless rural households, members of microfarm households, and Haitian migrants, work part-time in the large-farm subsector, which is highly dependent on hired labor.

As previously stated, small farms apply more labor per hectare than medium and large farms. Average employment per hectare of utilized land in small farms amounted to 82.3 man-days in 1975, medium-sized farms employed 39.0 days, and the large farms employed only 17.8 man-days. Much of the difference in per hectare employment rates by farm size is attributable to the land-extensive nature of livestock activities in the large-farm subsector. On cropland, small farmers apply only 20 to 30 percent more labor per hectare than the large and medium farms (Table 3.12). (These figures do not include employment in sugarcane production, which appears to be highly labor-intensive and is concentrated mainly in large farms.) On the average, medium-sized farms apply less labor per hectare of cropland than the small and large farms. Also, they experience the lowest gross output per hectare in crops. A number of factors may explain this: (1) Medium-sized farmers may emphasize the production of crops requiring relatively low labor inputs, such as corn or tree crops;

Table 3.12. Labor Utilization per hectare and output per man-day by farm size, 1975[a].

Farm size	Small farms	Medium farms	Large farms
	Labor utilization (man-days/ha)		
Total employment/utilized ha[b]	82.3	39.0	17.8
Employment in crops/ha in crops[c]	61.2	46.8	51.2
	Output (RD$/man-day)		
Total output/work-day[b]	5.45	6.62	13.76
Output in crops/work-day in crops[c]	6.41	7.69	13.81
Output in livestock/work-day in livestock	10.95	11.39	39.27

[a]Source: USAID/Bureau for Latin America, Agricultural Sector Farm Survey for the Dominican Republic - 1975, Statistical Working Document Series, Vol. 1-6, Washington, D.C., 1977.

[b]Includes employment in general administration, maintenance, and other general farm activities.

[c]Does not include sugarcane land.

(2) The medium-sized farms may be a relatively "forgotten" subsector in the provision of tecnical assistance and other services. (The large farms traditionally receive ample attention because of their importance in production. Recent programs and policies have increasingly emphasized the small farm subsector.) and, (3) The medium-sized farms may have inferior land.

Gross output per work-day amounted to RD$5.45, RD$6.62 and RD$13.76 in the small, medium, and large farm subsectors, respectively. Large farms have more capital and land per worker than the small and medium farms. Many large farms (or ranches) are relatively specialized in cattle production, which is a labor extensive activity. Large farms hire labor and are not constrained by the family labor supply. Even if production techniques and land quality were uniform in farms of different sizes, labor market imperfections or social factors could cause labor to be more expensive or in relatively short supply to the large farms, and it would be rational for them to specialize in relatively land and/or capital intensive product and production techniques. The average daily wage for hired labor in the large farms amounted to RD$2.53 and in the small farms RD$2.16, a differential of 17 percent. This appears to be a significant difference, indicating that labor market imperfections exist in the rural sector.

3.5.4 Agricultural Income and Its Distribution

Data about the distribution of agricultural output by farm size classes are not adequate for describing rural income distribution patterns. Members of the small farm households engage in off-farm work to supplement their incomes. The large farm subsector is the major source of work for "excess"

labor in small-farm households and for landless rural families. Consequently, part of the agricultural GDP derived in the large farms accrues to landless and small-farm households as wages. The average value-added per farm household amounted to an estimated RD$2,302 in 1975. If wage payments amounted to one-fourth of the estimated GDP in the large farms and if all of the value added in forestry and fishing accrues to small farmers and landless workers, gross income per household in the small farm and landless households would have been an estimated RD$957. This compares to estimates of RD$2,805 per medium-farm household and RD$43,398 per large-farm household. Overall, about 80 percent of the farm population received less than 36 percent of the gross farm income (Table 3.13). Based on the Agricultural Sector Survey, small farm households (0.5 - 4.9 ha) received an average net household income of RD$895.[1/] These figures compare to the overall national average GDP per household estimated at RD$4,840 in 1975. Thus, average household income in the small-farm and landless rural-worker households amounts to only about one-fifth the national average. Compared to large farms the small-farm landless households earn an average income equal to about one-third of medium farms but only 2-3 percent of "large farm" income.

On a regional basis, the planning zones bordering Haiti, especially the Northwest and the South, have lower-all farm incomes than the other regions. These are the poorest regions, in terms of agricultural resources and climatic conditions. As a result, regional income differences will have to be addressed through farm size and mechanization policies and investments in social and physical infrastructure and human capital.

[1/] See Table A3.3.

Table 3.13. Distribution of agricultural income in major farming subsectors, 1975

Subsector	Total income[a]	Percent	No. of households[b]	Percent	Average income per household
	(1,000 RD$)		(000)		(RD$)
Large farms	308,124.5[c]	40.8	7.1	2.0	43,398
Medium farms	176,184.0[c]	23.3	62.8	17.8	2,805
Small farms and landless	271,088.4	35.9	283.4	80.2	957
Total	755,396.9	100.0	353.3	100.0	2,138

[a]Income figures are based on estimates of value added by subsector and the assumptions that: one-fourth of value added in crops, excluding sugarcane, and livestock accrued to the small farm and landless households; 15 percent of the value added in sugarcane accrued to the small farm and landless households, and 5 percent of the value added in sugarcane (RD$9,500,000) accrued to Haitian migrants; all of the value added in forestry and fishing accrued to the small farm and landless households.

[b]Assumes one household per farm, and includes rural and small town laborer households.

[c]Incomes in the large and medium sized farms were affected by unusually favorable sugarcane prices in 1975. The average price of DR$24.53/MT was approximately three times normal levels. However, production was about 8 percent below normal levels. Some income attributed to large farms accrues to the Government through its sugar estates, state farms and other land holdings.

Relating farm size to total farm-family income, the Gini coefficient is .661, which reflects a high degree of inequality within the sector.[1/] Also off-farm income as a percent of total family income is larger for small farms than for larger farms. This finding underlines the importance of off-farm employment, particularly during off-peak periods, under prevailing conditions of underemployment among small-farm families.

3.6 Projection of the Rural Sector to 1990

Rural development in the Dominican Republic should be viewed in the context of a rural society undergoing rapid urbanization. In 1975, 63 percent of the population lived in the rural sector (defined to include farming areas and small towns). By 1990, only 50 to 55 percent of the population is projected to be in the rural sector; by the year 2000, this proportion is projected to decline to between 40 to 45 percent. As a result, most of the requirements for new jobs will be in the cities. If current trends hold, the number of new job requirements in the cities could average almost 52,000 jobs annually during 1975-2000. About one-third of these urban job requirements would be for rural migrants (see Chapter 1).

In the rural sector, the number of new job requirements is projected to average between 19,000 and 26,000 jobs, annually, depending on rural-urban migration. Most - perhaps 65 to 75 percent - of these job requirements will be in agriculture. The remainder will be for non-farm occupations in a rural setting. Overall, approximately 75 to 80 percent of the total national requirements for new jobs are projected to be in nonagricultural occupations. Preparing rural people for nonagricultural jobs and urban lifestyles could be an important element of rural development in the

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[1/] Based on Agricultural Sector Survey data.

Dominican Republic. And, as a concomitant of rural development, an effective set of national policies and programs to create urban employment opportunities is needed.

The results do not mean that agricultural development and employment can be neglected. The need for increased agricultural output is very great, considering the anticipated increases in demand for food due to rising incomes and the widespread desire for nutritional improvements. Failure to reduce underemployment in agriculture will exacerbate urban unemployment problems, due to rural-urban migration. Moreover, it may be easier and cheaper to raise productivity in agriculture than in other sectors, and this strategy is required to achieve the country's stated objectives to improve nutrition and income distribution among the poor majority of the population.

The total number of farms in the Dominican Republic is projected to increase from an estimated 324,000 farms in 1975 to 360,900 farms in 1990 if the rate of land redistribution through agrarian reform during 1962-75 continues and no subdividing of farms in the private sector occurs (Table 3.14). That is, under these assumptions, a total of 36,400 new farms will be created on some 182,900 hectares taken from the largest farms through agrarian reform. (This would be equivalent to about one-third of the estimated cropland in large farms.) (Table 3.15). Based on previous settlement patterns, 20,900 new farms and 100,200 hectares of redistributed land would be in the Northern region, 4,000 new farms and 15,900 hectares would be in the Southwestern region, and 11,500 farms and 66,800 hectares would be in the Southeastern region. Total land in the large farm subsector would fall from an estimated 1,465,710 hectares in 1975 to 1,282,800

Table 3.14. Number of small farms and land in farms by region, 1975, and projection to 1990 based on 1962-75 rate of land redistribution

	Region			
	Northern	South-western	South-eastern	Total Republic
Year 1975				
Total no. of farms (1,000s)	170.6	62.0	91.9	324.5
No. of small farms (1,000s)	136.0	48.8	69.5	254.2
Farms with 0.5-4.9 ha	(108.5)	(43.5)	(52.6)	(204.6)
Microfarms (less than 0.5 ha)	(27.5)	(5.3)	(16.9)	(49.6)
Land in small farms (1,000 ha)	233.7	90.1	127.5	451.3
Land in farms with 50 ha or more	628.4	110.4	726.8	1,465.7
Average size of small farms (ha)	1.7	1.8	1.8	1.8
Year 1990				
Total no. of farms (1,000s)	191.5	66.0	103.4	360.9
No. of small farms (1,000s)	156.9	52.2	81.0	290.6
Land in small farms (1,000 ha)	333.9	106.0	194.3	634.2
Land in farms with 50 ha or more	528.2	94.5	660.0	1,282.8
Percent change land in large farms	15.9	14.4	9.2	12.5

Table 3.15. Total land and utilization in large farms by region, 1975[a]

Land use category	Region			Total
	Northern	South-western	South-eastern	
	(1,000 ha)			
Total land	628.4	110.4	726.8	1,465.7
Cropland excluding sugarcane	157.7	66.1	154.6	378.3
Sugarcane land	12.2	12.4	158.1	182.7
Pasture and rangeland	396.6	24.8	343.3	764.8
Other	61.9	7.1	70.8	139.9

[a]Large farms include farms with 50 ha and more.

hectares in 1990, representing a decrease of less than 13 percent. Even if rapid rural-urban migration persists, the total number of rural households is projected to increase from an estimated 475,400 households in 1975 to 594,100 households in 1990, an increase of 118,700 households (Table 3.16). Of this increase, an estimated 52,700 heads of households would be e gaged in nonagricultural occupations. The remaining 66,000 heads of households would be farmers or landless laborers. If rural-urban migration were to slow, the number of additional agricultural households could reach 91,700 households by 1990 (Table 3.17). The projected increases in the numbers of agricultural households are considerably higher than the projected increase in the number of new farms created through agrarian reform on a "status quo" basis. By 1990, the number of landless households in agriculture could reach 83,500 households, which is triple the current number. The members of landless households would be primarily dependent on the large-farm subsector for work and income.

In summary, although agrarian reform has been in progress since 1962, the Dominican Republic's actual latifundio-minifundio landholding structure causes "excess" labor to be compressed into a large number of very small farms and into an underemployed landless labor force. Many of the small-farm and rural landless laborer households are among the poorest members of Dominican society. Their average incomes are est'mated to be one-fifth or less of the national average household income. The number of low-income small farmers and landless laborers will continue to increase until 1990 if the 1962-75 rate of land redistribution is maintained. Recognition of this rural income and employment situation, and an awareness of the

Table 3.16. Number of rural heads of households and occupations by region, 1975, and projections 1980-2000 (rapid rural-urban migration)[a]

Year	1975	1980	1985	1990	2000
		(1,000 households)			
		Northern Region			
Total rural	247.1	263.6	281.0	299.0	336.5
Farmers and laborers	176.1	185.5	195.0	204.4	221.7
Other occupations	71.0	78.1	86.0	94.6	114.8
		Southwestern Region			
Total rural	86.9	94.9	105.6	117.6	145.5
Farmers and laborers	58.6	63.4	69.6	76.2	90.4
Other occupations	28.3	31.5	36.0	41.4	55.1
		Southeastern Region			
Total rural	141.4	154.9	167.1	177.6	185.8
Farmers and laborers	102.6	111.1	127.8	122.8	119.6
Other occupations	38.8	43.8	39.3	54.8	66.2
		Total Republic			
Total rural	475.4	513.4	553.6	594.1	667.8
Farmers and laborers	337.4[b]	359.9	382.3	403.4	432.2
Other occupations	138.0	153.5	171.3	190.7	235.6

[a]Includes rural and small town households (small towns have less than 10,000 inhabitants).

[b]Excludes an estimated 16,100 farmers in cities with 10,000 inhabitants or more.

Table 3.17. Number of rural heads of households and occupations by region, 1975, and projections 1980-2000 (slow rural-urban migration)[a]

Year	1975	1980	1985	1990	2000
		(1,000 households)			
		Northern Region			
Total rural	247.1	271.1	293.4	318.9	377.2
Farmers and laborers	176.1	192.5	206.7	223.1	259.9
Other occupations	71.0	78.6	86.7	95.8	117.3
		Southwestern Region			
Total rural	86.9	98.1	109.5	121.1	150.0
Farmers and laborers	58.6	66.6	73.2	79.4	95.2
Other occupations	28.3	31.5	36.3	41.7	54.8
		Southeastern Region			
Total rural	141.4	150.7	165.8	183.0	223.8
Farmers and laborers	102.6	107.0	116.3	126.6	149.3
Other occupations	38.8	43.7	49.5	56.4	74.5
		Total Republic			
Total rural	475.4	518.4	568.7	623.1	751.0
Farmers and laborers	337.4[b]	365.1	396.1	429.1	504.3
Other occupations	138.0	153.3	172.6	194.0	246.7

[a]Includes rural and small town households (small towns have less than 10,000 inhabitants).

[b]Excludes an estimated 16,100 farmers in cities with 10,000 inhabitants or more.

poor prospects for additional employment in the cities, have led to an active interest in expanded programs of land redistribution and other measures to raise employment and productivity of the poor rural population as a means of increasing output and achieving a more equitable distribution of income.

Recent agrarian reform settlements mainly have been on cropland, and the government has emphasized collective settlements over individual parcels to facilitate the extension of technical services. Overall, the small farms achieved the highest average productivity per hectare of utilized land in 1975. But their output per-hectare in crops was below that of the largest farms. (Unusually high prices for export crops which are mainly grown by large farms accounted for part of this difference, however.) It would appear that shifting cropland out of the large-farm subsector into the small-farm subsector could increase employment per hectare by a minimum of 20 percent. Output might fall on redistributed land unless productivity programs or crop diversification are implemented. Initially, an expanded agrarian reform could concentrate on underutilized pastureland. Several of the recent state farms in the Northern Region have been highly successful in raising crops on land that was once considered suited only for pasture. Evaluation of the impacts of land redistribution policies could be greatly improved if data to estimate the production potential of presently underutilized land were available.[1/]

[1/] A full inventory of rural farms, land use, labor force, improvements, etc., is being carried out through the Rural Division of the National Cadastral Survey, financed in part through an InterAmerican Development Bank Loan. Once completed and equipped with permanent updating procedures, this

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inventory will greatly improve information about land resources in the sector. With the detailed data on individual farm units, it will also facilitate the planning and execution of various rural development programs seeking to improve the access of rural families to farm land. The Cadastral Survey has problems, however, and is not likely to complete the detailed inventory of rural land resources before 1985.

The principal tasks ahead for the Rural Cadastral Survey are to achieve a reasonable estimate of the potential output of the soils classes of the country, apply this at the level of individual farm units, and then carry out a massive evaluation of every farm unit in the country. Other agencies should have major roles in this effort; in particular, it appears that the SIEDRA Project (the project on soils and their potential productivity discussed in Chapter 2) could help the Cadaster and could itself gain from a close working relationship with the Cadastral Survey. (See Strasma, op. cit.)

APPENDIX

TO

CHAPTER 3

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A3.1 The Agricultural Sector Survey of 1976

Farm survey data are available for 1975 based on a stratified random sample of 1,802 farms.[1/] The survey universe included virtually all of the farms in the 0.5 - 4.9 ha. size-class, most of the farms in the 5.0 - 499.9 ha. size-class, and most of the farms in the 50.0 - 499.9 ha. size-class.[2/] These farms size classes accounted for 71 percent of the total land in farms in 1971 (Table 3.2).

The SEA's farm suvey was limited to "viable" farms on which a single decision-maker could be identified whose major source of income was from the farm. Farms with less than 0.5 ha. (microfarms) were not included in the survey universe because they were not considered as viable economic units. Microfarms occupy so little land that it was doubtful that they could improve their economic condition by adopting modern farming practices, even though for some labor intensive farms a very high gross income can be generated on a very small piece of land. (It would appear that microfarms are considered to be outside the group of potential direct beneficiaries of agricultural modernization in the Dominican Republic.)

[1/] See Statistical Working Document No. 1: Employment, USAID Bureau for Latin America, Office of Development Resources, Sector Analysis Div., Nov. 1977.

[2/] The sample farms fall within census farm size classes as follows: 989 farms fall within 0.5 - 4.9 ha.; 704 farms fall within 5.0 - 49.9 ha.; 108 farms fall within 50.0 - 499.9 ha., but the largest surveyed farm in this size class has only 327 ha., one very large farm has 1,132 ha. The regional distribution of the surveyed farms is presented in Appendix Table A3.1.

Table A3.1

Number and Size Distribution of Farms in the Agricultural Sector Survey by Region, 1975.

	FARM SIZE														
	0.5 - 4.9 ha.					5.0 - 49.9 ha.					50 - 499.9 ha.				
REGION	Number of Farms	Land in Farms	Average Farm Size	Minimum Farm Size	Maximum Farm Size	Number of Farms	Land in Farms	Average Farm Size	Minimum Farm Size	Maximum Farm Size	Number of Farms	Land in Farms	Average Farm Size	Minimum Farm Size	Maximum Farm Size
Northwestern	153	372.0	2.4	0.5	4.7	73	1130.9	15.5	5.0	37.7	5	579.8	115.9	85.1	148.7
Northern	191	442.0	2.3	0.5	4.9	152	2541.9	16.7	5.0	48.8	32	3738.3	116.8	50.0	327.0
Northeastern	149	332.4	2.2	0.5	4.8	131	2198.5	16.8	5.0	48.9	24	2192.1	91.3	50.0	251.6
Southwestern	148	408.8	2.7	0.5	4.8	86	1141.1	13.3	5.0	49.9	--	--	--	--	--
Southern	118	273.3	2.3	0.5	4.8	99	1388.4	14.0	5.0	42.8	19	1627.1	85.6	50.0	138.5
Central	123	287.2	2.3	0.5	4.8	99	1486.3	15.0	5.0	47.0	16	1514.2	94.6	50.0	314.5
Eastern	107	241.3	2.3	0.5	4.9	64	1120.6	17.5	5.3	48.2	12	1210.4	100.9	50.0	185.8
Total Republic	989	2357.0	2.4	0.5	4.8	704	11,008.2	15.6	5.0	49.9	108	10,862.0	100.6	50.0	327.0

Source: Agricultural Sector Survey - 1976; preliminary unweighted data for 1801 farms.
Note: One very large farm of more than 1,100 ha. was excluded from this analysis.

The farm survey did not include sugar colonos. Reliable information about sugarcane growing could not be obtained in interview with sugar colonos because they participate only marginally in decisions concerning sugarcane production on their land. Essentially, many of the sugar colonos only oversee farming and marketing processes performed by the sugar companies and hired laborers.

Farms and land controlled by the State Sugar Council (CEA) and large agri-business enterprises, such as Gulf and Western and Vicini, were not included in the survey universe because data about their operations could be obtained more readily in special corporate interviews. Thus, none of the sugar estates were included in the survey. For a similar reason, farms and land managed centrally by the IAD such as rice collectives, state farms, and experimental farms, were also considered as outside the survey universe. Large ranches specialized in cattle production were also excluded.[1/]

If data in the agricultural census of 1971 are considered as defining the universe of all farms and land in farms in the country, it would appear that the survey farms are representative of at least 50 percent, but less than 71 percent, of the total land in farms. This estimate is based on the assumptions that the total land in farms did not change during 1971-76 and that land redistribution between farm size classes was relatively unimportant.[2/] Farms included in the survey universe are estimated to have

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[1/] Only one farm surveyed exceeded 500 hectares in size.

[2/] It is estimated that government programs during 1972-75 resulted in the transfer of about 65,000 hectares out of the large farm sector into the smaller farm size classes; equivalent to less than 10 percent of the total land in large farms in 1971. During 1972-72 the Government acquired 247,000 hectares in its land reform programs. Probably, this land had mostly been

12.8 hectares, on the average, which compares to an average farm size of 9.0 hectares for all farms based on data in the agricultural census (Table 3.2). Farm survey data have been published according to three farm size classes as follows: 0.5 - 4.9 ha., 5.0 - 31.4 ha., and 31.4 ha. and more.[1/] With the exception of the small farm size class, these farm size classes are different from those in the agricultural census, but correspond to new farm size classifications tentatively being adopted by the SEA in its planning and programming activities. Basically, the small farms (0.5 - 4.9 ha) are considered as having insufficient land and resources to provide acceptable levels of income and work to those farm households employing average production methods. The medium-sized farms (0.5 - 31.4 ha) correspond, approximately, to farms providing acceptable levels of income and work to the farm househood. Large farms have sufficient land and capital to utilize labor from more than one household.

A3.2 Composition of Output by Size of Farm[2/]

Crops, livestock, and processing of raw agricultural products accounted for 62 percent, 32 percent, and 6 percent, respectively, of the gross production in small farms. Small farms specialize in food staples.

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in large farms. About 5,100 hectares were placed in State farms; some 32,000 hectares were placed in collective farms; almost 145,000 hectares were left with previous tenants until they could be absorbed in agrarian reform projects, or are vacant; and an estimated 65,000 hectares were distributed in individual settlements.

[1/] See Statistical Working Document series, op. cit.

[2/] The following sections draw on a draft of Descriptive Analysis of Income: Dominican Republic Cost of Production Survey, by Sandra K. Rowland, USDA/IDS/SAIG, 1977.

Livestock on small farms consists primarily of poultry and hogs, which do not require extensive pasture. The composition of output in medium-sized farms, as reflected by major enterprise aggregates, was essentially the same as for small farms. Probably, the medium-sized farms produce relatively more perennial crops and less annual crops than small farms. Only 41 percent of the gross output in large farms was attributable to crops. Livestock production in the large farms consisted primarily of beef and dairy. Almost half the output in large farms in the Southeastern region was in livestock in 1975 (Table A3.2).

A3.3 Income

For the survey, net farm income was defined as gross farm production less cash expenditures on farm inputs. Thus, net farm income represents the returns to household labor and the farm's fixed productive resources. Net household income includes net farm income and income derived from off-farm sources. Net household income in small farms averaged RD$895 in 1975, which allowed for an average income of RD$140 per household member (Table A3.3). This was equivalent to about one-fourth of the national average per-capita income based on data in the national income accounts. Almost 40 percent of the net household income of small farms was derived from off-farm sources, especially work on other farms. Off-farm work accounted for 22 percent of the net household income of small farms. Besides work, off-farm sources of inocme included interest, dividends, rental income, and remittances from relatives in the cities. Net farm income of the small farms averaged RD$541 in 1975.

Table A3.2 Average Value of Gross Production in Crops, Livestock, and Processed Products by Size of Farm, 1975.

Farm Size Class	All Farms		Small Farms		Medium Farms		Large Farms	
	RD$	Percent	RD$	Percent	RD$	Percent	RD$	Percent
(Total Republic)								
Gross Farm Production	2,185	100	895	100	2,477	100	8,602	100
Crops	1,164	53	552	62	1,478	60	3,536	41
Livestock[a/]	773	35	288	32	750	30	3,691	43
Processed Products[b/]	248	11	55	6	250	10	1,375	16
(Northern Region)								
Gross Farm Production	2,236	100	766	100	2,436	100	10,565	100
Crops	1,174	53	488	64	1,543	63	4,077	38
Livestock[a/]	744	33	241	31	587	24	4,401	42
Processed Products[b/]	318	14	37	5	307	13	2,087	20
(Southwestern Region)								
Gross Farm Production	1,881	100	982	100	2,819	100	4,908	100
Crops	1,202	64	684	70	1,933	69	2,036	42
Livestock[a/]	531	28	258	26	705	25	1,981	40
Processed Products[b/]	148	8	40	4	181	6	891	18
(Southeastern Region)								
Gross Farm Production	2,322	100	1,143	100	2,330	100	7,079	100
Crops	1,113	48	585	51	1,087	47	3,358	47
Livestock[a/]	1,025	44	444	39	1,040	44	3,326	47
Processed Products[b/]	184	8	115	10	203	9	396	6

Source: Agricultural Sector Survey, 1976; weighted data.

a/ includes changes in livestock inventory

b/ value added

Table A3.3

Value of Gross Farm Production, On Farm Use of Production, Sales, Net Farm Household Income and Per Capita Income by Size of Farm, 1975 (All farms in survey universe)

Farm Size Class	Farms in Survey Universe		Small Farms[a]		Medium Farms[b]		Large Farms[c]	
	RD$	percent	RD$	percent	RD$	percent	RD$	percent
			(Total Republic)					
Gross Farm Production	2,185	100.0	895	100.0	2,477	100.0	8,602	100.0
Change in Livestock Inventory	106	4.9	49	5.4	153	6.2	263	3.1
Sales	1,543	70.6	516	57.7	1,696	68.4	6,955	80.9
On Farm Use	536	24.5	330	36.9	628	25.4	1,384	16.0
Cash Production Expenditures	1,289	59.0	354	39.6	1,373	55.4	6,437	74.8
Net Farm Income[d]	896	66.9	541	60.4	1,104	73.2	2,165	65.8
Off Farm Income	444	33.1	354	39.6	404	26.8	1,124	34.2
Work[e]	200	14.9	192	21.5	201	13.3	239	7.3
Other	244	18.2	162	18.1	203	13.5	885	26.9
Net Household Income[f]	1,340	100.0	895	100.0	1,508	100.0	3,289	100.0
Household Size (persons)	6.7		6.4		7.0		7.4	
Per Capita Income	200		140		215		444	

Source: Agricultural Sector Survey, 1976; weighted data.

[a] includes farms with 0.5-4.9 ha.

[b] includes farms with 5.0-31.4 ha.; and excludes sugar colonos and rice collectives.

[c] includes farms with 31.5 ha. and more; and excludes sugar colanos, large rice collectives, State Sugar Council land, large private agri-business enterprises and State farms. The two largest farms in the survey sample have 327 ha. and 1,132 ha., respectively.

[d] equals gross farm production less cash expenditures on farm inputs.

[e] includes a small portion of non farm work on the farm site.

[f] equals net farm income plus off farm income.

Average net household and per capita incomes for medium farms were RD$1,508 and RD$215, respectively. Large farms achieved average net household and per capita incomes of RD$3,289 and RD$444, respectively. Large farm households in the Northern region enjoyed the highest average per capita income, almost RD$650 per person (Table A3.5). Average net farm income was negative in the large farms of the Southeastern region primarily due to drought conditions in 1975 (Table A3.6). But, off-farm income in these farm households was sufficient to allow for an average per capita income of RD$122. Unlike the small farm households, off-farm income in the large farm households primarily was derived from nonagricultural sources. Net farm income of the large farms averaged RD$2,165, four times that in the small farms.

A3.4 Sales

The proportion of gross farm production sold generally increases as the size of farm increases. Small farms marketed about 58 percent of their production, large farms marketed 81 percent, and medium farms marketed 68 percent, on the average. The percentage of production marketed by small farmers can be considered as high compared to traditional rural sectors in other countries (Table A3.4).

A3.5 Cash Expenditures on Production Activities

Cash expenditures on production activities as a proportion of gross farm production increased with farm size. Cash expenditures in small farms averaged RD$354 which was equivalent to 40 percent of gross farm production. Regional differences in the amount of cash expenditures per small farm appear not to be significant. Cash expenditures in the medium-sized farms

Table A3.4 Value of Gross Farm Production, On Farm Use of Production, Sales, Net Farm Family Income and Per Capita Income by Size of Farm, 1975 (Northern Region).

Farm Size Class	Farms in Survey Universe		Small Farms[a]		Medium Farms[b]		Large Farms[c]	
	RD$	percent	RD$	percent	RD$	percent	RD$	percent
Gross Farm Production	2,236	100.0	766	100.0	2,436	100.0	10,565	100.0
Change in Livestock Inventory	29	1.3	39	5.1	75	3.1	-198	-1.9
Sales	1,692	75.7	413	53.9	1,710	70.2	9,489	89.8
On Farm Use	515	23.0	314	41.0	651	26.7	1,274	12.1
Cash Expenditures	1,228	54.9	345	45.0	1,229	50.5	6,651	63.0
Net Farm Income[d]	1,008	70.8	421	54.3	1,207	77.5	3,914	79.5
Off Farm Income	416	29.2	354	45.7	350	22.5	1,012	20.5
Work[e]	182	12.8	187	24.1	177	11.4	160	4.1
Other	234	16.4	167	21.5	173	11.1	852	17.3
Net Farm Household Income[f]	1,424	100.0	775	100.0	1,557	100.0	4,926	100.0
Household Size (persons)	6.7		6.2		7.2		7.6	
Per Capita Income	213		125		216		648	

Source: Agricultural Sector Survey, 1976; weighted data.

Table A3.5 Value of Gross Farm Production, On Farm Use of Production, Sales, Net Farm Family Income and Per Capita Income by Size of Farm, 1975 (Southern Region).

Farm Size Class	Farms in Survey Universe		Small Farms[a]		Medium Farms[b]		Large Farms[c]	
	RD$	percent	RD$	percent	RD$	percent	RD$	percent
Gross Farm Production	1,881	100.0	982	100.0	2,819	100.0	4,908	100.0
Change in Livestock Inventory	175	9.3	44	4.5	249	8.8	924	18.8
Sales	1,229	65.3	623	63.4	1,909	67.7	3,039	61.9
On Farm Use	477	25.4	315	32.1	661	23.5	945	19.3
Cash Expenditures	917	48.8	384	39.1	1,283	45.5	3,626	73.9
Net Farm Income[d]	964	71.9	598	73.7	1,536	76.3	1,282	49.8
Off Farm Income	377	28.1	213	26.3	476	23.7	1,290	50.2
Work[e]	184	13.7	134	16.5	185	9.2	606	23.6
Other	193	14.4	79	9.7	291	14.5	684	26.6
Net Household Income[f]	1,341	100.0	811	100.0	2,012	100.0	2,572	100.0
Household Size (persons)	7.4		7.3		7.7		7.9	
Per Capita Income	181		111		261		326	

Source: Agricultural Sector Survey, 1976; weighted data.

Table A3.6 Value of Gross Farm Production, On Farm Use of Production, Sales, Net Farm Family Income and Per Capita Income by Size of Farm, 1975 (Eastern Region)

Farm Size Class	Farms in Survey Universe		Small Farms[a]		Medium Farms[b]		Large Farms[c]	
	RD$	percent	RD$	percent	RD$	percent	RD$	percent
Gross Farm Production	2,322	100.0	1,143	100.0	2,330	100.0	7,079	100.0
Change in Livesotck Inventory	212	9.1	81	7.1	217	9.3	726	10.3
Sales	1,482	63.8	669	58.5	1,538	66.0	4,577	64.7
On Farm Use	628	27.1	393	34.4	575	24.7	1,776	25.0
Cash Expenditures	1,712	73.7	345	30.2	1,660	71.2	7,471	105.5
Net Farm Income[d]	610	52.3	798	61.5	670	60.3	-392	-46.7
Off Farm Income	556	47.7	499	38.5	442	39.7	1,232	146.7
Work[e]	247	21.2	261	20.1	247	22.2	197	23.5
Other	309	26.5	238	18.4	195	17.5	1,035	123.2
Net Household Income[f]	1,166	100.0	1,297	100.0	1,112	100.0	840	100.0
Household Size (persons)	6.3		6.2		6.2		6.9	
Per Capita Income	185		209		179		122	

Source: Agricultural Sector Survey, 1976; weighted data.

RD$1,373, equivalent to 55 percent of gross farm production. Average cash expenditures in large farms ranged from RD$3,626 in the Southwestern region to more than RD$7,450 in the Southeastern region. Overall, cash expenditures amounted to 75 percent of gross farm production in large farms. Poor weather in 1975 influenced agricultural output adversely in the Southeastern region, and consequently many farms reported net losses in income.

A3.6 Labor[1/]

A farm can be viewed as having the farm operators' labor and that of his household available to it. Additional labor may be hired by the farm operator. On the other hand, the labor of the farm operator's household would be only partially available for work on the farm if members of the household engage in off-farm work[2/] A special feature of farm household labor is its reserve capacity for work. One can think of the able-bodied adult males in a farm household as constituting the permanent component of the household work force, and the women and children as constituting the equivalent of a reserve labor force. This "stand-by" labor, which may be held in reserve at very low opportunity cost, provides the household with a special capacity to adjust its work input to the seasonal variations in work demand that are typical of agriculture in most countries.

[1/] For more information see: Aspectos del Empleo Rural en la Republica Dominicana, Secretaria de Estado de Agricultura, 1977.

[2/] Members of farm households work off the farm to supplement farm incomes. According to farm survey data, off-farm work in small farm households amounted to 26 percent of the total employment in households.

Fluctuations in the demand for labor over the year are of great significance for Dominican rural workers, resulting in surpluses of labor at slack periods and in shortages of labor at peak seasons. The latter occurs during harvesting time, especially when harvesting coicides with land preparation for a second crop. Basically, there are two main harvests; one beginning in late November and extending through August, and another beginning in late November and extending through March. Rice, for example, is harvested during June through September and again in December and January. Sugarcane harvesting has an enormous influence on employment during November through April. Beans, corn, peanuts, potatoes, tomatoes, and onions may be planted and harvested at almost any time of the year in areas with sufficient rainfall or irrigation.

In 1975, the peak labor requirements in crop production were in November and December. Employment in small farms during December was 61 percent above July, when employment was at a minimum. Likewise, employment in large farms during December was 54 percent above that in July. These patterns held both for farm household labor and hired labor (Table A3.7).

The percentages for medium-sized and large farms were 15 percent and 9 percent, respectively. These estimates may understate the importance of off-farm work. In the farm survey questionnaire, households were defined to include family members, relatives, and friends who live on the farm. But, a person was not counted as part of the household if all of his work was off the farm, even though he lived on the farm. If persons in small farm households were particularly active in full-time off-farm work, the apparent increase in household size as the size of farm increases would be overstated, also.

Table A3.7 Employment in Crops by Month and Size of Farm, 1975

	Average Monthly Employment	Monthly Index											
		J	F	M	A	M	J	J	A	S	O	N	D
	(work-days)	(Percent of average)											
Small Farms													
Employment in Crops	7.6	101	90	106	110	103	100	73	115	72	84	110	134
Household Labor	5.1	99	91	104	108	110	102	75	118	71	85	106	124
Hired Labor	2.6	106	90	109	113	90	94	70	109	74	82	117	152
Hired Labor as percent of Employment	33	35	33	35	34	29	32	32	32	34	33	36	38
Medium Farms													
Employment in Crops	18.1	107	94	94	102	107	102	76	110	93	86	121	107
Household Labor	7.3	104	82	85	93	107	114	70	110	100	96	118	123
Hired Labor	10.8	110	102	100	108	107	94	80	111	87	78	123	96
Hired Labor as percent of Employment	60	61	65	64	64	60	55	63	60	56	54	61	54
Large Farms													
Employment in Crops	58.6	109	123	98	100	76	82	73	108	106	96	103	127
Household Labor	11.3	90	119	121	125	73	79	41	73	117	112	105	150
Hired Labor	47.3	114	124	93	94	77	82	80	117	104	92	102	121
Hired Labor as percent of Employment	81	84	81	76	76	82	81	89	87	79	77	80	77

Source: Agricultural Sector Survey, 1976; weighted data

In reality, data for one year are hardly adequate for establishing seasonal production patterns and labor requirements since a delay in seasonal rainfall can shift planting and harvesting dates by a month or more from one year to another.

A3.7 Capital

Capital assets were divided into three categories: fixed capital, working capital, and circulating capital (Table A3.8). Fixed capital was defined as the value of land and land improvements plus farm houses. Unfortunately, data are not available on other structures such as barns, machine sheds, livestock pens, wells, etc. Working capital comprised farm machinery, implements, tools, draft animals, and livestock inventory. These items depreciate more rapidly than fixed capital items. Circulating capital was defined as the annual cash expenditures on farm production activities. This included expenses for seeds, fertilizers, insecticides, pesticides, etc.; and also hired labor. The sum of these three types of capital was defined as gross capital. Net capital is gross farm capital less unpaid balances on agricultural loans and credit.

Gross farm capital increased substantially as farm size increases. Small farms had an average gross capital of RD$6,076, medium farms a gross capital of RD$18,935, and large farms an average gross capital of more than RD$100,000. Land as a percentage of gross farm capital increased from 43.3 percent for small farms to 55.2 percent for medium farms and almost 62 percent for large farms. Fixed capital, including

Table A3.8 Average Fixed Capital, Working Capital, Circulating Capital, Gross Capital and Net Capital by Size of Farm, 1975.

Farm Size Class	All Farms in Survey Universe	Percent	Small Farms	Percent	Medium Farms	Percent	Large Farms	Percent
			(RD$)					
A. Fixed Capital	16,503	84.7	5,287	87.0	15,576	82.3	85,647	85.6
1. Value of Land	10,963	56.2	2,633	43.3	10,454	55.2	61,623	61.6
2. Land Improvements	3,696	19.0	1,679	27.6	3,127	16.5	17,677	17.7
3. Residential Structures	1,844	9.5	975	16.0	1,995	10.5	6,347	6.3
B. Working Capital	1,701	8.7	435	7.2	1,986	10.5	8,009	8.0
1. Machinery, Implements and hand tools	370	1.9	102	1.7	457	2.4	1,610	1.6
2. Draft Animals	108	0.6	62	1.0	135	0.7	272	0.3
3. Livestock Inventory	1,223	6.3	271	4.5	1,394	7.4	6,127	6.1
C. Circulating Capital[a]	1,289	6.6	354	5.8	1,373	7.3	6,437	6.4
D. Gross Capital	19,493	100.0	6,076	100.0	18,935	100.0	100,093	100.0
Net Capital	19,268	98.8	6,022	99.1	18,766	99.1	98,656	98.6
Indebtedness[b]	225	1.2	54	0.9	169	0.9	1,437	1.4
E. Economic Capital A (A2 + B + C)	6,686		2,468		6,486		32,123	
F. Economic Capital B (A2 + B)	5,397		2,114		5,113		25,686	

Source: Agricultural Sector Survey, 1976; weighted data.

[a] equals annual cash expenditures on production activities.

[b] equals outstanding balance on production credits.

including land, accounted for more than 80 percent of gross capital in each of the farm size classes.[1/] Small farms had a greater percentage of their fixed capital in land improvements than the medium and large farms. With the exception of land items, the composition of gross farm capital did not change markedly by size of farm. It is surprising that the average outstanding debt for production activities reported by farmers does not reach 1.5 percent of gross farm capital for any farm size class. The average indebtedness of farmers amounted to less than 18 percent of just circulating capital.

Figures for alternative definitions of economic capital are also presented in Table A3.8. As is true for gross capital, economic capital increases markedly as farm size increases. Using figures on gross farm production and economic capital (defined as the sum of land improvements, working capital, and circulating capital) gross returns per unit of capital amounted to 36 percent in small farms compared to 38 percent in medium-sized farms and only 27 percent in large farms. On the average, therefore, capital in large farms is less productive than capital in the small and medium farms. This is consistent with the existence of relatively labor-intensive production practices on small farms as compared to large farms. Large farmers may purchase capital goods as a hedge against inflation. Moreover it may be rational for large farms to specialize in more capital-intensive activities especially if hired labor is not readily available.

[1/] The value of fixed capital items was that stated by the farmer, which is usually considered to be an unreliable method for valuing durable capital goods.

The seasonal migration of Haitian cane cutters could have a pervasive effect on the rural wage structure. It is not clear whether the large farms use relatively capital intensive methods in the production of the same crops produced by the small farms. Output per work-day in crops amounted to RD$6.00 and RD$6.81 in the small and medium farms, respectively, in 1975. Output per work-day in crops on large farms was only RD$5.03. Thus it appears that insufficient land is the major constraint to increasing incomes in the small farm households.

What is required now is a detailed examination of alternative production practices and techniques on farms of different sizes and cropping patterns to identify where and how output and employment can be increased through land redistribution and increased credit, technical assistance and other inputs. Unfortunately, the survey data are not fully accessible for accomplishing this type of analysis.

Table A3.9 Number and Size of Farms, 1971
(Northwestern Zone)

Farm Size Class (ha)	Number of Farms	Percent of Farms	Area (ha)	Percent of Area	Average Farm Size (ha)
Less than 0.5	2,259	9.9	545	.3	.2
0.5-4.9	13,694	60.4	27,378	14.0	2.0
5.0-49.9	6,146	27.1	83,897	42.9	13.7
50.0-499.9	580	2.6	64,380	32.9	111.0
500 and more	16	.1	19,145	9.8	1,196.6
Total	22,695	100.0	195,345	100.0	8.6
(Northern Zone)					
Less than 0.5	16,194	19.6	3,932	.7	.3
0.5-4.9	51,655	62.6	82,193	13.6	1.6
5.0-49.9	12,851	15.6	170,708	28.2	13.3
50.0-499.9	1,772	2.2	212,631	35.2	120.0
500 and more	88	.1	135,466	22.4	1,539.4
Total	82,650	100.0	604.930	100.0	7.3
(Northeastern Zone)					
Less than 0.5	9,015	16.7	2,189	.5	.3
0.5-4.9	31,761	58.9	63,570	13.5	2.0
5.0-49.9	11,874	22.1	153,091	32.6	12.9
50.0-499.9	1,180	2.2	141,426	30.1	119.9
500 and more	59	.1	109,323	23.2	1,852.9
Total	53,889	100.0	469,599	100.0	8.7
(Southwestern Zone)					
Less than 0.5	3,082	7.2	834	.4	.3
0.5-4.9	31,540	73.5	60,720	29.9	1.9
5.0-49.9	7,856	18.3	86,903	42.8	11.1
50.0-499.9	400	.9	42,793	21.1	106.9
500 and more	11	.1	11,870	5.8	1,079.1
Total	42,889	100.0	203,120	100.0	4.7

Source: 6th National Agricultural Census - 1971.

Table A3.9 (continued)

Farm Size Class (ha)	Number of Farms	Percent of Farms	Area (ha)	Percent of Area	Average Farm Size (ha)
		(Southern Zone)			
Less than 0.5	2,181	13.1	568	.4	.3
0.5-4.9	9,959	59.6	20,224	14.8	2.0
5.0-49.9	4,267	25.5	52,411	38.3	12.3
50.0-499.9	281	1.7	30,815	22.5	109.7
500 and more	24	.1	32,766	24.0	1,365.5
Total	16,712	100.0	136,784	100.0	8.2
		(Central Zone)			
Less than 0.5	11,637	20.0	2,834	.6	.3
0.5-4.9	32,704	56.1	60,283	11.8	1.9
5.0-49.9	12,773	21.9	165,857	32.6	12.9
50.0-499.9	1,134	1.9	128,925	25.3	113.7
500 and more	77	.1	151,058	29.7	1,961.8
Total	58,325	100.0	508,957	100.0	8.7
		(Eastern Zone)			
Less than 0.5	5,283	19.1	1,307	.2	.3
0.5-4.9	13,979	50.4	25,251	4.1	1.8
5.0-49.9	7,023	25.3	106,297	17.2	15.1
50.0-499.9	1,302	4.7	164,381	26.6	126.2
500 and more	163	.5	320,320	51.9	1,965.2
Total	27,750	100.0	617,556	100.0	22.3

Source: 6th National Agricultural Census - 1971.

Table A3.10 Utilization of Land by Size of Farm, 1975.

Farm Size Class	Average Farm Size	Annual Crops	Perennial Crops	Fallow Land	Cultivated Pasture	Natural Pasture	Mountains, Forests, & Other
	(ha.)			(percent)			
			(Total Republic)				
Small Farms	2.3	40.5	27.0	--	5.4	13.5	13.5
Medium Farms	11.6	21.6	20.0	1.6	21.1	20.0	15.7
Large Farms	78.4	6.4	11.9	1.1	36.4	23.8	20.5
Total Republic	12.8	14.8	15.8	1.0	28.1	21.7	18.3
			(Northern Region)				
Small Farms	2.3	37.8	29.7	--	5.4	16.2	10.8
Medium Farms	11.8	20.7	25.0	1.1	14.4	23.9	14.9
Large Farms	80.7	6.3	11.1	0.9	40.6	27.7	13.4
Total Region	12.8	14.8	17.2	1.0	28.9	25.5	13.3
			(Southern Region)				
Small Farms	2.4	55.3	15.8	--	2.6	10.5	13.2
Medium Farms	11.4	32.0	15.5	2.2	11.6	24.3	14.4
Large Farms	59.6	10.9	9.7	1.1	39.2	22.6	16.4
Total Region	9.4	26.0	13.3	1.3	22.7	22.0	15.3
			(Eastern Region)				
Small Farms	2.2	34.3	28.6	--	5.7	5.7	25.7
Medium Farms	11.4	17.6	14.8	1.6	37.4	11.0	17.0
Large Farms	83.8	4.9	13.7	1.6	28.2	17.6	34.0
Total Region	15.3	11.1	15.2	1.6	29.9	14.8	27.8

Source: Agricultural Sector Survey, 1976; weighted data.

Table A3.11
Number of Persons per Farm Household, Available Household Labor, and Employment on Farms, 1975.

Region	No. of Persons per farm Household[a]	No. of Males Aged 15-64 years	Available Household Labor[b]	Employment Total	Employment Household	Employment Percent	Employment Hired	Employment Percent	Total Employment as Percent of Avail. Household Labor
	(persons)			(man-days/year)					(percent)
				(Small Farms)					
Northern	6.2	1.6	538	161	123	76.4	38	23.6	29.9
Southwestern	7.3	1.7	571	191	147	77.0	51	23.0	33.5
Southeastern	6.2	1.4	507	132	97	73.5	34	26.5	26.0
Total Republic	6.4	1.6	538	163	123	75.5	40	24.5	30.3
				(Medium Farms)					
Northern	7.2	1.7	586	374	201	53.7	172	46.3	63.8
Southwestern	7.7	2.0	652	449	242	53.8	210	46.7	68.9
Southeastern	6.2	2.2	688	327	166	50.8	161	49.2	47.5
Total Republic	7.0	1.9	615	374	198	52.9	176	47.1	60.8
				(Large Farms)					
Northern	7.6	1.9	669	1,196	386	32.3	810	67.7	178.8
Southwestern	7.9	1.5	631	842	221	26.2	621	73.8	133.4
Southeastern	6.9	1.7	577	1,045	287	27.5	758	72.5	181.1
Total Republic	7.4	1.8	634	1,094	330	30.2	764	69.8	172.6

Source: Agricultural Sector Survey, 1976; weighted data.

[a]Households were defined to include family members, relatives, and friends who lived on the farm. However, a person was not counted as part of the household if all of his work was off the farm, even though he lived on the farm.

[b]Available man-days per year are based on the following assumptions: 130 days for persons 65 years and older, 210 days for males between 15 and 64 years , 60 days for females between 15 and 64, 25 days for children less than 15 years. See Statistical Working Document No. 1.

Table A3.12 Farm Households: Number of Persons and Employment, 1975.

Region	No. of Persons per Household[a]	Available Labor[b]	Employment			Employment as Percent of Avail. Labor
			Total	On Farm	Off Farm	
	(persons)		(man-days/year)			(percent)
			(Small Farms)			
Northern	6.2	538	164	123	41	30.5
Southwestern	7.3	571	182	147	35	31.9
Southeastern	6.2	507	158	97	61	31.2
Total Republic	6.4	538	167	123	44	31.0
			(Medium Farms)			
Northern	7.2	586	227	201	26	38.7
Southwestern	7.7	652	278	242	36	42.6
Southeastern	6.2	688	211	166	45	30.7
Total Republic	7.0	615	232	198	34	37.7
			(Large Farms)			
Northern	7.6	669	408	386	21	61.0
Southwestern	7.9	631	324	221	103	51.3
Southeastern	6.9	577	309	287	22	53.6
Total Republic	7.4	634	364	330	34	57.4

Source: Agricultural Sector Survey, 1976; weighted data.

[a] Households were defined to include family members and friends who live on the farm. But, if a family member worked off the farm entirely, he was not counted as part of the household even though he slept and ate his meals on the farm.

[b] Available man-days are based on the following assumption: 130 days for persons 65 years and older, 210 days for males between 15 and 64 years, 60 days for females between 15 and 64, and 25 days for children less than 15 years. See Statistical Working Document No.1.

Table A3.13 Total Employment on Farms, Household Labor, and Hired Labor, 1975.

Region	Available Household Labor[a/]	Average Employment on Farms					Employment on Farms as Percent of Available Household Labor
		Total	House-hold	Percent	Hired	Percent	
	(man-days/year)						
	(Small Farms)						
Northern	538	161	123	76.4	38	23.6	29.9
Southwestern	571	191	147	77.0	51	23.0	33.5
Southeastern	507	132	97	73.5	34	26.5	26.0
Total Republic	538	163	123	75.5	40	24.5	30.3
	(Medium Farms)						
Northern	586	374	201	53.7	172	46.3	63.8
Southwestern	652	449	242	53.8	210	46.7	68.9
Southeastern	688	327	166	50.8	161	49.2	47.5
Total Republic	615	374	198	52.9	176	47.1	60.8
	(Large Farms)						
Northern	669	1,196	386	32.3	810	67.7	178.8
Southwestern	631	842	221	26.2	621	73.8	133.4
Southeastern	577	1,045	287	27.5	758	72.5	181.1
Total Republic	634	1,094	330	30.2	764	69.8	172.6

Source: Agricultural Sector Survey, 1976; weighted data.

[a/] See notes to table.

Table A3.14 Employment on Farms in Crops, Livestock and Other Work, 1975.

Region	Employment on farms	Crops	Percent	Livestock	Percent	Other[a]	Percent
			(man-days/year)				
			(Small Farms)				
Northern	161	78	48.4	28	17.4	55	34.2
Southwestern	191	131	68.6	23	12.0	37	19.4
Southeastern	132	86	65.2	19	14.4	27	20.4
Total Republic	163	92	56.4	25	15.3	46	28.2
			(Medium Farms)				
Northern	374	217	58.0	73	19.5	84	22.5
Southwestern	449	292	65.0	57	12.7	100	22.3
Southeastern	327	170	52.0	60	18.3	97	29.7
Total Republic	374	217	58.0	66	17.6	91	24.3
			(Large Farms)				
Northern	1,196	813	68.0	139	11.6	244	20.4
Southwestern	842	570	67.7	90	10.7	182	21.6
Southeastern	1,045	580	55.5	198	18.9	267	25.6
Total Republic	1,094	703	64.3	150	13.7	241	22.0

Source: Agricultural Sector Survey, 1976; weighted data.

[a]Includes small amounts of nonagricultural work on the farm premises.

Table A3.15 Employment per Utilized Hectare in Farms and Employment in Crops per Hectare in Crops, 1975.

Farm Size Class	Employment per Utilized Hectare in Farms[a]	Employment in Crops Per Hectare in Crops[b]
	(man-days/year)	
	(Total Republic)	
Small Farms	81.9	60.5
Medium Farms	38.2	48.4
Large Farms	17.6	46.5
Total Republic	31.2	50.7
	(Northern Region)	
Small Farms	78.5	53.3
Medium Farms	37.3	47.1
Large Farms	17.1	51.8
Total Region	29.6	50.2
	(Southwestern Region)	
Small Farms	91.8	78.3
Medium Farms	46.0	57.6
Large Farms	16.9	55.5
Total Region	41.4	63.4
	(Southeastern Region)	
Small Farms	81.0	59.0
Medium Farms	34.6	42.4
Large Farms	18.9	26.4
Total Region	28.8	40.4

Source: Agricultural Sector Survey, 1976; weighted data.

[a]based on total land in farms less land in mountains, forests and other nonagricultural uses.

[b]excludes labor in general administration, maintenance, processing of raw products.

Table A3.16 Gross Farm Production per Man-day Employed on the Farm, and Gross Production in Crops per Man-day Employed in Crop Production by Size of Farm, 1975.

Farm Size Class	Gross Farm Production per Man-day Employed on the Farm	Gross Production in Crops per Man-day in Crop Production
	(RD$)	
	(Total Republic)	
Small Farms	5.49	6.00
Medium Farms	6.62	6.81
Large Farms	7.86	5.03
Total Republic	6.70	6.00
	(Northern Region)	
Small Farms	4.76	6.26
Medium Farms	6.51	7.11
Large Farms	8.83	5.01
Total Region	6.81	6.08
	(Southwestern Region)	
Small Farms	5.14	5.22
Medium Farms	6.28	6.62
Large Farms	5.83	3.57
Total Region	5.71	5.56
	(Southeastern Region)	
Small Farms	8.66	6.80
Medium Farms	7.13	6.29
Large Farms	6.77	5.79
Total Region	7.30	6.29

Source: Agricultural Sector Survey, 1976; weighted data.

Table A3.17 Average Wage for Hired Labor for Crop Production, 1975

Region	Small Farms	Medium Farms	Large Farms
	(RD$/Day)		
Northern	2.22	2.21	2.33
Southwestern	1.86	2.01	2.11
Southeastern	2.39	2.85	2.86
Total Republic	2.16	2.31	2.53

Source: Agricultural Data Survey, 1976, weighted data

Table A3.18 Percentage of Farms that Use Chemical Fertilizers[a/], 1975

Region	All Farms	Small Farms	Medium Farms	Large Farms
Northern	15.9	16.6	12.1	25.0
Southern	26.9	25.3	31.0	20.9
Eastern	12.1	8.8	9.2	36.4
Total Republic	17.2	16.9	14.9	27.9

Source: Agricultural Sector Survey, 1976; weighted data.

[a/] Includes livestock farms.

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Chapter 4

CONSUMPTION PATTERNS AND SUPPLY AND DEMAND PROJECTIONS FOR FOODS AND EXPORT PRODUCTS

Attention in this chapter is centered on consumption patterns and supply and demand projections for the food products that are most important in the Dominican Republic diet and the major export products. Using calories as a measure of relative importance, the major foods are rice, plantains, peanut oil, wheat and wheat products, sugar, milk, and yucca. Using proteins to rank the major foods, the order changes to rice, milk, wheat and wheat products, plantains, beef, and red beans (Table 4.1). Sugar, coffee, cacao, tobacco, and beef are the major agricultural exports.

Table 4.1. Annual Per Capita Consumption of Major Foods

Product[a/]	lbs./capita/yr.	Calories per day	Protein per day (grams)
1. White Rice	109.1	493.6	9.8
2. Plantain	317.6	366.9	3.8
3. Peanut Oil	20.1	220.6	---
4. Wheat Products	41.8	170.5	4.6
5. Sugar	34.7	165.4	---
6. Milk (liters)	39.1	93.8	5.6
7. Yucca	81.8	91.2	0.7
8. Red Beans	29.2	54.4	3.6
9. Beef	18.6	39.8	3.8
10. Sweet Potatoes	29.6	32.0	0.3
11. Chicken	12.8	20.0	2.9
12. Corn	2.9	13.2	0.4
13. Pork	5.5	13.0	1.0
14. Onions	3.3	1.6	0.1

Source: SEA, Diagnostico y Estrategia del Desarrollo Agropecuaria, 1976-86, 1976.

[a/] Products ranked in terms of relative importance of calories.

Most of the supply and demand projections presented in this chapter are based on the assumption that past trends will continue. Food consumption patterns in the Dominican Republic have been changing, however, as relative prices and incomes have changed and as the proportion of the population living in urban areas has increased. Such changes in demand patterns are expected to continue but to be gradual. Production patterns, on the other hand, could change quite rapidly depending on the type and success of development programs, weather, and disease problems.

Reliable production data are scarce. Even for major crops, the data series appear to be pieced together from different sources with different product definitions. At times, for some series, total uses (demand) do not even add to equal production plus imports (supply). Data on minor crops are nearly nonexistent. When there are little, if any, widely accepted and reasonably reliable data on production, it is not surprising that there are large differences in the supply and demand projections developed by different groups. The trend projections developed for this chapter, while methodologically defensible, are only as reliable as the underlying data. For some products, alternative sets of projections will be presented to illustrate what could happen under different sets of assumptions.

4.1 Family Consumption Patterns

A national household consumption survey was conducted by the Central Bank, with the collaboration of the National Statistics Office, during 1976-77. Average expenditures per family in the survey were RD$220.65 monthly (Table 4.2). Of this total, RD$174.55 (79 percent) were cash expenses financed by earned income, transfers and savings. Imputed rent

TABLE 4.2

AVERAGE MONTHLY EXPENDITURES PER FAMILY, 1976-77
(RD $)

Type of Expenditure	Urban	Rural	National
Cash	282.75	98.52	174.55
Home Production	1.47	48.03	29.46
Imputed Rent	23.40	11.80	16.64
Total	307.62	158.35	220.65

Source: Central Bank, National Household Consumption Survey, 1976-77, preliminary data.

accounted for 8 percent, and home production for 13 percent of total consumption.

Substantial differences were found between urban and rural families. Average monthly expenditures for urban families were almost twice as large as those of rural families. Home production by urban families was negligible but represented 30 percent of average consumption of rural families. As would be expected, average imputed rent was somewhat larger for urban families (Table 4.2).

The food, beverages, and tobacco group represented about half of household expenditures (Table 4.3). This proportion was significantly higher in rural areas (64 percent) than in the cities (43 percent). This difference is in line with income elasticities and relative average income levels of urban and rural families. Housing expenditures, which include cash and imputed rents, utilities, and furnishings, were the second largest type of expenditures in both the urban and rural zones. "Other" expenditures, including expenses for health, education, entertainment, and transportation, were the third largest type. Expenditures on clothing represented 6 percent of average expenditures for both urban and rural families.

Food consumption patterns follow the prevailing differences in income levels in the urban and rural areas. Average family expenditures for different foods and beverages are shown in Table 4.4. Cereal products are the largest food item, except in Santo Domingo where average expenditures on meat exceed those for cereals. Rural diets are more concentrated in cereals, roots, beans, fruits, and fats and oils. Urban families consume larger quantities of meat, milk, and meat and milk products.

TABLE 4.3

FAMILY EXPENDITURES BY
TYPE OF GOOD AND RESIDENCE, 1976-77

	Food, Beverages, and Tobacco	Housing	Other	Clothing
Urban	43	28	23	6
Rural	64	18	12	6
Total	52	24	18	6

Source: Central Bank, National Household Consumption Survey, Preliminary data.

TABLE 4.4

AVERAGE FAMILY EXPENDITURES
FOR FOODS, BEVERAGES, AND TOBACCO, 1976-77
(RD $)

Type of Food	Santo Domingo Urban		Santiago Urban		Santiago Rural		Rest of Country Rural	
	Ave. Monthly Exp.	%	Ave. Monthly Exp.	%	Ave. Monthly Exp.	%	Ave. Monthly Exp.	%
Cereal & Cereal Products	26.17	17	23.25	18	28.37	24	23.62	24
Roots & Tubers	4.33	3	5.10	4	10.30	9	6.78	7
Sugar	5.11	3	4.70	4	3.85	3	3.54	4
Dry Beans	5.51	4	5.60	4	5.67	5	6.91	7
Vegetables	8.54	6	6.28	5	5.64	5	3.74	4
Fruits	12.88	8	12.69	10	8.77	8	11.89	12
Meat & Meat Products	31.35	21	21.91	17	14.11	12	12.00	12
Eggs	3.08	2	3.20	3	2.46	2	1.61	3
Fish	3.71	2	1.50	1	2.38	2	2.99	3
Milk & Milk Products	17.77	12	15.12	12	8.27	7	4.61	5
Fats & Oils	14.58	10	11.01	9	13.20	11	10.02	10
Various	6.87	5	7.13	6	5.10	4	3.19	3
Beverages	6.21	4	4.41	3	4.00	3	4.32	4
Tobacco	5.68	4	5.49	4	4.70	4	3.76	4
Total	151.79	100	127.39	100	116.82	100	98.98	100

Source: Central Bank, National Household Consumption Survey, Preliminary data.

4.2 Food Grains

Rice and wheat are the most important food grains in the Dominican diet. All wheat is imported. In recent years, rice imports have averaged 20 percent of total consumption. Since 1973, corn imports have accounted for over one-half of total consumption. The majority of the corn is fed to livestock, primarily poultry, dairy, and swine. Some grain sorghum is produced by medium and large farmers for livestock feed but the amount is small and production data are very incomplete.

4.2.1 Rice

Rice is considered to be a strategic agricultural product in the Dominican Republic. It is consumed widely by all social classes in both rural and urban areas. It is estimated that for the average family in Santo Domingo, rice purchases represent 3 percent of total income and 10 percent of total food expenditures. For families with monthly incomes between RD$50 and RD$100, rice purchases average.8 percent of income and 17 percent of food expenditures.

The production of rice accounts for almost 8 percent of total GDP in agriculture. Three-fourths of total rice production originate from 25,000 small farm units of less than 5 hectares in size. The GODR has strongly encouraged rice production. In 1976, for example, two-thirds of agricultural credit for crops went to rice producers and one-half of the land on Government administered land reform settlements was devoted to rice. Price guarantees, improved seeds, and access to irrigation water have provided additional incentives to produce rice. These efforts notwithstanding, production increases in the early 1970s fell short of expectations, in part as a result of the drought during the 1974-75 growing

season. Good weather in 1978 led to a large crop such that no imports were expected in 1979.

Per capita consumption of rice has increased from under 30 kg/cap/yr during 1963-67 to over 51 kg/cap/yr during the 1973-77 period. If the rate of growth of income slows down somewhat and if the government does not attempt to lower the price of rice relative to other staple foods, then the rate of growth of per-capita consumption of rice should slow down during the next ten years. Raising the relative price of rice is not a likely policy choice due to the political sensitivity of the price for this important staple food.

Based on trends since 1962, total rice production would increase from 238,000 MT in 1980 to 329,000 MT in 1990. Total consumption would increase from 291,000 MT to 414,000 MT during the same period. Based on the trend projections, per-capita consumption would be approximately 56 kg/cap/yr by 1990. If per capita consumption could be maintained at the present level of 53 kg/cap/yr, total consumption by 1990 would be 394,000 MT, or 20,000 MT less than the trend projection. On the basis of the trend projections, rice imports would increase from 18 percent of consumption in 1980 to over 20 percent in 1990 (Table 4.5).

The SEA, in conjunction with the Ag. Bank, IAD, and INDRHI, has initiated a comprehensive rice improvement program. The objectives of the program are to raise yields to approximately 3.5 MT per hectare and increase the amount of land planted to rice. Emphasis is being placed on more efficient water utilization, better weed and insect control, and more timely availability of improved seeds and fertilizers. Self-sufficiency in rice

Table 4.5. Supply and Demand Projections for Major Grains: 1980-1990

	1980 (1000 MT)	1985 (1000 MT)	1990 (1000 MT)
I. RICE			
a. Production: trend[1/]	238	283	329
b. Consumption: trend[2/]	291	352	414
c. Consumption: (53 kg./cap./yr.)	290	337	394
d. Imports: trend, (b-a)	53	69	85
e. Imports: (c-a)	52	54	65
II. WHEAT			
a. Imports: trend[3/]	143	170	197
b. Imports: (22 kg./cap./yr.)	120	140	164
III. CORN			
a. Production: trend[4/]	49	50	51
b. Consumption: trend[5/]	143	182	222
c. Consumption: (22 kg./cap./yr.)	120	140	164
d. Imports: trend (b-a)	94	132	171
e. Imports: (c-a)	71	90	113
IV. POPULATION (1000's)	5466.0	6368.5	7441.9

Notes: Quantity Q in 1000 MT and T = time in years

[1/] Rice, Q = 63.30 + 9.17 T, Production, T = 1 for 1962, T = 19 for 1980

[2/] Rice, Q = 57.40 + 12.30 T, Consumption, T = 1 for 1962, T = 19 for 1980

[3/] Wheat, Q = 28.10 + 5.40 T, Imports, T = 1 for 1960, T = 21 for 1980

[4/] Corn, Q = 44.79 + 0.19 T, Production, T = 1 for 1960, T = 21 for 1980

[5/] Corn, Q = 23.60 + 7.90 T, Consumption, T = 1 for 1960, T = 21 for 1980

production by 1990 would require approximately 118,000 hectares of land in rice production with an average yield of 3.5 MT/ha. This would be an ambitious goal but not an unrealistic one. It would require bringing approximately 2,500 hectares of new land into rice production each year and increasing average yields by about 0.1 MT/ha annually.

4.2.2 Wheat

Wheat is not produced in the Dominican Republic. The consumption of wheat and wheat products has increased rapidly during the past ten years as a result of the rapid growth in incomes and the increased percentage of persons living in urban areas. Total wheat imports increased from 29,000 MT in 1960 to an estimated 136,000 MT in 1976 and have averaged 105,000 MT annually during the past five years.

Based on the past trend, wheat imports would increase to 143,000 MT by 1980 and 197,000 MT in 1990. If per capita consumption of wheat remained stable at its present level of approximately 22 kg/cap/yr, imports in 1990 would be 164,000 MT (Table 3.2). The Superior Institute of Agriculture (ISA) is experimenting with cassava flour and other substitutes in bread production with the hope of eventually reducing the need for wheat imports somewhat. Such programs seldom have had a significant effect on per capita wheat consumption either because of mixing other types of flour with wheat flour changes the baking qualities of the flour, the taste of the final products, or increases the price of the flour. Thus, the projected imports based on per capita consumption of 22 kg/cap/yr can be viewed as low projections and those based on the past trends as high projections. There is relatively little the government can do to change wheat consumption short of restricting imports or increasing the price of

wheat products substantially relative to the prices of other carbohydrate foods to discourage their consumption.

4.2.3 Corn

Corn is basically a small farmer crop in the Dominican Republic. It frequently is interplanted with other crops, especially beans. Total production in recent years is thought to be between 40,000 to 50,000 MT per year. Corn yields are low, averaging at best less than 2.0 MT/ha. In recent years, yields appear to have been substantially lower.

Corn is used both for human consumption and for livestock production. Direct per capita consumption of corn has averaged about 6 kg/yr in recent years, nearly twice as great as in the mid-1960s. Total corn utilization per capita, which includes corn for livestock feeds, averaged about 22 kg/yr during the 1974-76 period. Expansion of poultry production led to rapid increases in corn imports beginning in the early 1970s. Corn imports, which accounted for only 15 percent of total consumption in 1970, increased to 60,000 MT, or 55 percent of consumption, by 1976.

If past trends continue, corn production will remain essentially static around 50,000 MT during the next 10-12 years. Consumption, on the other hand, would increase from 143,000 MT to 222,000 MT by 1990. The trend projections for corn appear to underestimate potential production and overestimate potential imports. More land in the San Juan Valley has been devoted to corn production in recent years because of drought conditions in the North. The low yields during the 1974-75 period were in part the result of drought condition. If production remains nearly constant, and per capita consumption continues to average 22 kg/cap/yr, imports would increase from 71,000 MT in 1980 to 113,000 MT by 1990. Total corn production

would have to be nearly doubled by 1990 to keep corn imports at their present levels of around 60,000 MT per year. Although higher yields are possible, increasing average yields substantially in the short-run is likely to be difficult because of the difficulties of introducing improved seed and production techniques to many small farmers. Therefore, it is likely to be difficult to double corn production without shifting fairly substantial amounts of land out of production of other crops.

Grain sorghum could become a more important substitute for corn in livestock feeds. Sorghum is more resistant to drought than corn. Although some efforts have been made to promote sorghum production, the presence of midge (a sorghum pest) and the danger of a midge build-up have resulted in reduced sorghum production in recent years. Thus, with a pest control program for sorghum, it seems likely that sorghum production could increase by enough to significantly reduce corn imports during the 1980s.

4.3 Beans, Root Crops, and Plantains

4.3.1 Beans

Red beans are the principal legume consumed by Dominicans. They are second only to rice as a source of protein for the very low income families. White and black beans are also produced but are of much lesser importance. Black beans, however, are increasing in importance as an export to Venezuela.

Bean yields are very low, averaging about 545 kg/ha. Usually beans are interplanted with other crops. Viruses are a major production problem. It is believed that bean production could be doubled if virus resistant varieties were available to small farmers.

Total production of dry beans averaged 41,000 MT during the 1974-76 period. If past trends continue, production would increase from 43,000 MT

in 1980 to 56,000 MT in 1990. Consumption, however, would continue to exceed production and, as a result, imports would increase from 9,000 MT in 1980 to 12,000 MT by 1990. Self-sufficiency in bean production could be achieved by 1990 with no new land in production if average yields could be increased by 20 percent, i.e., approximately 2 percent annually (Table 4.6).

4.3.2 Plantains

Plantains are a basic source of calories for lower income groups in both rural and urban areas. The government places great importance on maintaining an ample supply of plantains for domestic consumption throughout the year. They are produced throughout the country by both large and small farmers. Several of the state farms in the Cibao Valley, and in the Southwestern Provinces of Azua and Barahona, specialize in plantain production.

Plantain production has increased fairly rapidly since the early 1960s. Production, which averaged 370,000 MT annually during the 196062 period, increased to an average of 550,000 MT during the 1974-76 period. Exports of plantains have seldom been more than 3,000 to 4,000 MT in recent years. Plantain production is projected to increase from 566,000 MT in 1980 to 686,000 MT by 1990. Consumption is expected to be about equal to production during most of this period (Table 4.6).

It is believed that plantain production could be increased with approximately the same amount of land in production by shifting the location of production. The region most suited to plantain production is the heavy rainfall area along the north coast from Puerto Plata east to Macao

Table 4.6. Supply and Demand Projections for Beans, Root Crops, and Plantains: 1980-1990

	1980 (1000 MT)	1985 (1000 MT)	1990 (1000 MT)
I. Beans			
a. Production: trend[1/]	43	49	56
b. Consumption: trend[2/]	52	60	68
c. Imports: (b-a)	9	11	12
II. Plantains			
a. Production: trend[3/]	566	626	686
b. Consumption: trend[4/]	565	626	686
c. Exports: (a-b)	1	0	0
III. Yucca			
a. Production: trend[5/]	214	233	253
b. Consumption: trend[6/]	208	226	245
c. Exports: (a-b)	6	7	8
IV. Sweet Potatoes			
a. Production: trend[7/]	99	106	112
b. Consumption: trend[8/]	94	99	104
c. Exports: (a-b)	5	7	8
V. Potatoes			
a. Production: trend[9/]	38	46	54
b. Consumption: trend[10/]	37	45	52
c. Exports: (a-b)	1	1	2

Notes: Quantity in 1000 MT. Time in years with T = 1 for 1960 and T = 21 for 1980.

[1/] Beans, Q = 15.87 + 1.28 T — Production

[2/] Beans, Q = 17.40 + 1.62 T — Consumption

[3/] Plantains, Q = 315.32 + 11.95 T — Production

[4/] Plantains, Q = 312.69 + 12.03 T — Consumption

[5/] Yuca, Q = 132.87 + 3.86 T — Production

[6/] Yuca, Q = 132.07 + 3.63 T — Consumption

[7/] Sweet Potatoes, Q = 71.92 + 1.30 T — Production

[8/] Sweet Potatoes, Q = 72.72 + 1.02 T — Consumption

[9/] Potatoes, Q = 5.01 + 1.58 T — Production

[10/] Potatoes, Q = 6.24 + 1.48 T — Consumption

at the northeastern corner of the country. Much of this area has not produced significant amounts of plantains in the past, probably due to the lack of adequate road access. As access to this area is improved, a program to encourage increased plantings of plantains, while at the same time encouraging Cibao Valley farmers to shift production to other crops, would not only increase plantain production but production of other crops as well. Such a program would be consistent with the government's interest in helping small and medium size farmers. These farms normally obtain higher than average yields of plantains and could be assisted in increasing production in the north coast region.

4.3.3 Root Crops

Yucca (cassava) is the major root crop in the Dominican diet, especially among lower income families. Higher income groups substitute rice and wheat products for yucca.

Estimates of yucca production in recent years vary widely, ranging for example, from 170,000 MT to 191,000 MT for 1975. The projections presented in Table 4.6 are based on the "high" estimates. Yucca production has increased gradually since 1960. It is primarily a small farmer crop, probably, in part, because it can be grown on marginal land. Production usually has been approximately equal to consumption. Exports have ranged from 3,000 to 5,000 MT annually. Based on the past trend of the high production estimates, total production would increase from 214,000 MT in 1980 to 253,000 MT in 1990. It is recognized that these projections are approximately 40,000 to 50,000 MT higher than similar projections based on low production estimates.

Dominican agronomists believe that average yucca yields could be tripled with better management. The main problem is reaching the thousands of small farmers producing yucca and convincing them to use improved varieties and technology.

Sweet potato production has increased from an average of 78,000 MT during the 1960-62 period to 92,000 MT during 1974-76. In recent years, approximately 3 percent of total production has been exported. On the basis of past trends, total production is projected to increase from 99,000 MT in 1980 to 112,000 MT in 1990. Exports would increase gradually to 8,000 MT by 1990.

White potato production increased rapidly during the 1960s from 6,000 MT in 1960 to 23,000 MT in 1970. Production during the 1974-76 period averaged 28,700 MT annually. The linear trend projections presented in Table 4.6 probably overestimate total production and consumption because they are heavily influenced by the rapid growth of production during the 1960s. Nonetheless, it appears likely that the Dominican Republic should continue to be reasonably self-sufficient in potato production during the next decade.

4.3.4 Summary

The Dominican Republic is expected to be roughly self-sufficient in the production of plantains, yucca, sweet potatoes and white potatoes during the next ten to twelve years. Self-sufficiency in bean production also could be achieved with relatively small increases in average yields each year. Through programs designed to increase yields of yucca, sweet potatoes, and white potatoes, and shift the regional location of production of plantains, it would be possible to shift land out of the production of

these crops and into the production of other crops.

4.4 Livestock and Poultry

The existing data on livestock and poultry production are extremely sketchy. The most extensive data available are those collected for the agricultural census of 1971. They provide a reasonably accurate idea of livestock numbers and location in the early 1970s. They are not particularly helpful for projecting future supplies. The projections developed for this section therefore are based primarily on time series of production from the Central Bank. Data from the SEA are used primarily to up-date the 1971 census information on livestock numbers.

4.4.1 Livestock

In 1971, four zones were important in terms of numbers of beef and dairy cattle. These were the northern (458,156 head), eastern (450,465 head), northeastern (258,931 head), and central (202,556 head). These zones had the most extensive areas of land in natural and improved pastures. In total, these four zones accounted for nearly 84 percent of total cattle numbers in 1971 (Table 4.7).

The same four zones accounted for nearly 80 percent of total swine numbers, 50 percent of the nation's goats, and 48 percent of the sheep. The dry northwestern and southwestern regions were relatively more important production regions for goats than for cattle and swine. The northern region was the single most important livestock producing region.

In 1971, 1,640,654 head of beef and dairy cattle were reported on 92,889 farms, an average of nearly 18 head per farm. A total of 866,411 swine were reported on 176,241 farms, an average of 5 head per farm. There were 502,063 work animals (horses, burros, mules, and oxen) on 25,565

Table 4.7. Livestock: Number of Farms and Animals by Region, 1971
(Cattle, Swine, Goats, Sheep, and Work Animals)

	Region	Cattle[a]		Swine		Goats[b]		Sheep[b]		Number of Work Animals[c]
		Number of Farms	Number of Cattle	Number of Farms	Number of Pigs	Number of Farms	Number of Goats	Number of Farms	Number of Sheep	
I.	Northwestern	9,470	120,369	13,127	53,350	4,801	49,959	520	4,798	47,190
II.	Northern	21,635	458,156	50,660	280,430	10,055	34,958	607	5,214	106,375
III.	Northeastern	14,059	258,931	31,923	169,314	5,465	20,359	194	1,306	60,747
IV.	Southwestern	15,081	98,514	23,521	98,407	10,434	63,624	786	7,628	75,964
V.	Southern	4,809	51,672	6,691	27,213	3,702	18,132	162	854	24,560
VI.	Central	18,998	202,556	33,025	134,088	9,708	49,949	273	3,673	89,904
VII.	Eastern	8,837	450,456	17,294	103,609	4,085	22,783	278	2,092	97,323
Total	Republic	92,889	1,640,654	176,241	866,411	48,250	259,764	2,820	25,565	502,063

Source: 6th National Agricultural Census--1971.

[a] Includes beef and dairy cattle.
[b] Does not include microfarms.
[c] Inclues horses, burros, mules, and oxen.

sheep on 2,820 farms.

Cattle production has increased substantially since 1960. Cattle numbers increased from 839,037 in 1960 to 1,926,000 in 1977. Total meat and milk production has increased at a somewhat slower rate, which suggests that more cattle are being raised on marginal pasture land or under less intensive management. Swine numbers increased more slowly than cattle until about 1975. The 1960 agricultural census reported 712,117 head of swine. The SEA estimated that there were 1,048,000 head of swine in 1975, and perhaps as many as 1,230,000 in 1977. The program to combat the outbreak of African swine fever is expected to essentially eliminate swine by 1980. Repopulation will be a slow process. The number of sheep is insignificant and declining. Goat production, however, increased 40,636 head, or 18 percent, during the 1960 to 1971 period, totaling 259,764 in 1971. The number of work animals increased slightly between 1960 and 1971 with the increase in mules more than offsetting a reported reduction of nearly 13,000 horses. Most oxen used in sugarcane areas have been replaced by tractors.

The production of beef and veal increased from 24,000 MT in 1960 to an estimated 40,000 MT in 1976. The most rapid increases in production took place between 1960 and 1973. Since 1973, production has increased at about 0.2 percent annually compared with an average compound annual growth rate of nearly 3.7 percent during the 1960-72 period. Exportation of beef, which was initiated in 1966 with the export of 539 MT of live and carcass beef, increased to 7,300 MT of frozen deboned beef in 1973.

Based on past trends, beef and veal production would increase from

44,200 MT in 1980 to 55,500 MT in 1990. Consumption would increase at a slower rate and beef exports would total 14,200 MT by 1990. These production projections are somewhat high compared to production increases during the past five years. To achieve the projected levels would require some dramatic improvements in pasture and herd management during the next five years. Nonetheless, the projected production levels are technically feasible. It has been estimated that the carrying capacity of pastures in many areas could be doubled. At present, very little use is made of hay or supplemental feeds during the dry season and weight losses are substantial. With a decline in pork production it seems likely that beef and veal consumption may increase more than projected (Table 4.8). If so, beef exports are likely to fall short of the projected levels until the mid-1980s. In any event, barring major disease problems, the Dominican Republic should be able to remain self-sufficient in beef and veal production during the next ten to twelve years.

Pork production in 1976 was estimated to be approximately 19,000 MT, nearly half as much as beef production. Based on past trends, pork production would be 20,500 MT in 1980 and 27,800 MT by 1990. With the outbreak of African Swine Fever, these projections are inappropriate.

It is estimated that over 80 percent of the swine were produced by small and medium-sized farms averaging 3 to 5 head of hogs per farm. The African Swine Fever will, therefore, have a more serious impact on small and medium-sized farmers than on larger farmers. This also will make it more difficult to isolate and control African Swine Fever. For small farmers, hogs are held for sale in emergencies and are, in a sense, a form of savings. They obviously will have strong resistance to having their hogs slaughtered to control a disease they have never seen before.

Table 4.8. Supply and Demand Projections for Livestock and Poultry: 1980-1990

	1980 (1000 MT)	1985 (1000 MT)	1990 (1000 MT)
I. Beef and Veal			
a. Production: trend[1/]	44.2	49.9	55.5
b. Consumption: trend[2/]	35.1	38.2	41.3
c. Exports: (a-b)	9.1	11.7	14.2
II. Poultry			
a. Production: trend[3/]	39.7	45.3	50.8
III. Eggs (in millions)			
a. Production: trend[4/]	279.9	319.0	358.2
IV. Milk (in million liters)			
a. Production: trend[5/]	415.4	458.6	501.8
V. Mutton and Goat Meat			
a. Production: trend[6/]	1.6	1.8	2.0

Notes: Quantity in 1000 MT. Time in years with T = 1 for 1960 and T = 21 for 1980. Pork omitted due to the African Swine Fever program.

[1/] Beef, $Q = 20.48 + 1.13\ T$	Production
[2/] Beef, $Q = 22.20 + 0.62\ T$	Consumption
[3/] Poultry, $Q = 16.42 + 1.11\ T$	Production
[4/] Eggs, $Q = 115.50 + 7.83\ T$	Production (millions of eggs)
[5/] Milk, $Q = 234.03 + 8.64\ T$	Production (millions of liters)
[6/] Mutton and Goat, $Q = 0.93 + 0.035\ T$	Production

African Swine Fever (ASF) is a highly contagious, virtually 100 percent fatal virus disease that is species-specific for swine, and for which neither cure nor prevention exists at this time. The disease is a severe problem in infected countries because of the extreme durability of the virus both within and outside the animal's body. In spite of the years of research, no effective vaccine has yet been developed, meaning that isolation and destruction of infected swine is the only way of controlling or eradicating the disease.

In terms of the Dominican economy as a whole, the seriousness of the ASF outbreak is indicated by the GODR plan of action to eradicate the disease from the entire country at an estimated program cost of approximately $27 million over a 27-month period.

Pork consumption, although less favored than beef and poultry, traditionally accounts for about 20 percent of national meat consumption. Most estimates of pork consumption are limited to carcass meat (3 kg.), leaving unaccounted the offals and by-products of slaughter which are also consumed.

The eradication program will be completed by mid-1981. With the planned repopulation program, it is expected that total pork production could be back to pre-ASF levels as early as 1988[1/].

The production of mutton and goat meat has increased gradually since 1960 and, at present, is estimated to be roughly 1,600 MT. Based on past trends, total production would remain under 2,000 MT until 1990 (Table 4.8).

At least two-thirds of cattle in the Dominican Republic are dual

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[1/] African Swine Fever Eradication Program. AID/LAC/P-007 Project No. 517-0135.

purpose crosses, bred for both beef and milk. When the emphasis is on milk, the crosses frequently combine Holsteins with Brown Swiss, Cebu, and occasionally Criollo cattle. When the emphasis is on beef, Cebu is dominant in the crosses. In recent years Brahma, Santa Gertrudis, and Charolais have become more important breeds.

With a large portion of dual purpose cattle, it is not surprising to find that milk has increased at nearly the same rate as beef production. Total milk production was 246,000,000 liters in 1960 and an estimated 383,000,000 liters in 1976, which is a total increase of 55 percent. If past trends continue, milk production would be over 415 million liters in 1980 and over 500 million liters in 1990.

Information on imports of powdered milk and processed milk products is very sketchy for recent years. During the early 1970s, it is estimated that approximately 20 to 25 percent of total milk consumed was imported. It appears that substantial amounts of milk products continue to be imported. The value of dairy imports in 1977 was US$1.5 million, largely for 3.2 million kilos of powedered milk. This situation seems likely to continue, with roughly 20 percent of total milk consumption accounted for by powdered and processed milk products during the 1980s.

4.4.2 Poultry and Specialty Animals

The 1971 agricultural census reported very few rabbits raised for commercial purposes with an estimated total of only 10,468 on 788 farms. Beekeeping was more widespread, with 13,300 farms reporting 141,294 hives (Table 4.9). No meaningful projections can be made on these products on the basis of available data. It seems reasonable to assume, however, that

Table 4.9. Livestock: Number of Rabbits, Beehives, and Poultry by Region, 1971

	Region	Rabbits[a]		Beekeeping[b]		All Poultry[b]	Number of Laying Hens
		Number of Farms	Number of Rabbits	Number of Farms	Number of Hives		
I.	Northwestern	27	278	1,686	22,607	413,813	132,310
II.	Northern	472	5,433	4,201	40,118	2,779,297	832,852
III.	Northeastern	93	739	1,636	16,503	962,913	322,859
IV.	Southwestern	36	917	1,337	15,077	446,380	170,623
V.	Southern	13	131	900	13,665	168,982	60,555
VI.	Central	107	2,510	2,036	16,491	3,025,572	616,792
VII.	Eastern	40	460	1,504	16,833	526,438	179,727
Total	Republic	788	10,468	13,300	141,294	8,323,395	2,315,718

Source: 6th National Agricultural Census--1971.

[a] Does not include microfarms.
[b] Includes all chickens, turkeys, and guinea fowl.

supply will continue to be approximately equal to demand.

The number of poultry increased by over 60 percent between 1960 and 1971. Even more dramatic increases in broiler production and large-scale egg operations occurred between 1971 and 1976, after which the rate of increase of poultry products began to slow down. The Northern and Central regions around the major urban population centers continue to be the most important production regions for both broilers and eggs.

It is estimated that 30,000,000 broilers were processed in 1975, providing approximately 36,000 MT of poultry meat. This was only 1,000 MT short of the estimated beef and veal production for the same year and was twice as much poultry meat as was produced in 1960.

Egg production increased from 128 million eggs in 1960 to 238 million in 1974. In 1976, over 32 million eggs were incubated and, of these, less than 9 million were imported.

A large portion of the broilers and eggs are produced by highly integrated operators. An estimated 60 percent of the broiler producers, for example, operate under contracts with firms which supply chicks, medicines, and balanced feeds. These are highly efficient operations which produce broilers of 3.3 pounds in 8 weeks with feed-to-meat conversion ratios of approximately 2.5. (The rapid growth of large scale, commercial poultry operations using balanced feeds is the single most important factor accounting for the rapid increases in corn imports during the 1970s.)

If past trends were to continue, broiler production would provide the nation with 39,700 MT of meat in 1980 and 50,800 MT by 1990. Poultry would be a close second to beef and veal in production and possibly exceed beef and veal in terms of consumption. The expected reduction in pork

production is likely to result in some upward pressure on poultry prices and encourage continued increases in production. This, in turn, will result in increased imports of corn, which have generally been freely authorized for broiler and egg production.

Based on past trends, egg production would increase by 28 percent between 1980 and 1990 -- from nearly 280 million to over 358 million eggs. As in the case of broiler production, increased production of eggs will require increased imports of feed grains, primarily corn.

4.5 Fruits, Vegetables, and Specialty Crops

In addition to root crops, grains, legumes, and plantains, Dominicans consume a wide variety of fruits and vegetables including, among others, tomatoes, eggplant, onions, garlic, avocados, pineapple, papaya, bananas, citrus mangos, and coconuts. The importance of these items in the diets varies widely by region and season. Sufficient data are not available to assess the importance of fruits and vegetables in the average diet or to project future supplies and demands for most of these products. It is possible, however, to identify some of the opportunities for, and problems of, increasing the production of various fruits, vegetables, and specialty crops. This is the primary focus of this section.

Low levels of vitamin and mineral intake have been identified as a serious nutrition problem for low income families. Improving the balance of fruits and vegetables in diets could make a significant contribution to the solution of this problem. A large number of farm families obtain an important part of their food supply from family gardens or fruit trees. Sufficient emphasis has not been given to increasing home food production and to improving the varieties and the nutritional balance of food produced in home gardens.

A wide range of fruits, vegetables, and specialty crops offer excellent potential for increasing rural incomes and nutritional levels. Many are reasonably well suited for production by small farmers with scarce land resources. Most are relatively high value crops, many of which have excellent market potential either in domestic or export markets, or both.

Several things have hindered the increased production of fruits, vegetables, and specialty crops. Good seeds of improved varieties and high quality planting materials have not been locally available for many crops. Most high-value crops also require a fairly high level of technical and management skills to produce. These skills can be developed by small farmers through training programs but such programs have not been available. Many high-value crops require relatively large cash expenditures for seed, planting materials, fertilizer, pesticides, and harvesting. Production credit has not been widely available to finance the required inputs or the capital costs of establishing fruit orchards. Some areas which appear to have considerable potential for the production of fruits, vegetables, or specialty crops are still difficult to reach. Gradually, these areas will be opened up with improved road systems. Finally, marketing systems have not been developed that would provide producers of new products an adequate return for their efforts and risks taken. In order to overcome these constraints, a concerted and coordinated effort will be required to develop improved seeds and planting materials, provide technical and financial assistance, and develop reliable marketing systems.

Tomatoes, onions, and garlic will be used as examples of the diversity of trends in vegetable production. The production and consumption of garlic has remained virtually constant since 1960. Production edged upward

slightly from 2,800 MT in 1960 to 3,300 MT in 1977, while consumption remained unchanged at 3,600 MT in both years. Based on a linear projection of past trends, garlic exports would increase from 200 MT in 1980 to 700 MT in 1990. Small amounts of garlic have usually been imported in past years. The trend projections appear to underestimate future consumption and, therefore, overestimate exports. It seems more likely that the Dominican Republic will remain approximately self-sufficient in garlic production.

The per capita consumption of onions has fallen from roughly 8 pounds per year in the early 1960s to 3 pounds annually in the mid-1970s. Based on past trends, the production of onions would drop from 6,900 MT in 1980 to 4,300 MT in 1990, while consumption would decline from 7,000 MT to 3,900 MT during the same period. Again, the trend projections appear to underestimate future consumption. They do, however, reflect the decline in per capita consumption which is most evident since 1972. Average production of onions during the 1960-62 period was roughly double the average production reported for the 1975-77 period. Certainly, a doubling of onion production is technically feasible, and with some improved storage to even-out supplies, substantial increases in production would have relatively little effect on typical seasonal prices.

Both table and industrial tomatoes are produced in the Dominican Republic. Total production of table tomatoes in 1976 was 17,500 MT compared to a reported 123,500 MT of industrial tomatoes. Nearly 2,000 MT of table tomatoes and over 400 MT of processed tomato paste were exported. The production of table tomatoes has remained approximately constant since 1973, while that of industrial tomatoes increased by over 5 times during

the 1966-76 period in spite of declines in average yields. The total domestic consumption of tomatoes and tomato products has increased substantially during the past ten years. Available data suggest that Dominicans are consuming at least 2.5 times as many tomato products as they did in the early 1960s. Although future increases in production and consumption seem unlikely to be as dramatic as those of the early 1970s, the Dominican Republic should be able to maintain existing per capita consumption levels and still gradually increase exports of both fresh and processed tomatoes.

The export market also offers excellent opportunities for several other fruits and vegetables. In 1976, the Dominican Republic exported more than RD$8.7 million worth of fruit and fruit products. Almost one-fourth of this was bananas, but avocados, plantains, frozen guava, coconut, and papaya were also important. Vegetable exports amounted to RD$14.0 million in 1976. More than one-third of this amount was root crops (yautía, cassava, sweet potatoes, and yams). Pigeon peas, peppers, frozen okra, calabash, and tomatoes contributed most of the rest. Exports of specialty crops, including beeswax, achiote, ginger, coriander, and oregano accounted for over RD$1.0 million in 1976. The Dominican Republic is in a unique position with respect to climate, location, and work force to expand fruit, vegetable, and specialty crop exports to the United States, Puerto Rico, and to other countries in the Caribbean area. The country could increase exports of such crops significantly and still fulfill the growing domestic demand.

Among the crops most frequently mentioned as offering <u>new</u> production

opprotunities are sisal, soybeans, sorghum, sunflowers, seasme, African palm, grapes, apples, chayote, havas, and pejibaye (peach palm). Sorghum has been discussed previously. Soybeans, African palm, and sunflowers will be discussed in Section 4.5. The remaining products will be discussed briefly in this section.

Sisal was produced commercially during the 1950s in El Rosario and Los Negros de Azua. The plantations in these areas were abandoned in the early 1960s and raw materials for processing plants were then imported from Venezuela and Haiti. National production of sisal fell from over 880 MT in 1963 to 50 MT in 1975. Imports of sisal fiber, on the other hand, grew from over 962 MT to nearly 3,023 MT during the same period. The value of sisal fiber imports in 1975 was RD$1.8 million.

The export market for sisal is not particularly promising but the domestic demand for sisal is adequate to support substantial increases in production. Farm-level prices for sisal have increased more slowly than prices of most other agricultural products since the early 1960s. The declines in domestic production undoubtedly reflect the decline in the relative profitability of sisal production. Substantial increases in sisal prices, on the other hand, would result in substitution of other fibers for sisal in many uses. Sisal is not particularly appropriate as a small farmer crop. Even though the domestic market is adequate to support increased production of sisal, it appears unlikely that such production will be forthcoming in the near future or that small farmers would benefit significantly from a government program to increase sisal production. Tariffs and other restrictions on the importation of fiber that increased

domestic sisal prices would, in turn, result in increased production by medium and large farmers.

Small amounts of sesame seed have been produced for many years primarily for use in candy and bread production. Very little is isued for oil production. The SEA has not yet identified high yielding varieties of sesame for the Dominican Republic. The present cost-price structure does not appear to provide farmers much incentive to increase sesame production. It is estimated that, with existing varieties, real farm prices of sesame would have to increase by 20 to 25 percent to encourage increased production.

Some grapes are produced in Neyba, in the southwestern part of the country. In general, the quality of grapes produced is fairly poor, yields are usually low, and at times marketing losses are reported to be at least 50 percent of the crop. Fresh grapes traditionally are imported during the holiday season in December and January. Domestic producers are likely to find it difficult to provide the high quality grapes required by this market. They should, however, be able to be reasonably competitive in providing lower quality grapes for direct consumption, grape juice, and low-priced wines. Increasing grape production would require the introduction of improved varieties, long-term production credit, technical assistance to farmers for establishing and managing grape arbors, and the development of new marketing organizations. Even if work has begun in these areas immediately, the results in terms of increased production of grapes would not be much evident before the mid-1980s.

Very few apples are produced on a commercial scale at present. Most of the better quality apples consumed are imported, especially during the

Christmas season, from the United States and Chile. The possibilities for exporting apples are limited. The domestic market could absorb increased production of fresh apples, juices, and jams. Improved planting material could be developed or imported fairly easily. The major factors discouraging apple production are the lack of long-term production credit, accessibility of areas suitable for apple production, lack of widespread knowledge of good orchard management, and poorly organized marketing channels.

Chayote is a small, perennial squash-like vegetable that grows well on fences or arbors. It is high in vitamins and minerals and readily accepted by most people as a tasty substitute for, or complement to, other vegetables. It could be grown throughout the country but, at present, is grown in only a few areas mostly for home consumption. This situation probably could be changed through an extension program providing small amounts of seed and information on ways to prepare and use chayote.

"Habas", a perennial bean, is a high producing climbing bean that would produce well in much of the country. Several varieties have been tested by the crop research department of the SEA. Again, an extension program designed to promote home gardens and new products for such gardens would be helpful to introduce habas to small farmers and other rural families.

Pejibaye (peach palm) probably could become an important source of food and oil if it were distributed widely throughout the areas to which it is adopted. Pejibaye is a palm with many spiny trunks emerging from a single root stock. The fruit is borne in bunches of up to 300 fruits per bunch on as many as a dozen bunches weighing 12 kg or so per trunk. It is used widely in Central and South America as a food. Its flavor and texture

are somewhat similar to chestnuts. If boiled and dried, the fruit can be preserved for up to six months without spoiling. The fruit is also an excellent feed for cattle and swine. The small seed contains a high quality oil. Because of its multiple stems, pejibaye is also one of the most promising palms for the plantation production of hearts of palm. As in the case of grapes and apples, an extension program to promote pejibaye production would require at least five to seven years to show significant increases in production.

In summary, taken as a group, the Dominican Republic is roughly self-sufficient in fruit and vegetable production. In other words, its exports of some fruits and vegetables, on the average, roughly offsets its imports of others. Nonetheless, it would be possible to improve the diets of many Dominicans, particularly those living in rural areas, by promoting the wider production of some fruits, vegetables, and specialty crops for home use and sale in domestic markets. In most cases, the domestic market could absorb likely increases in production but in some cases the price structure and poorly functioning marketing systems are likely to discourage production regardless of the availability of improved varieties or technical information on production possibilities.

Citrus grown in the country include sweet oranges, sour oranges, limes (limón), and grapefruit. Most of the oranges are produced for the urban market from native varieties in the Cibao and Eastern Zones. Small plantings of Valencia and Navel varieties have taken place. Very small exports of Valencia oranges were made in 1977 and 1978. There is some processing of sour oranges and limes, the latter being exported. The potential for increased production of improved orange varieties exists, but a program

to produce nursery stock and bring new groves into production would require a minimum of five to seven years.

A wide variety of mangos are produced and consumed. Minor exports of mangos take place but information on their value is unavailable. Most of the existing production comes from trees around farm homes that are growing wild. Little basis exists for developing a significant export of mangos.

4.6 Oil Crops

Peanuts, coconuts, and cottonseed are the primary sources of domestically produced edible oils. Peanut oil, cottonseed oil, and soybean oil are the major edible oils imported. Soybean oil imports, in particular, have grown rapidly in importance since 1970.

Total Dominican production of oil crops was 77,500 MT in 1978, up 10 percent over 1977. Of this, peanuts accounted for 47,500 MT, copra for 21,000 MT, and cottonseed for 9,-00 MT. The total area devoted to oil seed production in 1978 was 84,000 has., up about 5 percent from 1977. Soybeans are not produced commercially at this time. SEA, however, is experimenting with varieties to determine production feasibility, especially in double-cropping systems with other crops such as tobacco.

The total vegetable oil deficit for 1978 was estimated to be 48,000 MT or about 63 percent of total national oil consumption. The deficit in 1977 was 65 percent of consumption, up from 60 percent in 1977. Production increases of edible oils have not kept pace with the increased demands or nutritional requirements. In 1978, imports included soybean oil (21,400 MT), cottonseed oil (10,400 MT), peanut oil (5,900 MT), and soybeans (31,000 MT). To change this situation will require a wide range of government actions to

promote new as well as traditional oil crops.

4.6.1 Peanuts

When Columbus landed on the island of Hispaniola, the Indians were already cultivating peanuts. Commercial production of peanut oil was initiated in 1937. Dominicans developed a strong preference for peanut oil and only gradually have accepted the introduction of oils from cottonseed, soybeans, and coconuts. On the average, about 80,000 hectares have been planted to peanuts annually since 1969. About 50 percent of the production is in the Southern Zone, 25 percent in the Northeast, 15 percent in the Cibao Valley and north coast, and 10 percent in the East. Peanuts are almost exclusively a small farm crop. Yields on small farms average about 800 kg per hectare. This compares with potential yields of over two tons under good management.

The principal oil extraction plants provide a limited amount of technical assistance to farmers. A sustained research and development program has not been developed by the government. Estimates of the supply function for peanuts indicate that a one-cent per kilogram increase in the real farm price of peanuts results in an additional production of over 1,600 MT of unshelled peanuts.[1/]

Farmers in the principal growing areas plant peanuts either separately or with another crop, usually corn. Correlation analysis based on 1966-75 data indicates that a one-metric ton increase in corn production was accompanied by a 2.9 MT increase in production of unshelled peanuts. This

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[1/] Hatch, L. U. Production and Marketing of Peanut Oil in the Dominican Republic, M.S. thesis, University of Georgia, Athens, Georgia, 1977.

provides a rough measure of the importance of corn-peanut intercropping for small farmers. The same type of analysis indicated an inverse relationship existed between the quantity of beans and peanuts produced. Farmers considered beans to be a close substitute for peanuts. A one-metric ton increase in bean production resulted in a decrease of 0.3 MT in peanut production. Although these estimates are based on national aggregates rather than individual farm surveys, they allow two important observations. First, government programs to promote corn production by small farmers should take account of the intercropping of corn and peanuts and attempt to increase peanut production simultaneously with corn production. Second, the promotion of bean production could reduce peanut production. This interrelationship should be taken into account in extension programs designed to influence production of peanuts, corn, and beans.

Both the supply and demand for peanut oil have been shown to be highly sensitive to price changes. It is estimated that an increase in the world price of crude peanut oil of one-cent per kilogram results in a decrease of 307 metric tons in imports. Similarly, if the price of peanut oil relative to that of coconut oil increases by one percent, imports of peanut oil are estimated to decrease by approximately 59 MT. On the demand side, a one percent increase in the price of peanut oil reduces demand by about 2.2 percent. The highly elastic demand for peanut oil is, in part, the result of the ready availability of several substitutes -- soybean oil, coconut oil, and cottonseed oil--and, in part, reflects the sensitivity of low income consumers to changes in edible oil prices.

Based on past trends, the production of peanuts would increase annually by about 1,400 MT and be adequate to produce roughly 22,000 MT of peanut oil in 1980 and 26,000 MT by 1990. The demand for peanut oil, on the other

hand, is projected to increase from 39,600 MT in 1980 to 54,300 MT by 1990.

These trend projections seem likely to overestimate the actual demand for peanut oil when the prospects for changing tastes and the substitution of soybean oil are taken into account. The trend projections would result in an increase in average imports of peanut oil of nearly 1,500 MT annually. Peanut production would have to increase by roughly 5 to 6 percent annually to keep pace with the projected increased demand for peanut oil. This increase should be possible through a combination of extension programs to increase yields and higher prices for peanuts.

Based on available estimates, an eight-cent per kilogram increase in the relative price of peanuts in any given year would be nearly adequate to provide the increased production needed to avoid the projected increased imports of peanut oil, other things remaining constant. This is a substantial increase in peanut prices. This magnitude of price increases could not be sustained annually over a ten-year period. Even on a one-time basis, such price increases would result in the substitution of other oils, primarily soybean oil, for peanut oil. Eventually, the higher price could also be reflected in some increased production of coconut oil, but the most immediate effect would be increased imports of edible oils, again primarily soybean oil. In brief, price policies alone will not be adequate to promote self-sufficiency in peanut oil production.

4.6.2 Coconuts

Sustained high prices for copra and fresh coconuts over the past several years have stimulated increased plantings of coconuts, especially in the Northwestern Zone. Total production in 1978 was estimated to be

140 million coconuts, roughly two-thirds of which were used for copra production. The remainder were consumed as fresh fruit or used for beverages.

In spite of some increased plantings of coconuts in recent years, the outlook for coconuts is not promising. Lethal yellowing, a disease that crippled the coconut industry in Jamaica, has reached Monte Cristi in the Dominican Republic. It is anticipated that within a decade this disease will spread throughout the island. Private sources have predicted that copra production may disappear altogether within a year or so. New disease resistant varieties of coconut will have to be introduced at a more rapid pace than in the past. Some efforts along these lines are underway, but the government lacks resources, and the production lags are such that substantial declines in copra and coconut oil production in the 1980s seem unavoidable.

4.6.3 Other Oil Crops

Cotton has been produced traditionally on government land rather than by the private sector. Production has been on a small scale, but plantings increased from 1,215 hectares in 1975 to 3.392 hectares in 1977. About 3,493 MT of cotton seed was produced in 1978. The GODR established the National Cotton Institute in 1976 to promote cotton production. The objective is to promote cotton production by private producers as well as on state farms. The outlook for some increases in cottonseed oil appears favorable, but cotton production will remain limited by a lack of suitable land and low profitability.

At present, sesame seed does not appear to be a price-competitive source of edible oil production. The development and promotion of new

varieties with high oil content possibly could change this situation. Nonetheless, sesame does not seem likely to become a major source of edible oils during the next decade.

Soybean and sunflower production probably could be increased with some investments in field research and extension on these crops. Both, however, seem best suited for large-farm production. It seems unlikely that either soybeans or sunflower production could be increased rapidly enough to become major sources of domestically produced oils during the next five years or so.

4.6.4 Summary

In light of the uncertainties about the future production of coconuts, the recent declines in peanut production, and the limited prospects for increased production of soybeans, cottonseed, sesame, and sunflowers, it is impossible to project future production of edible oils with a reasonable degree of confidence. The most likely prospect appears to be continued increases in edible oil imports, particularly soybean oil. On the basis of available information, it appears that government programs to increase peanut production, or multiple-cropping of peanuts and corn, would have the highest benefit-cost ratio, followed by programs to introduce disease resistant coconuts, promote cotton production, and to introduce soybeans.

4.7 Export Crops

The principal agricultural exports are sugar, coffee, tobacco, and cacao. Export crops of lesser importance include bananas, taro (yautía), dry coconuts, and beef. In addition, as discussed previously, various fruits and vegetables are exported but, even in total, they are of far less importance compared to the major export products. There is a great deal

of uncertainty about the future of agricultural exports. World prices of most of the major exports have experienced large variations in recent years and, thereby, induced major changes in production levels. During the 1977-78 crop year, disease and bad weather combined with low world prices resulted in a major reduction in earnings from agricultural exports. It is too soon to accurately assess the magnitude of the short-run effects, let alone the future impacts of the disease problems encountered in 1978.

Bad weather, while coffee was flowering, reduced 1978 production compared to the levels of production in 1977. Coconut blight, discussed previously, has caused serious damage to coconut palm plantations in Sanchez, Samana, and Sabana de la Mar, the main producing region in the north. The prospects for controlling this disease in the near future appear bleak. Plantain estates in several areas have suffered from Panama disease, which decimated many banana plantations elsewhere at the end of the 1960s. Since then, resistant strains of banana have been established, but now plantains are seriously affected. Finally, and perhaps potentially most serious, is the appearance of sugarcane rust that has affected at least two sugarcane varieties covering several thousand acres. The magnitude of the sugarcane rust problem or the degree of cooperation the government will receive in its efforts to control the disease are as yet unknown.

4.7.1 Coffee

Coffee is the Dominican Republic's second most important export product. Most of the coffee is grown by small farmers on mountain slopes in the northern region. The area devoted to coffee is estimated at 121.509 has.

Coffee production increased from 42,000 MT in 1960 to 62,000 MT in 1975, and then dropped to 46,000 MT in 1976. Exports increased from 29,000 MT in 1960 to 40,000 MT in 1975, and fell thereafter. Based on past trends, coffee production and exports would continue to increase gradually. Production in 1980 would be 57,300 MT and increase to 67,600 MT by 1990 (Table 4.10). Exports would increase from 38,600 MT to 46,000 MT during the same period. The projected levels of production and exports are not significantly different from the peak production and export levels achieved in recent years and appear to be very conservative projections. Factors that will encourage production include favorable world market prices, more normal weather, and new assistance programs by SEA.

4.7.2 Cacao

The production of cacao beans has varied substantially from year to year since 1960. Average annual production during the 1960-64 period was 39,200 MT. Production declined to an average of 27,800 MT annually during 1965-69 and then increased to 35,200 MT annually during the 1972-76 period.

Based on production trends since 1965, production would increase from 40,200 MT in 1980 to 48,700 MT by 1990. Exports would increase from 30,900 MT to 36,000 MT during the same period. As in the case of coffee, the projected production and export levels for cacao are not substantially different from peak levels of production and exports in recent years. Unless major disease problems are encountered, the projected production and export levels should be easily achieved provided that world prices continue favorable.

4.7.3 Tobacco

Recent estimates of tobacco production and exports are difficult to interpret. Reported exports for 1975, for example, exceeded estimated

Table 4.10. Supply and Demand Projections for Major Export Crops: 1980-1990

	1980 (1000 MT)	1985 (1000 MT)	1990 (1000 MT)
I. Sugar			
a. Production: (b+c)(HIGH)	1318	1636	2029
b. Exports: (4.6% annual growth)	1127	1413	1769
c. Consumption: (35 kg/cap/yr)	191	223	260
d. Exports: (2% annual growth)	1150	1270	1402
e. Production: (c+d)(MED)	1341	1493	1662
II. Coffee			
a. Production: trend[1/]	57.3	62.4	67.6
b. Exports: trend[2/]	38.6	42.5	46.4
c. Consumption: trend (a-b)	18.7	19.9	21.2
III. Cacao (Beans)			
a. Production: trend[3/]	40.2	44.4	48.7
b. Exports: trend	30.9	33.6	36.0
c. Consumption: (1.7 kg/cap/yr)	9.3	10.8	12.7
IV. Tobacco			
a. Production: trend (c+d-b)	41.1	47.8	54.5
b. Imports: trend[4/]	1.4	1.6	1.9
c. Exports: trend[5/]	37.9	44.0	50.1
d. Consumption: (0.85 kg/yr/capita)	4.6	5.4	6.3

Notes: Quantity in 1000 MT. Time in years with T = 1 for 1960 and T = 21 for 1980 except for cacao.

[1]Coffee: $Q = 35.49 + 1.04T$ Production

[2]Coffee: $Q = 22.28 + 0.79T$ Exports

[3]Cacao $Q = 26.6 + 0.85$ Production
(T = 1 for 1965 and 16 for 1980)

[4]Tobacco: $Q = 0.31 + 0.05T$ Imports

[5]Tobacco: $Q = 12.20 + 1.22T$ Exports

production by over 12,000 MT. Part of the exports may have come from stocks but it is difficult to explain why exports were greater than production for 4 out of 6 years between 1971 and 1976. Nonetheless, it is evident that tobacco production has been increasing since the mid-1960s. The increases have been primarily due to increased land going into production rather than increased yields.

Projections of future production were obtaining assuming that per capita consumption of tobacco would remain constant and the trend in exports would continue. Under these assumptions, tobacco production would increase from 41,100 MT in 1980 to 54,500 MT in 1990. Exports during the same period would increase from 37,900 MT to 50,100 MT. If these projections prove to be reasonably accurate, tobacco will continue to remain the nation's third most important export following sugar and coffee.

4.7.4 Sugar

The sugar subsector plays a key role in the agricultural sector and in the economy. It occupies about 12 percent of total cultivated area and generates 40 percent or more of total exports. It employs directly 80,000 workers in production and processing, and provides even more employment indirectly through transport, trade, and other services. In 1974, taxes on sugar exports of nearly RD$100 million accounted for over 20 percent of the central government's total current revenues. Hence, fluctuations in sugar output and prices are an important determinant of economic conditions in the country.

Nearly all of the raw sugar production is controlled by three companies: (a) Consejo Estatal del Azucar (CEA), (65 percent); (b) Central Romana (a subsidiary of Gulf and Western Corporation), (about 28 percent); and (c) Vicini (a private Dominican company), (7 percent). Some 1,200

individual growers (colonos) produced about 28 percent of total sugarcane in the mid-1970s when sugar prices were high. From 15,000 to 30,000 workers from Haiti enter the country annually to work in field operations, especially cutting. Because of the low-cost Haitian labor, sugarcane production is more labor-intensive than in other Latin American countries. This has provided some advantages for sugarcane processors because of low proportion of trash, leaves, and tops, and smaller amounts of cane unburnt results in a sugar content of cane of 11.7 percent, one of the highest in the world.

Raw sugar production dropped sharply between 1960 and 1965 from 1,020,00 MT to 580,000 MT, and then gradually recovered to 1,237,000 MT in 1976. The rate of increase was most rapid during the 1965-71 period and has slowed down since 1971. Production in 1978 was estimated at 1,180,000 MT. Marginal improvements in processing efficiency resulted in an increase from 10.7 to 11.7 percent of raw sugar per ton of cane processed. Average sugarcane yield per cultivated hectare, on the other hand, declined by nearly 5 percent annually from 1963/65 to 1973/75 and has since stabilized at about 60.5 MT per harvested hectare.

In recent years, a growing portion of cultivated area has not been harvested because of limited processing capacity. Under normal conditions and full utilization of present milling capacity, sugar factories can produce 1.32 million metric tons of raw sugar (CEA, 840,00; Romana, 400,000; and Vicini, 90,000). In 1976, CEA and Vicini produced sugar at full factory capacity. Romana, however, was estimated to have produced at about 17 percent below maximum capacity because of raw material shortage in the eastern part of the country as a result of drought.

The overall cost of production of raw material in 1976 was estimated to be 9.2¢ per pound. This is in line with other exporting countries such as Mauritius (9-10¢/lb.) and the Philippines (10-11¢/lb.). CEA's cost is about 10¢/lb. and the cost of Vicini and Romana is estimated to be about 8¢/lb. The price paid to colonos for their cane is about twice the estimated cost of the cane produced by the large processors.

Domestic consumption of sugar has grown about 7.2 percent annually since 1970. About 14 percent of annual sugar production is used for domestic consumption. Domestic refined sugar prices and marketing are under the control of INESPRE. Producers, in recent years, have been required to sell refined sugar to INESPRE below cost. INESPRE, in turn, sells the sugar to consumers at a price which includes about a 38 percent tax. This tax is transferred to the Corporacion Dominicana de Electricidad (CDE) to subsidize electric power sales.

Molasses is consumed domestically by the livestock feed and alcohol (primarily rum) industries; the residual is exported. Domestic consumption of molasses expanded at an average annual rate of 22 percent from 44,031 MT in 1970-71 to 98,674 MT in 1974-75. In 1978, molasses consumption was 135,000 MT. This expansion has been due, in part, to the rapid expansion of the livestock feed industry and, in part, because of the subsidized prices that the livestock feed industry pays for molasses. In 1975-76, under government regulation, the feed industry paid only 5.7¢/gallon for molasses compared to an fob export price of 29¢/gallon. The alcohol industry paid 17.5¢/gallon.

Sugar exports increased at about 1 percent annually between 1960-62

and 1973-75. Exports averaged about 1,000,000 MT in the latter period. The United States bought as much as 93 percent of Dominican sugar exports in the late 1960s, but its share has declined to less than 70 percent in the mid-1970s. Although the expiration of the U.S. Sugar Act in late 1974 did not appear to have significantly reduced the country's export volume to the U.S., in the last few years the Dominican Republic has been diversifying its export markets, which now include Italy, Portugal, Sweden, Iran, and Venezuela.

Based on past trends, raw sugar production is projected to be 1,341,000 MT in 1980 and 1,662,000 MT by 1990 (Table 4.10). Exports based on a 2 percent annual growth rate would be 1,150,000 MT in 1980 and 1,402,000 MT in 1990. Higher levels of production and exports should be possible with some changes in government policies and the operations of the processing companies. It is estimated that, given a continuation of existing policies, the U.S. sugar deficit could reach 5.9 million metric tons by 1980 and remain at that level through 1985. The Dominican Republic should be able to retain its existing share of 16 percent of the U.S. market and 4.1 percent of the market of remaining non-centrally planned economies. This implies overall exports of about 1.5 million metric tons in 1985. The <u>medium</u> projected exports of 1.27 million metric tons by 1985 can be viewed as a cautious planning target. Some additional investment in sugar processing capacity will be needed by 1985 to enable the nation to meet the projected export demands. The World Bank estimates suggest that about 100,000 metric tons of additional processing capacity is needed. At least 80 percent of this capacity would be controlled by CEA. A careful assessment needs to be made of the possible impact of the sugarcane rust and the

regional impacts of shifting sugarcane production before final decisions are made on how much and where new sugar processing capacity should be located.

The average money costs of production of sugar could be reduced by lowering the price paid for cane produced by colonos and expanded cane production by the large sugar companies. This approach would force some of the colonos into the production of yucca, peanuts, beans, corn, sorghum, livestock, and plantains. A careful review of the income effects of lower cane prices on colonos has not been undertaken. An alternative to lower cane prices for cane produced by colonos would be for the government to revise its price policies for molasses and domestic refined sugar in order to reduce the subsidies to livestock feed, rum producers, and electric power consumers.

In summary, the Dominican Republic should be able to maintain its share of the world export markets for sugar during the 1980s. Nonetheless, both the government and sugar companies will need to continually review the possibilities for shifting marginal land out of sugar production, making increased use of by-products, increasing raw sugar processing capacity, and modifying tax, price, and subsidies policies.

4.8 Summary

In total, the Dominican Republic is a net exporter of agricultural products. Its main deficits are grains and edible oils but these deficits are more than offset by exports of sugar, coffee, tobacco, and cacao. Relatively small amounts of fruits and vegetables are exported. These roughly offset imports of some high-quality fruits and processed food products. Exports of beef roughly offset imports of milk and milk products

(Table 4.11).

In order to achieve the projected production levels, the government will have to continue to give high priority to bringing new land into production and improving the productivity of land already in production. It will also have to give higher priority to agricultural research and extension activities which increase the yields of the major food crops such as rice, corn, beans, peanuts, yucca, and plantains.

If the distribution of income in rural areas is to be more equal, the government will need to give close attention to how programs and policies to increase food output are structured. Programs will be needed to provide small farmers with greater access to land. Irrigation programs should be designed to assist small farmers to improve the quality of their land. Greater emphasis should be placed on increasing the availability of credit to small farmers. Research and extension programs should emphasize those crops grown by small farmers and the development of programs in those regions where there is a high concentration of small farmers. Food price policies should be restructured to be of greater benefit to small farmers.

Without continued government-backed efforts to increase food production during the next decade, most of the surpluses (except for the major exports crops) are likely to disappear by the mid-1980s, and the deficits increase at rates higher than the projections in Table 4.11 imply. The production of root crops and plantains is only slightly greater than domestic consumption. Emphasizing higher yields for these crops would allow land presently devoted to their production to be shifted to other crops. With greater emphasis on the introduction of improved seed and production practices, it should be possible to achieve significantly higher yields of

Table 4.11. Summary of Projections of Surpluses or Deficits of Major Food Products

Product		Surplus (+) (1000 MT)	Deficit (-) (1000 MT)	Surplus or Deficit as Percent of Total Production (+) or Consumption (-) (%)
Rice	1980	-	52	18
	1985	-	54	16
	1990	-	65	16
Wheat	1980	-	120	100
	1985	-	140	100
	1990	-	164	100
Corn	1980	-	71	59
	1985	-	90	64
	1990	-	113	69
Beans	1980	-	9	17
	1985	-	11	18
	1990	-	12	18
Plantains	1980	1	-	-
	1985	0	-	-
	1990	0	-	-
Yucca	1980	6	-	3
	1985	7	-	3
	1990	8	-	3
Sweet Potatoes	1980	5	-	5
	1985	7	-	7
	1990	8	-	7
Beef	1980	9.1	-	20
	1985	11.7	-	23
	1990	14.2	-	26
Milk (million liters)	1980	-	83	17
	1985	-	92	17
	1990	-	99	17
Peanut Oil	1980	-	18	45
	1985	-	23	49
	1990	-	28	52

Table 4.11(Continued)

Product		Surplus (+) (1000 MT)	Deficit (-) (1000 MT)	Surplus or Deficit as Percent of Total Production (+) or Consumption (-) (%)
	1980	1150	-	86
Sugar	1985	1270	-	85
	1990	1402	-	84
	1980	38.6	-	67
Coffee	1985	42.5	-	68
	1990	46.4	-	69
	1980	30.9	-	77
Cocoa	1985	33.6	-	76
	1990	36.0	-	74
	1980	37.9	-	92
Tobacco	1985	44.0	-	92
	1990	50.1	-	92

Note: Percentage is the percent of production if the product is exported (in surplus) or percent of consumption if product is imported (in deficit).

corn, beans, rice, and peanuts. Programs of this type would not only increase production but would also be of direct benefit to small farmers.

It seems likely that the government will be able to change substantially the pattern of some agricultural deficits within the next ten years. There appears to be little prospect of substantially reducing wheat imports. Government programs probably will not substantially affect the level of production of cattle or poultry, but they may affect the cost of production. The cost of poultry and eggs, for example, will be affected by government actions on feed ingredient prices and the importation of feed grains. By allowing milk prices to increase, the government could promote increased milk production, but this would have relatively little effect on total production of beef.

Government extension and research programs could result in some increases in production of nontraditional crops and export crops. The more important examples are cotton, coffee, cacao, and tobacco. Some increases in the production of fruits and vegetables should be possible as new areas are opened up and better water control systems are constructed.

One of the major uncertainties about future production is the major disease problems encountered in the past year or so: lethal yellowing for coconuts, African Swine disease in the case of hogs, sugarcane rust, and Panama disease affecting plantains. A great deal of attention will have to be given to crop and livestock disease controls and the development and introduction of disease resistant varieties during the next two to four years.

Weather also has been an important factor affecting the level of production of many crops in the past. The drought of 1974 and 1975 are recent

dramatic examples. Although there is relatively little the government can do about weather problems in any given short-run period, there are some actions that would help reduce the impacts of weather variation over the long-run. Increased emphasis on water control, both drainage and irrigation, would be helpful. Promotion of improved intercropping and sequential cropping systems would reduce the effects of weather on overall food production. The development of drought tolerant varieties, opening up of new land areas, and the promotion of crop diversification regionally, would help offset the effects of bad weather in any given region. In brief, weather variations and the resulting uncertainties in production are an important environmental factor to be taken into account in a wide variety of government programs.

Even though in total the Dominican Republic is in an agricultural "surplus" position, this is due primarily to the exports generated by sugar, coffee, cacao, and tobacco producers. The nation's deficits of rice, corn, wheat, beans, milk, and edible oils are projected to increase if current conditions continue. The adequacy of production of plantains, yucca, sweet potatoes, and some fruits and vegetables is very slim, even at existing demand levels, and could easily disappear if disease or weather problems are encountered. Aggressive programs of research, extension, agricultural credit, price policies, marketing, and investments in rural infrastructure will be needed during the 1980s if the Dominican Republic is to reduce the projected deficits and improve the situation of the rural poor.

On the demand side, the recent SEA study on food requirements suggests

that domestic food production would need to grow about 5.5 percent per year to achieve desired nutritional improvements by 1986.[1/] However, even assuming this production growth target could be met, not all of the "required" food could be purchased. Income at the disposal of the needy population group is another essential element. If total population grows at 3.0 percent annually and the average income elasticity of demand for food is taken as 0.7, then annual increases in real per capita income must average about 3.6 percent over the next ten years to achieve the desired nutritional improvements by 1986. A minimal target rate of growth of GDP of about 6.6 percent is implied. Even if this growth target is met, if most of the increases in income are concentrated in narrow population strata and consumption effects constrained by income inequalities, all of the "required" food could not be purchased. The lower income strata would fail to achieve the recommended dietary levels; they could not afford to buy the required amounts of foods.

The magnitude of the SEA's estimates of the number of malnourished, low-income, rural families emphasizes the need for programs of broadly-based economic growth and social progress in the rural economy. Rice, beans, plantains, cassava, sweet potatoes, meat, and milk are the basis of the Dominican diet. These foods are produced by small farm families for both home consumption and sale in the marketplace. If agricultural programs emphasize development in the small farm subsector, increases in output can directly contribute to employment, real incomes, and nutritional levels of many of the poorest Dominicans, as well as to provide food for the urban

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[1/] Secretaria de Estado de Agricultura, Diagnostico y Estrategia del Desarrollo Agropecuario, 1976-86, Santo Domingo, 1976.

population. Also, many small farmers produce coffee, cacao, and tobacco for export. Increases in output of these and other products on small farms could contribute to balance of payments objectives as well as to increased employment and improved rural income distribution. If the population in the small farm subsector and landless workers group is to be more fully and productively employed, existing constraints on their access to land and complementary resources must be reduced, as described and analyzed in Chapter 3. A strategy that achieves improvements in nutrition and income levels among the rural poor must necessarily confront these constraints.

APPENDIX

TO

CHAPTER 4

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Table A4.1. RICE (MILLED) Production and Consumption: 1962-78

Year	Area (1000 has)	Yield (MT/ha)	Production (1000 MT)	Imports (1000 MT)	Consumption (1000 MT)	Consumption Per Capita (kg/yr)
1962	80	0.93	75	-	75	22
1963	79	0.93	74	32	106	30
1964	80	1.15	92	22	114	32
1965	75	1.44	108	-	108	29
1966	77	0.78	106	0	106	27
1967	75	1.50	114	-	114	29
1968	73	1.50	116	18	134	34
1969	76	1.65	126	0	126	31
1970	83	2.09	174	0	174	43
1971	75	2.02	152	0	152	36
1972	80	2.02	163	9	172	40
1973	88	2.02	178	30	208	47
1974	137	1.42	194	70	264	56
1975	132	1.51	199	50	249	53
1976	90	2.13	192	32	224	46
1977	93	2.13	198	65	263	53
1978	109	1.95	213	15	228	46

Source: 1962-72 - SEA-INESPRE
1973-74 - SEA
1975-78 - INESPRE

Table A4 .2: WHEAT Imports: 1960-78

Year	Imports[a/] (1000 MT)
1960	29
1961	33
1962	45
1963	60
1964	55
1965	35
1966	71
1967	76
1968	112
1969	96
1970	50
1971	106
1972	123
1973	99
1974	86
1975	99
1976	136
1977	131
1978	135

Source: Central Bank and SEA

[a/] Imports = Consumption

Table A4.3: CORN Production and Consumption: 1960-78

Year	Area[a/] (1000 has)	Yield (MT/ha)	Production[b/] (100 MT)	Imports[c/] (1000 MT)	Consumption (1000 MT)
1960	43	1.2	52	na	na
1961	39	1.3	50	na	na
1962	36	1.3	49	na	na
1963	33	1.4	46	na	na
1964	30	1.4	43	na	na
1965	25	1.5	38	na	na
1966	29	1.5	43	-	43
1967	23	1.7	39	5	44
1968	24	1.7	40	3	43
1969	23	1.9	43	0	43
1970	25	1.8	45	8	53
1971	30	1.6	49	12	61
1972	29	1.7	50	26	76
1973	36	1.4	52	53	105
1974	62	1.0	59	66	125
1975	76	0.6	48	33	81
1976	81	0.6	49	60	109
1977	75	0.6	44	75	119
1978	24	1.2	28	100	128

Sources: a/ PIDAGRO
b/ Central Bank
c/ SEA-INESPRE

Table A4.4: BEANS (DRY) Production and Consumption, 1960-78

Year	Production (1000 MT)	Imports (1000 MT)	Consumption (1000 MT)
1960	25	-	25
1961	19	-	19
1962	19	2	21
1963	19	5	24
1964	23	10	33
1965	23	2	25
1966	29	1	30
1967	23	3	26
1968	20	4	24
1969	26	6	32
1970	25	7	32
1971	28	7	35
1972	30	4	34
1973	34	11	45
1974	44	2	46
1975	39	9	48
1976	40	5	45
1977	27	4	31
1978	29	2	31

Source: Central Bank and SEA

Table A4.5: PLANTAINS Production and Consumption, 1960-78

Year	Production (1000 MT)	Exports (1000 MT)	Consumption (1000 MT)
1960	360	1	359
1961	369	8	361
1962	380	4	376
1963	388	-	388
1964	390	-	390
1965	391	-	391
1966	397	-	397
1967	324	1	323
1968	326	-	326
1969	427	3	434
1970	443	4	439
1971	455	4	451
1972	444	4	440
1973	442	2	440
1974	461	1	460
1975	556	na	556
1976	636	na	636
1977	530	na	530
1978	542	na	542

Source: PIDAGRO and SEA

Table A4.6: YUCCA Production and Consumption, 1960-78

Year	Production (1000 MT)	Exports (1000 MT)	Consumption[a] (1000 MT)
1960	153	-	153
1961	140	1	139
1962	148	1	147
1963	147	2	145
1964	153	2	151
1965	152	2	150
1966	153	2	151
1967	152	3	149
1968	155	3	152
1969	165	4	161
1970	170	4	166
1971	184	5	179
1972	195	5	190
1973	197	4	193
1974	192	4	188
1975	191	3	188
1976	198	12	186
1977	202	10	192
1978	206	5	201

Source: Central Bank

[a] Consumption includes losses which are estimated to be approximately 20 percent of production.

Table A4 .7: SWEET POTATO Production and Consumption, 1960-78

Year	Production (1000 MT)	Exports (1000 MT)	Consumption (1000 MT)
1960	87	0.3	86.7
1961	72	0.4	71.6
1962	76	0.4	75.6
1963	75	0.2	74.8
1964	77	0.3	76.7
1965	77	0.1	76.9
1966	77	0.1	76.9
1967	75	0.4	74.6
1968	78	1.1	76.9
1969	84	1.5	82.5
1970	87	3.5	83.5
1971	91	4.0	87.0
1972	95	2.5	92.5
1973	93	3.5	89.5
1974	92	3.6	88.4
1975	80	2.4	77.6
1976	105	4.8	100.2
1977	95	5.4	89.6
1978	97	6.7	90.3

Source: Central Bank and SEA

Table A4.8: POTATO Production and Consumption, 1960-78

Year	Production (1000 MT)	Imports (1000 MT)	Exports (1000 MT)	Consumption (1000 MT)
1960	6	-	0	6
1961	6	-	0	6
1962	8	2	0	10
1963	8	2	0	10
1964	15	2	0	17
1965	16	-	0	16
1966	18	1	0	19
1967	20	-	0	20
1968	20	0	0	20
1969	23	-	0	23
1970	23	0	0	23
1971	24	-	0	24
1972	25	0	0	25
1973	29	0	-	29
1974	30	-	0.1	30
1975	27	-	-	27
1976	29	-	0.9	28
1977	14	-	-	14
1978	9	-	-	9

Source: Central Bank and SEA

Table A4 .9: BEEF AND VEAL Production and Consumption, 1960-78

Year	Production (1000 MT)	Slaughter [a] (1000 MT)	Exports (1000 MT)	Consumption (1000 MT)
1960	24	20	-	24.0
1961	26	20	-	26.0
1962	23	15	-	23.0
1963	25	21	-	25.0
1964	25	19	-	25.0
1965	26	20	-	26.0
1966	26	21	-	26.0
1967	26	24	0.5	25.5
1968	30	24	5.1	24.9
1969	32	25	4.9	27.1
1970	32	22	3.4	28.6
1971	34	19	3.1	30.9
1972	37	22	6.9	30.1
1973	39	23	7.3	31.7
1974	39	26	6.7	32.3
1975	37	26	3.8	33.2
1976	40	27	6.0	36.0
1977	38	26	0.8	37.6
1978	45	27	1.0	43.5

Source: Central Bank, SEA

[a] Slaughter at slaughter houses reported by National Statistics Office.

Table A4 .10: PORK AND POULTRY Production, 1960-78

Year	Pork (1000 MT)	Poultry (1000 MT)	Mutton and Goat Meat (1000 MT)	Milk (million Liters)	Eggs (millions)
1960	10	18	1.0	246	128
1961	7	19	1.0	253	134
1962	7	20	1.0	260	140
1963	8	21	1.1	268	146
1964	9	22	1.1	276	153
1965	9	23	1.1	284	160
1966	9	24	1.2	293	167
1967	10	25	1.2	301	175
1968	10	26	1.2	310	187
1969	10	27	1.3	319	191
1970	11	28	1.3	329	199
1971	12	30	1.3	338	208
1972	15	31	1.4	348	218
1973	16	32	1.4	358	228
1974	18	30	1.5	369	238
1975	19	36	na	365	na
1976	19	37	na	383	na
1977	18	36	na	383	na
1978	19	43	na	394	na

Source: Central Bank and SEA

Table A4.11: GARLIC Production and Consumption, 1960-78

Year	Production (1000 MT)	Imports (1000 MT)	Consumption (1000 MT)
1960	2.8	0.8	3.6
1961	2.9	0.6	3.5
1962	3.1	0.5	3.6
1963	3.3	0.6	3.9
1964	3.4	0.9	4.3
1965	2.7	0.5	3.2
1966	4.1	0.6	4.7
1967	3.6	0.1	3.7
1968	3.4	0.6	4.0
1969	2.7	0.2	2.9
1970	3.6	0.3	3.9
1971	2.9	0.0	2.9
1972	2.5	0.1	2.6
1973	3.4	0.2	3.6
1974	4.1	0.0	4.1
1975	4.7	0.0	4.7
1976	2.4	0.2	2.6
1977	3.3	0.3	3.6
1978	2.3	0.1	2.4

Source: Central Bank and INESPRE

Table A4.12: ONIONS Production and Consumption, 1960-78

Year	Production (1000 MT)	Imports (1000 MT)	Consumption (1000 MT)
1960	11	1	12
1961	13	1	14
1962	13	2	15
1963	14	2	16
1964	16	-	16
1965	6	2	8
1966	8	2	10
1967	7	-	7
1968	5	-	5
1969	9	1	10
1970	10	-	10
1971	10	0	10
1972	11	0	11
1973	12	-	12
1974	10	-	10
1975	9	0	9
1976	7	0	7
1977	6	3	9
1978	19	-	19

Source: INESPRE and SEA

Table A4.13: PEANUT Production and PEANUT OIL Consumption, 1960-78

Year	Production [a] (100 MT)	Consumption of Peanut Oil [b] (100 MT)
1960	62	na
1961	43	na
1962	52	na
1963	48	na
1964	50	na
1965	45	na
1966	51	24.8
1967	45	23.4
1968	47	10.8
1969	73	19.3
1970	75	23.5
1971	80	27.5
1972	80	32.3
1973	72	39.0
1974	59	30.5
1975	51	25.7
1976	68	na
1977	42	na
1978	48	na

Source: Central Bank and SEA

[a] Peanuts in shell.

[b] Estimates by L. U. Hatch, "Production and Marketing of Peanut Oil in the Dominican Republic," M.S. Thesis, University of Georgia, Athens, Georgia, 1977.

Table A4 .14: Imports of EDIBLE OILS by INESPRE, 1960-78

Year	Peanut Oil MT	Soybean Oil MT	Cottonseed Oil MT
1970	5,467	6,439	-
1971	8,675	5,964	-
1972	13,640	5,142	3,959
1973	17,691	-	2,989
1974	6,251	10,419	12,824
1975	3,860	16,495	4,551
1976	8,000	24,000	-
1977	12,692	9,493	2,017
1978	5,862	21,425	10,376

Source: INESPRE

Table A4 .15: COFFEE Production and Consumption, 1960-78

Year	Production (1000 MT)	Exports (1000 MT)	Consumption (1000 MT)
1960	42	29	13
1961	33	20	13
1962	42	29	13
1963	41	28	13
1964	48	34	14
1965	39	25	14
1966	40	25	15
1967	37	22	15
1968	39	24	15
1969	44	28	16
1970	45	27	18
1971	44	25	19
1972	48	26	22
1973	59	35	24
1974	53	36	17
1975	62	45	18
1976	46	37	9
1977	61	40	21
1978	45	24	21

Source: Central Bank, SEA, and PIDAGRO

Table A4 .16: COCOA (BEANS) Production and Consumption, 1960-78

Year	Production (1000 MT)	Exports (1000 MT)	Consumption (1000 MT)
1960	43	26	17
1961	37	12	25
1962	35	19	16
1963	40	24	16
1964	41	26	15
1965	27	22	4
1966	29	26	3
1967	27	24	3
1968	29	25	4
1969	28	25	3
1970	38	34	4
1971	32	29	3
1972	36	32	4
1973	36	23	13
1974	38	27	11
1975	33	26	7
1976	33	25	8
1977	34	26	7
1978	36	28	9

Source: Central Bank, SEA, and USDA

Table A4 .17: TOBACCO Production and Consumption, 1960-78

Year	Production (1000 MT)	Imports (1000 MT)	Exports (1000 MT)	Consumption (1000 MT)
1960	27	0.3	15.2	12.1
1961	29	0.2	22.0	7.2
1962	25	0.5	18.2	7.3
1963	31	0.9	16.7	15.2
1964	28	0.4	25.3	3.1
1965	19	0.5	14.9	4.6
1966	20	0.5	12.7	7.8
1967	21	0.9	20.0	1.9
1968	16	0.8	16.5	0.3
1969	21	1.2	17.6	4.6
1970	22	0.7	19.5	3.2
1971	23	1.1	25.8	(-1.7)
1972	26	0.7	32.6	(-5.9)
1973	44	0.9	31.2	13.7
1974	38	0.9	42.3	(-3.4)
1975	18	1.2	31.4	(-12.2)
1976	35	1.2	33.0	3.2
1977	41	1.2	19.6	22.3
1978	43	1.2	36.1	8.1

Source: Central Bank, SEA, and PIDAGRO

Table A4.18: Prices of Principal Agricultural Exports: 1960-78
(RD$ per metric ton)

Year	Cacao	Coffee	Tobacco	Beef	Bananas	Dry Coconuts	Taro
1960	534	772	443	--	62	73	70
1961	430	715	427	--	70	63	50
1962	409	679	550	--	69	61	64
1963	469	676	503	--	72	74	64
1964	403	886	583	--	75	80	50
1965	283	859	625	--	71	84	56
1966	417	826	521	--	76	100	57
1967	487	767	517	593	46	85	105
1968	539	762	681	789	54	99	170
1969	810	766	704	874	50	95	135
1970	557	1023	714	989	86	96	89
1971	432	898	768	960	73	99	92
1972	496	932	897	989	65	98	110
1973	847	1127	946	1373	60	98	167
1974	1669	1264	922	1408	55	208	172
1975	1132	1364	1095	1224	61	217	183
PROJECTIONS							
1976	1832	2395	1151	1352	71	284	252
1977	3640	4030	1427	1324	88	254	250
1978	3086	3542	1226	2175	83	258	249

Source: Central Bank, Boletin Estadistico - CEDOPEX

Chapter 5

ORGANIZATION AND PERFORMANCE OF THE FOOD MARKETING, INPUT SUPPLY, AND CREDIT SYSTEMS

This chapter is divided into five major sections. The first section provides a general orientation of the organization and operation of the food marketing system. The second provides more detailed information on the marketing of major food products. The third summarizes some of the major conclusions drawn from the SEA/IICA marketing studies and outlines some potential programs of possible interest to AID and other donors.[1/] The fourth section discusses the role played by the Government in establishing food prices and marketing agricultural products. Agricultural input utilization and credit systems are described in the fifth section. Little or no attention is given to several of the major export crops, such as sugar and coffee, or to some products that may have considerable future potential for export or increased domestic consumption, such as fish. The products not covered have not yet been carefully investigated by the SEA/IICA marketing group or presently seem likely to be of less importance in programs designed to benefit smaller farmers.

[1/] Beginning in 1975, the Secretariat of Agriculture (SEA) in cooperation with the Inter-American Institute of Agricultural Sciences (IICA) has been carrying out a number of studies to provide a diagnosis of food marketing in the Dominican Republic. The general objective of these studies was to prepare a National Plan for Agricultural Marketing consistent with the National Plan for Social and Economic Development. These studies constitute, by far, the most significant research done in recent years on the food marketing system. This assessment of food marketing draws heavily on the SEA/IICA studies. The reports of these studies have been published by the Sub-Secretaria de Producción y Mercadeo, Departamento de Economía Agrícola; Proyecto Comercialización Integrado (SEA/IICA).

5.1 Organization and Operation of the Food Marketing System

5.1.1 Marketing Subsystems for Food Producers

In overall terms, the country's food marketing system can be conceptualized as a set of five loosely related subsystems identified as:

1. local
2. regional
3. interregional
4. agro-industrial
5. export

Within each subsystem there are both "small farmer" and "large farmer" marketing channels. A given product may be marketed in several (or all) of the subsystems.

Products which move from the producers in a region to nearby towns are said to move in the local subsystem. These products are frequently sold directly by producers to consumers in municipal public markets. As a general rule, fewer intermediaries are involved in local marketing than in the other subsystems.

When products move between municipalities within a region they are said to move in the regional subsystem. In many cases full-time traders who move between municipalities on a fixed "market day" schedule are key participants in the regional market subsystem. Many of these traders deal primarily in non-food household goods such as clothing.

The interregional subsystem consists of the marketing channels that move food products from a region in which they are produced to a different region in which they are consumed. A large portion of the food in the interregional subsystems passes through the wholesale markets in Santo Domingo.

There is very little information on the quantity of food that moves in each of these geographically defined subsystems. It is difficult at times even to separate the subsystems. In a municipal public market a consumer might frequently buy food items that have moved through local, regional, and interregional subsystems. In the food system, some merchants act as retailers in one subsystem and wholesalers in another.

As a general rule, going from local to regional to interregional subsystems, the market intermediaries deal in larger volumes, are better financed, and have better market information. In short, the intermediaries in the interregional systems usually have more market power than those who deal primarily in the regional or local systems. Increased market power provides the opportunity to increase marketing profits either through higher consumer prices or lower producer prices. While this description greatly simplifies the geographic marketing channels, in which there are a series of intermediaries each with different sources and degrees of market power, this conceptualization nevertheless makes it obvious that government marketing programs cannot benefit both consumers and producers simultaneously unless the programs can either improve the economic efficiency of the markets or reduce the market power of the intermediaries without reducing their economic efficiency.

The key marketing participants in the agro-industrial subsystem are a set of firms engaged in processing and wholesaling of food products. These firms basically specialize in a limited number of products although a few process a fairly wide line of vegetable and fruit products. Many

of the food processing firms offer the farmer technical assistance, credit, and inputs in return for sales agreements at predetermined prices. Some farmers sell almost all of their output on a contractual basis to food processing firms. Although the food processing firms may not provide these farmers with the greatest possible returns on land or labor, they do provide an opportunity for them to reduce some risks by providing a fairly secure market at a guaranteed price. The reduction in marketing risks plus the incentives of credit and technical assistance are particularly appealing to small and medium sized farmers.

The export subsector includes a wide variety of marketing channels and arrangements between exporters, individual producers, wholesalers, and producers' associations. In some cases exporters provide credit, technical assistance and marketing services in order to assure a supply of farm products that meet export standards. In other cases, the exporters provide almost no services other than keeping track of the amount of products placed on the boat. For most food exports both the potential risks and rewards are high. Small and medium sized farmers seldom can participate in export markets except through associations. Such associations have to be well capitalized and managed if they are to gain the potential rewards of export marketing for their members.

The "subsystem" approach to conceptualizing the food marketing system allows the policy analyst to identify different types of market interventions the government could undertake to improve the efficiency of the marketing system or alter the market power of the participants. For example, promoting standard weights and measures may benefit producers and consumers in local, regional and interregional marketing. Or, changing the criteria

or procedures for granting export licenses could substantially alter market power relationships in the export subsystem.

Smaller farmers encounter their most serious marketing problems in dealing with the regional and interregional subsystems. In these markets they have relatively little market power, and frequently are at a disadvantage in competition with larger producers. The intermediaries in the regional and interregional markets have better market information, great access to or control over transportation, and frequently a degree of control over retailers. For some products, the larger farmers produce primarily for food processing firms or export markets and are in a position to "dump" surplus of lower quality production into regional and interregional markets in competition with smaller farmers. In some cases, larger farmers have better access to farm inputs, greater availability of credit at lower cost, and better land, thus allowing them to produce at a lower per-unit cost than small farmers and providing them with a competitive advantage in the market place. Government programs that provide small farmers with better market information, improved roads, and greater access to public markets improve their market position relative to that of the intermediaries. Programs designed to improve access to farm inputs, increase the availability of credit, and improve the quality of their land can help smaller farmers improve their competitive position relative to larger farmers.

5.1.2 The Marketing System Affecting Consumers

Viewing the food marketing system from the standpoint of consumers, a distinction between rural and urban markets is useful. The term "rural markets" as used here applies to all markets outside of the major urban

centers. It is estimated that approximately 64 percent of the nation's consumers purchase their food in "rural" markets. Available price data suggests that these consumers usually pay 10 to 20 percent more for their food than do urban consumers. This appears to be largely due to the structure of the wholesale operations, which result in food being transported first to the major wholesale markets and then returned to the smaller "rural" markets. This results in higher handling costs, increased transportation costs, and larger wholesaling margins.

In the urban centers, public markets are a major source of food for consumers of all income levels. Many of these markets are fairly old, crowded, and leave much to be desired in terms of sanitation. They are frequently controlled, in large part, by a small number of wholesalers or wholesale-retailers and operated through long established traditional rules that determine entry into the market, grades and standards, price structures, terms of credit, etc. Given the infrastructure and traditions, the public markets are reasonably efficient and frequently provide urban consumers with better food at lower prices than do small retail stores and supermarkets. Comparative pricing for meat, as an example, suggests that consumers may pay 30 to 40 percent more for meat purchased in supermarkets than in public markets.

Public markets are of greatest benefit to consumers living relatively near the markets. For consumers living relatively far from the public markets, transportation and time-opportunity costs frequently offset the price advantages, particularly when food is purchased daily in relatively small amounts. In Santo Domingo the population has grown rapidly during the past ten years, the city has spread out, and there has been relatively little investment in the public market system.

As a result, some parts of the city lack adequate public-market food outlets. This deficiency is particularly relevant for the lower-income neighborhoods on the outskirts of the metropolitan area. The indirect consequence has been increased pressure on the government for price controls of basic foods, and for special programs to provide subsidized food to low-income groups.

The SEA lists 103 public markets nationwide. Of these, 11 are classified as metropolitan markets, 25 as provincial markets, and the remaining 77 as smaller municipal or rural-town markets. Of the 11 metropolitan markets, 7 are in Santo Domingo and 4 in Santiago. Roughly half of the public markets are considered to have reasonably good physical facilities. The remainder are in poor repair. Nearly all of the markets are crowded, regardless of the quality of their facilities.

Excluding the markets in Santo Domingo and Santiago, the Government has invested approximately RD$1,250,000 in the construction of 45 public markets in the past 15 years. Many of the newer markets are reported to be in a poor state of repair or little used.

The administration of most public markets leaves much to be desired. Of the 103 public markets, 77 are rented to the private sector, 23 are administered by municipalities, and 3 seldom operate. The costs of market services such as building maintenance, water, and cleaning usually must be covered by rental of space to retailers and wholesalers. The rents apparently seldom cover the cost of an adequate level of market services. To the extent that lack of market services add to wholesalers' and retailers' costs, such costs are largely passed on to consumers in the form of higher prices or lower food quality.

The public marketing system in Santo Domingo is a particularly important component of the national marketing system. The merchants in these markets not only have a substantial influence on the prices and quality of food available to the Santo Domingo area but also control large amounts of the food eventually transported and consumed elsewhere in the nation. They are particularly influential in the pricing of fruits, vegetables, and root crops.

There are three major wholesale markets in Santo Domingo. The numbers of wholesalers and retailers operating in these markets are:

Market	Wholesalers	Retailers
Nuevo	404	1,046
Modelo	112	355
Villa Consuelo	50	461
TOTAL	566	1,862

The Nuevo and Modelo markets handle approximately 44 percent of the overall wholesale volume of food in Santo Domingo. For some products, the percentages handled in the two major models are higher. The two markets account for 88 percent of the wholesale volume of roots and tubers, 83 percent of vegetables, and 59 percent of fruits. It is obvious that any efforts to expand, modernize or relocate the Nuevo Market could have a very significant influence on the price and availability of food both in Santo Domingo and elsewhere in the country. A reasonably detailed study of the administration and marketing conditions in the Nuevo market should be undertaken before any major physical market improvements are considered. Of particular interest would be the relationships between the merchants operating within the Nuevo market and those

controlling food storage, processing, and packing facilities in the area surrounding the market.

The 1976-77 household budget survey showed that families in Santo Domingo with a monthly income of less then RD$100 spend about 54 percent of their income on food while those with over RD$400 spend 38 percent of their income on food.[1/] Families with high incomes prefer to shop in supermarkets, at public markets, or purchase food from street vendors. Low income families, on the other hand prefer to purchase from small neighborhood stores. One of the major factors involved in the low-income consumers' decisions on where to purchase food is the availability of credit. The small neighborhood stores provide credit; supermarkets and public markets generally do not. For higher-income consumers, supermarkets offer a wide variety of products and more pleasant shopping conditions for which they are willing to pay a higher price. Public markets offer better quality fruits and vegetables at lower prices. The time-opportunity costs of using public markets are considered fairly low for families that have maids to do the shopping.

Lower-income families in Santo Domingo shop more frequently and purchase smaller quantities than do higher-income families. Approximately 55 percent of low-income families purchase food daily compared to only 14 percent of the higher-income families.

[1/] Central Bank, Household Income and Expenditure Survey 1976-77, preliminary data.

Helping low-income consumers obtain better food at lower prices through marketing improvements is as, or even more, difficult a task than that of increasing the market power of small farmers. Consumers' food associations or cooperatives can help in some cases. Nevertheless, any retail operation that sells food in small quantities on credit must cover the related costs through higher prices. Low-income consumers are likely to benefit more from programs that reduce food prices through increased production or improved efficiency of food marketing than from programs designed to put the neighborhood food outlets out of business.

5.2 Food Consumption Patterns by Income Level

As a result of the inequality in income distribution, nearly 75 percent of the population consume less than the recommended levels of proteins and calories. Cereals and legumes, primarily beans and rice, provide the largest source of calories for all income levels. Tubers are a particularly important source of calories for the rural poor. Plantains are the second most important source of calories for the poor. The importance of sugar, meat, milk, and oils as sources of calories increases with income levels.

Cereals and legumes are also the most important source of protein for lower income groups. Families with less then RD$50 monthly obtain over 50 percent of their proteins from these sources, primarily beans and rice. Meat and mile provide nearly 58 percent of the total protein of the high income families but only 28 percent of the protein for the

for the lowest income families.[1/]

The poorest of the rural poor rely very heavily on locally produced foods. Small rural stores carry very little fresh produce but do stock domestically produced canned foods along with imported items. Improvements in the food marketing system can benefit small farmers who sell part of their production, but the primary beneficiaries are more likely to be the urban poor.

5.3 Marketing Grains and Beans

The three basis grains are rice, corn, and wheat. Rice is the most important food grain. During the past five years, approximately 18 percent of the total rice consumed has been imported. All wheat is imported. Corn is used both for human consumption and animal feeds, particularly poultry feeds. In recent years, roughly 40 percent of the corn has been imported. The difference sources and uses of the basic grains results in substantially different marketing channels.

5.3.1 Rice

Three-fourths of total rice production comes from farms of less than five hectares in size. The smallest rice farmers, those with less than one-third hectare, sell half or less of their production. Larger farmers, those with over 6.7 hectares, usually sell at least 95 percent of their production.[2/]

[1/] Secretaria de Estado de Agricultura, Diagnostico y Estrategia del Desarrollo Agropecurio 1976-1986. Santo Domingo, R.D., 1976 and USAID/Dominican Republic, Health Sector Assessment for the Dominican Republic, Santo Domingo, R.D., 1975. More data on consumption patterns by income groups will be available when the results of the 1976-77 household consumption survey are released by the Central Bank.

[2/] Based on SEA data.

Rice prices are controlled by the public food marketing and price control agency, INESPRE (Institute for Price Stabilization).[1/] Responsibility for controlling rice prices was given to INESPRE in 1973. It handles the distribution of rice from rice fields to wholesalers. It also controls rice imports and operates a number of grain silos and warehouses. Rice production purchased by INESPRE has risen to almost 90 percent in recent years (Table 5.1).

There are 127 rice mills in the country with an estimated annual milling capacity of 275,200 MT (based on 250 operating days of 8 hours) (Table 5.2). Many of the mills produce a good to high quality rice, reasonably clean and with a relatively low percentage of broken grain. Although the mills operate most of the year, their major production is during the harvest period of June-February. Some double cropping is undertaken by medium and large rice farmers, while smaller farmers often let the summer crop ratoon which is harvested three months after the first harvest.

Marketing margins for rice are lower than for most other agricultural products. The SEA/IICA studies suggest that rice producers receive over 72 percent of the retail price of rice. Truckers' margins are 1.7 percent, wholesalers receive 3.5 percent, and retailers 12.6 percent (See Table 5.3). The margins reported by SEA/IICA should be viewed as rough estimates. Marketing margins, particularly at the farm level, tend to vary widely between markets and throughout the year. Small farmers generally receive a lower proportion of the retail rice price. The apparent low margin

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[1/] The operation of INESPRE is reviewed later in this chapter.

Table 5.1. Rice Purchases by INESPRE

Year	Rice Production (000 MT)	INESPRE Purchaser (000 MT)	Percent
1975	199	133	67
1976	192	144	75
1977	198	176	89
1978	213	189	89

Source: INESPRE, Statistics Division

Table 5.2. Number and Capacity of Rice Mills, 1979

Zone	Number of Mills	Milling Capacity (MT/tons)
Northern	21	48.9
Northeastern	24	32.3
Southwestern	23	29.5
Central	26	13.9
Northwestern	11	7.3
Eastern	19	5.0
Southern	3	0.7
	127	137.6

Source: INESPRE, Statistics Division

Table 5.3. Marketing Margins and Returns to Producers for Grains and Beans

Market Level	Rice	Corn	Beans
	(percent of retail price)		
Producer	72.5	66.5	71.0[c/]
Trucker[a/]	1.7	6.0[b/]	10.0
Processor	9.1	---	---
INESPRE	0.6	---	---
Wholesaler	3.5	7.5	4.0
Retailer	12.6	20.0	15.0
Total	100.0	100.0	100.0

Source: SEA/IICA

[a/] Margins for truckers include margins of rural collective agents from whom truckers buy.

[b/] Includes margins of corn shellers.

[c/] Estimated margin for red beans. Margins for other types of beans vary somewhat.

of INESPRE does not reflect its total operating costs. Its margin is low because its operations are subsidized by the government.

Over time, the effectiveness and efficiency of the rice marketing system will be determined largely by INESPRE's price policies and the extent to which it is able to enforce those policies. Through its price policies, INESPRE can encourage or discourage rice production, alter the flow of investment capital into the rice milling industry, and affect the quality and quantity of rice available to consumers. INESPRE's price policies and the way those policies are implemented are likely to have a greater effect on the income and welfare of small rice farmers than rice marketing programs directed to small farmers.

5.3.2 Corn

Animal feed is the most important use of corn, although 25-35 percent is used directly for human consumption. The most important production areas are in the northwestern part of the country where corn is harvested during the October-April period.

A great variety of marketing channels and intermediaries are involved in corn marketing. The producer ususally sells to a trucker or takes his corn directly to a local corn sheller or collection center. Some producers sell to their cooperative or farmer association. INESPRE buys a small portion (3-5 percent) of total production, which is then mostly sold to feed firms in an effort to stabilize prices. Corn shellers, truckers, and cooperatives sell from 8 to 15 percent of their corn to wholesalers in public markets and the remainder to feed producers. The truckers and corn shellers are by far the most important market outlets available to

most farmers. They handle at least 90 percent of total corn marketed. Of this 90 percent, the truckers probably control 50 to 60 percent and the corn shellers 30 to 40 percent.

Neither truckers nor corn shellers use set standards of classification. Farmers receive the "market price" with discounts being based on the moisture content and amount of extraneous material in the corn. SEA/IICA estimates that producers receive roughly 66.5 percent of the retail price, truckers and shellers 6 percent, wholesalers 7.5 percent, and retailers 20 percent (Table 5.3). The lower returns to farmers for corn compared to rice reflect, in part, the market power of the feed processors and the lack of major market activities by INESPRE.

Corn prices have been less stable than rice prices. During the 1968-72 period, wholesale prices rose gradually. They increased 16 percent between 1972 and 1973 and by 46 percent during the 1973-76 period. The rapid increase in corn prices between 1972 and 1976 reflects changes in the world price of corn and the country's heavy dependence on corn imports. Wholesale prices of corn in the Santo Domingo markets are usually lowest in September--the peak of the harvest season--and highest in June, just before harvest begins. The seasonal price index for the 1968-76 period was 85 in September and 129 in June. This price spread is more than adequate to cover storage costs. In recent years, purchase of corn in March for sale in June would almost consistently have provided an excellent return on the costs of storage.

5.3.3 Beans

Beans are grown throughout the country. In recent years 20-25 percent of beans supplies have been from imports of pinto beans from the United States.

Prior to August, 1975, marketing channels for beans were somewhat similar to those for corn, with the differences primarily in the percentage of beans moving through various market participants. Truckers played an important role. In August, 1975 INESPRE was designated as the exclusive buyer and seller of beans. With the entry of INESPRE into the market, producers' returns fell, roughly from 75 percent to 65 percent of retail price, mainly as a result of INESPRE's actions to reduce consumer prices of beans and as a result of increased production. Bean prices declined from a high of RD$72 per quintal in the drought month of October 1975 to RD$37 per quintal a year later.

Red bean prices in 1976 ranged from a low of RD$28.64 per quintal to a high of RD$42.78. Traditionally, bean prices have been highest in October, just before harvest, and lowest in December and January. Price swings are more than adequate to cover annual storage costs. Purchase of beans in August for sale in October would have consistently provided a handsome profit during the past ten years.

In 1972 INESPRE signed a contract to export 10 MT of black beans to Venezuela over a two-year period. Production was not sufficient to fulfill that contract. Nevertheless, Venezuela remains a potential market for black bean exports.

5.4 Fruits and Vegetables

5.4.1 Plantains

Plantains are produced year-round throughout the country. Total production varies by roughly 20 to 30 percent from the "peak" to "low" production periods. There are two general types of plantains of major

importance, the "Cibao" and "Barahona", that vary in size, texture and weight. In general, the types are of most importance in the regions after which they are named.

Farmers usually sell their plantains directly to rural collection agents or truckers. Plantains sold to rural collection agents are resold to truckers who in turn sell them to wholesalers. From the wholesalers, plantains move into a wide variety of retail outlets from street merchants to supermarkets. Small quantities of plantains were exported to the United States, Puerto Rico, and the Virgin Islands in the early 1970s. The value of annual exports ranged from between RD$100,000 to RD$400,000. Exports are regulated by the Dominican Center for Export Promotion (CEDOPEX) and have recently been suspended to protect domestic suppliers.

Producers' receive 40 to 47 percent of the retail price depending on type of plantain (Table 5.4). Retail margins average 30 to 40 percent. Truckers earn 7 to 20 percent depending on the types of services rendered to the farmer. Wholesalers average 7 to 10 percent. The high margins at the retail level reflect substantial losses to plantains due to spoilage at the end of the marketing chain. At least part of these losses could be reduced by more careful handling of plantains at the earlier stages of marketing.

Market prices for plantains can vary considerably during the year. The seasonal index of wholesale prices in Santo Domingo for the 1968-76 period ranges from 74 in July to 133 in January. Prices are low during the June-August period and high during the December-February period. The average annual price of "Barahona" plantains increased by 77 percent between 1972 and 1973 and by 327 percent between 1972 and 1976. Prices for

"Cibao" type plantains increased by 264 percent during the 1972-76 period. As a result, the wholesale price differential between these two major types has widened substantially since 1972.

5.4.2 Yucca

Yucca is grown throughout the country. At least half of the yucca produced never enters commercial marketing channels but is consumed at home by producing families. As a result of the dozen or so varieties of yucca grown in the Dominican Republic - with production periods ranging from 6 months to a year - this root is harvested throughout the year. Production usually is greatest during the August-December period and drops off during the February-April period.

Yucca prices in the Santo Domingo wholesale market increased by 70 percent during the 1972-76 period. A substantial part of this increase can be attributed to the drought of 1975 and the resulting high prices during the period from September 1975 to June of 1976. Prices during the first half of 1977 were considerably below those of the first half of 1976. Prices usually are lowest in October and highest in February with the seasonal wholesale price index ranging from 79 to 131 during this period.

Most of the yucca entering commercial marketing channels moves from farmer to trucker to a wholesaler in the public market. Approximately 2 percent of total production is exported. A small amount of yucca is handled by food processors. Some canned yucca, for example, is exported. Of the yucca consumed on the farm, part is used for human consumption and the remainder fed to animals. Producers receive roughly 60 percent of the retail price, truckers 11 percent, wholesalers 4 percent, and retailers 25 percent (Table 5.4).

Table 5.4. Marketing Margins and Returns to Producers for Fruits and Vegetables

Market Level	Plantains	Yucca	Sweet Potato	Potatoes	Fresh Tomatoes	Red Onions	Garlic	Oranges
				(percent of retail price)				
Producer	6.6[b/]	60.0	46.0	40.0	46.0	73.0	60.0	50.0
Trucker[a/]	6.7	11.0	16.0	17.0	-	7.0	16.0	7.0
Wholesaler	6.7	4.0	5.0	5.0	4.0	2.0	2.0	10.0
Retailer	40.0	25.0	33.0	38.0	50.0	18.0	22.0	33.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: SEA

[a/] Trucker's margin includes rural collection agent's margin.

[b/] For "Tipo Barahona" plantains. Farmer's margin for "Tipo Cibao" is only 40 percent.

5.4.3 Sweet Potatoes

Marketing channels for sweet potatoes are very similar to those for yucca. An estimated 64 percent of the production is marketed, roughly 30 percent is consumed on-farm, and the remainder fed to animals. The seasonality of production of sweet potatoes is somewhat different than that of yucca. As a result, sweet potato prices tend to be low when yucca prices are high, and high when yucca prices are low.

Per captia consumption of sweet potatoes declined from 50.6 pounds per year in 1961 to 41.4 pounds in 1973 and then dropped sharply to 26.7 pounds in 1974 and 19.5 pounds in 1975. The large drop in average consumption in 1975 was in part due to poor harvests. Nevertheless, the declines in per capita consumption over the entire period are a reflection of more general changes in the "typical" Dominican diet. The more rapid changes since 1972 support the general observation that Dominican diets, particularly of lower income groups, have changed substantially in the last five years.

Marketing margins for sweet potatoes are substantially different than those for yucca. The producer receives roughly 46 percent of the retail price, truckers 16 percent, wholesalers 5 percent, and retailers 33 percent (Table 5.2).

5.4.4 Potatoes

Potatoes follow roughly the same seasonal production patterns as sweet potatoes. Seasonal price patterns are also very similar except that potato prices show a wider range of price fluctuations. The wholesale price index for Santo Domingo, for example, ranges from a low of 75 in

September to a high of 164 in January. Between September 1975 and January 1976, potato prices increased by 97 percent. During the same period a year later the price increase was 130 percent. Although these seasonal price increases are substantially greater than previously and due, in part, to special reasons (droughts in 1975 and difficulties of importing seed in 1976), they clearly illustrate the potential profitability of potato storage.

Potato producers receive 40 percent of the retail price. Truckers and rural collection agents receive 17 percent, wholesalers 5 percent, and retailers 38 percent (Table 5.4). A number of potato producers are large enough to sell directly to wholesalers in Santo Domingo. Approximately 25 percent of total production moves directly from producer to wholesaler. Truckers handle 73 percent of marketed production, and cooperatives the remaining 2 percent. At the retail level, supermarkets sell 27 percent of the potatoes, street merchants 20 percent, and 48 percent are sold in public markets or small neighborhood stores. Five percent of production is "industrialized" and sold as potato products, such as potato chips.

The high marketing margins for potatoes are partly due to poor handling and lack of adequate storage facilities, both of which result in substantial marketing losses. In a study of wholesalers' losses it was found that, after 48 hours of "storage" in the wholesale market, losses amounted to 7.5 percent. Such losses reflect poor handling that usually extends back to the farm gate. Rough roads, stacking potatoes too high, frequent moving of sacks from one buyer to the next, and continuous sorting and resorting at various market levels all contribute to marketing losses.

Potatoes usually cost urban consumers at least twice as much as sweet potatoes and from 50 to 100 percent more than yucca. This, plus the fact that they are not grown as widely, accounts for the low average per-capita consumption of potatoes. Average daily consumption of potatoes per person for families with less than RD$50 monthly is only 0.016 pounds compared to 0.290 pounds for yucca and 0.75 pounds for plantains. As incomes increase, potato consumption increases while consumption of yucca and sweet potatoes drops.

5.4.5 Tomatoes

Although tomatoes are not a tpyical "small farm" crop, 95 percent of production comes from farms with less than 3.3 hectares. The production of tomatoes is a relatively highly capital-intensive operation requiring a high level of technical farming skills. Tomatoes for fresh consumption and processing are produced in the Dominican Republic. Both fresh tomatoes and canned tomato paste are exported (Table 5.5).

Producers play a more direct role in marketing tomatoes than for most other food products. They sell 93 percent of the fresh tomatoes directly to the wholesalers and 98 percent of the industrial tomatoes move directly to processing companies. The extent of direct marketing by producers is partly determined by the highly perishable nature of the product. Tomatoes have a fairly short market life. Thus producers cannot rely entirely on traveling truckers who may or may not be present when the tomatoes are ready to be marketed. Rural collection agents handle only 7 percent of fresh tomato production and most of this is high quality tomatoes for export.

Table 5.5. Tomato Exports

Year	Fresh (MT)	Paste (MT)
1973	1,268	135.4
1974	1,528	5,254.8
1975	2,318	4,107.7
1976	1,841	428.0
1977	3,296	660.2
1978	2,082	243.5

Source: Centro Dominicana de Pronoción de Exportaciones

Farmers' receipts for fresh tomatoes are estimated to be 46 percent of retail price. Wholesalers receive 4 percent and retailers 50 percent. The high margins at the retail level reflect high losses more than excess profits. If more and better sorting were done at the farm level and tomatoes were handled with greater care between the farmer and the retailer, the farmers' receipts could be higher and the retailers' margins lower.

Marketing losses between the farmer and retailer have been estimated to be nearly 15 percent. Roughly half of these losses can be attributed to careless handling. The other half are due to insects, diseases, and miscellaneous causes. (These figures probably underestimate the full losses due to careless handling because a part of these losses can not be observed.)

Credit is very important for tomato producers. Not only is the initial planting expensive but heavy use is made of chemical inputs (fertilizer and insecticides). As a result, the control of credit is an important factor in marketing. Processing companies use credit and production contracts to assure a supply of industrial tomatoes. Exporters of fresh tomatoes frequently extend credit to rural collection agents who in turn earn a fixed commission on tomatoes purchased for the exporter.

Average annual wholesale market prices for fresh tomatoes were approximately 15 cents a pound during the 1974-76 period. The prices varied during this period from 9 to 28 cents per pound. Prices usually are lowest in March, with a seasonal index of 69 and highest in October, with a seasonal index of 142.

The price of industrial tomatoes purchased by private processing plants is set by the Government. The 1977 price, for example, was fixed at RD$1.95 per quintal. This compares with an estimated average production cost for 1975-76 of RD$1.23 per quintal. The government has set the price for industrial tomatoes since 1966, balancing the interests of the Agrarian Reform Settlements which produce tomatoes and other producers in higher prices against the wishes of processors for lower prices.

It seems unlikely that Government sponsored programs would accomplish much in terms of improved efficiency in the marketing of industrial tomatoes. A program to encourage better handling of fresh tomatoes, on the other hand, potentially could result in better quality tomatoes to consumers at lower prices and improved returns to growers.

5.4.6 Onions

It is estimated that 70 percent of the national production of onions is marketed through wholesalers in Santo Domingo. INESPRE handles a small amount of the national production in an effort to set floor prices for both red and yellow onions. It is both an importer and exporter of onions. The marketing channels for onions differ from on region to another. In some areas producers market at least 50 percent of their onions directly to wholesalers. In other regions, farmers sell mostly to truckers who in turn, sell to wholesalers, supermarkets, and small neighborhood stores ("colmados").

Producers reportedly receive 73 percent of the retail price of onions (Table 5.4). Truckers or rural collection agents receive a 7 percent margin. Wholesalers receive 2 percent and retailers 18 percent.

Market prices for onions vary considerably during the year. The wholesale seasonal price index for red onions, as an example, ranged from

a low of 52 in April to a high of 156 in January. Market prices are usually well above the floor prices set by INESPRE. The price structure for onions suggests that improved storage of onions would help reduce seasonal price fluctuations. In addition, short-term forecasting of production plans could help even-out some of the market surpluses.

5.4.7 Oranges

Three types of oranges are produced: sweet oranges, sour oranges, and juice oranges. Although oranges are grown fairly widely, the majority of the production comes from a limited number of production zones such as San Cristobal, Hato Mayor, and Higuey. Production costs tend to be high in part because of poor management and old trees and in part because of the high costs of controlling diseases and birds. SEA estimates that, with good orchard management and high yielding varieties, orange production could be highly profitable.

At least 90 percent of the unprocessed oranges are sold first to truckers or rural buyers who in turn sell to wholesalers. These are primarily sweet and juice oranges. Many of these oranges are purchased before harvest with the buyer taking the risks of production losses due to bad weather, etc. The cost to the farmer is a lower price. Many of the processed oranges, mainly sour and juice oranges, are picked up at the farm by the processor's trucks.

The distribution of the retail price for fresh oranges is estimated to be: 50 percent to producers, 7 percent for truckers, 10 percent for wholesalers, and 33 percent for retailers (Table 5.4). Public markets and street vendors are the most important retail outlets. Supermarkets and small neighborhood stores are of secondary importance.

Small quantities of both fresh and processed oranges are exported. In 1976, CEDOPEX[1/] reported exports of fresh oranges to be 112,529 kgs. and processed oranges of 54,770 kgs. Exports of fresh oranges has declined since 1973, while processed orange exports have increased.

Orange prices fluctuate widely during the year. The seasonal wholesale price index of juice oranges in Santo Domingo ranges from a low of 56 in October to a high of 170 in May. Orange processors purchase most heavily during the period of lowest prices, from August to December. Nevertheless, their purchases are inadequate to substantially reduce the seasonal price variations of fresh oranges.

5.5 Livestock and Poultry Products

5.5.1 Beef

Small farmers with only 1 or 2 head of cattle to sell usually sell them to a cattle buyer on the basis of a weight estimate and are paid immediately. Larger cattle producers transport their cattle to a weighing point where they are sold to buyers on the basis of actual weight and receive payment 5 to 7 days later. There are several different types of cattle buyers in rural areas. Some buy primarily from larger farmers on a commission basis for slaughter houses. Small meat retailers and larger slaughter houses also buy some cattle directly from farmers.

There are a wide variety of beef "processors". Some small butchers slaughter cattle in their patio for sale in the local market. Roughly one percent of the cattle are processed in this fashion. Local public slaughter

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[1/] CEDOPEX, Centro Dominicana de Pronoción de Exportaciones, is a government agency responsible for encouraging exports of non-traditional products.

houses dress cattle for wholesalers and larger retailers for a fixed fee. Private slaughter houses dress cattle for local wholesalers and retailers. Four large private slaughter houses are authorized to export beef. It is estimated that 64 percent of the cattle are slaughtered in the Santo Domingo area, nearly 15 percent in La Altagracia, and 11 percent in Santiago. The remainder are slaughtered throughout the country, primarily in La Vega, San Francisco de Macorís, and Duarte.

Producers receive about 44 percent of the retail value of meat (Table 5.6). Local buyers receive 2 percent, slaughter houses and processors receive 22 percent, wholesalers 6 percent, and retailers 26 percent. Most slaughter houses prefer to sell to beef wholesalers rather than directly to retailers who frequently require the credit and delivery services provided by wholesalers.

Most slaughter houses currently are working at less than full capacity. Nevertheless, with the increases in production projected in Chapter 4, an increased slaughtering capacity is likely to be needed by the early 1980s.

Farm prices of live cattle increased from RD$0.12 per pound in 1962 to RD$0.33 in 1976, with the most rapid rate of increase occuring since 1971. Retail meat prices are usually lowest in the public markets and highest in the supermarkets. The price differences probably reflect some differences in quality of beef and also a wider selection of cuts, retail packing, and convenience. As an example, a good cut of beef (Tipo "Bola") was selling in late 1976 for RD$0.90 per pound in the public Mercado Modelo of Santo Domingo and RD$1.30 per pound in supermarkets.

The SEA/IICA studies have identified a number of market improvements needed in meat marketing. At the farm level, producers frequently lack

Table 5.6 Producers' Share and Marketing Margins for Livestock and Poultry Products

Market Level	Beef	Crude Milk	Pasteurized Milk	Live Chickens	Chickens	Eggs
		(percent of retail price)				
Producer	44.0	70.0	64.0	81.0	86.0	86.0
Trucker	2.0	-	-	-	-	-
Processor[a/]	22.0	-	24.0	7.0	6.0	-
Wholesaler	6.0	11.0	-	-	-	5.4
Retailer	26.0	19.0	12.0	12.0	8.0	8.6
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: SEA

[a/] Processors' margin includes transportation costs and some wholesale costs.

up-to-date information on market prices. Useful price information is particularly difficult to provide, however, when there are substantial differences in the types of cattle marketed, the way in which they are fed, and how they are transported from farm to market. All of these factors affect quality of product, dressing weights, and market prices. Many of the slaughter houses, especially the smaller local facilities, operate at a minimum level of sanitation. A general shortage of cold storage facilities is considered to be a particularly serious problem at the retail level. Finally, it is believed that retailers frequently sell consumers less beef than the market scales indicate or that, if true weights are used, officially established prices are ignored.

The official price was fixed at RD$0.98 per pound in 1978. However, a reduction in market supply of meat made it difficult to maintain the fixed price. Meat supplies usually increase in fall and winter months when pastures are less abundant.

5.5.2 Milk

It is estimated that approximately 59 percent of the milk produced is consumed as fresh milk, 19 percent is processed as canned or pasteurized milk, 10 percent is used for cheese, and the remainder lost or fed to animals.

Most of the milk marketed is produced on fairly large farms. Roughly 98 percent of total marketed production is from herds of 25 cows or more. Over 50 percent of national production comes from the Central and Northern Zones.

Producers sell 51 percent of their marketed milk to wholesalers, 19 percent to milk processors, 10 percent directly to consumers, 14 percent

to retailers and the remaining 6 percent is sold to other outlets or processed on farm as cheese. For fresh milk, the producers' share is 70 percent, wholesalers earn 11 percent, and retailers 19 percent of retail value. For pasteurized milk the producers' share is 64 percent, processors receive 24 percent, and retailers earn 12 percent.

There were seven major milk processing plants in operation in 1977 and four plants not in use. The plants in operation were being utilized at 35 to 90 percent of their capacity. Milk processors believe there is adequate demand to allow fuller utilization of capacity. They see the problem as lack of adequate milk supplies. The lack of supplies can be explained partly by the price structure of milk marketing.

Milk prices paid by processors increased from 15.85¢ per liter in 1969 to 23.78¢ in 1975 and have remained approximately constant since 1975. The production costs of larger producers in 1974 were under 20¢ per liter, while relatively smaller producers (those producing under 950 liters per day) had average production costs of at least 25¢ per liter. The cost-price structure is such that larger producers prefer to sell their milk to a processing plant, while smaller producers have an incentive to sell their milk raw, and thus not subject to quality controls. Of the milk pasteurized in 1973, an estimated 52 percent was obtained from farms with more than 950 liters of production daily, and only 8 percent was obtained from farms producing less than 380 liters daily.

Families with less than RD$50 monthly income drink less than 20 percent as much milk as those with incomes of over RD$100 per month. From the viewpoint of low-income families, milk is not a particularly good food to buy. An estimated 90 percent of the fresh milk marketed in

Santiago, for example, has water added. As a result, the true price of milk is at least 15 percent above the quoted retail price. In Santiago, the average real price of milk in 1976 was estimated to be 27 percent higher than the apparent price, and in some cases as much as 40 percent of the volume was added water.

From the nutritional viewpoint, the national consumption of milk and milk products is well below the level recommended by nutritionists. In 1977, for example, total per capita consumption was only 59 percent of the "recommended" level. This "deficit", of course, is larger for rural and low income families than for high-income urban families.

Tighter government controls on the quality of milk at present price levels probably would force many smaller producers out of production. An alternative would be to first adjust farm-price levels in such a way that small producers would be encouraged to sell to pasteurizing plants and the plants would have an incentive to purchase milk from smaller producers, and then initiate tighter controls on milk quality.

5.5.3 Chickens

Broiler production is located primarily around the major population centers. Roughly 70 percent of the broilers sold in Santo Domingo are produced in the National District with most of the remainder coming from the Cibao area.

The broiler industry is strongly oligopolistic and vertically integrated. Several of the larger firms have highly integrated operations involving chick hatching, feed mixing, broiler production, processing, and marketing. Many of the ingredients for mixed feeds (corn, soybean meal, fish meal, minerals, antibiotics, etc.) are imported. The production

operations are reasonably efficient with an estimated conversion ratio of 6.9 pounds of feed for the first 3.3 pounds of meat. Average production costs in 1977 were estimated to be RD$0.432 per pound of live chicken. This was 2.2¢ above the price control level of RD$0.410.

In the Santo Domingo area, 60 percent of total broiler production is sold directly to processing plants and 40 percent directly to wholesalers. The processing plants in turn sell approximately 15 percent of the broilers live to wholesalers, 10 percent live to retailers, 7 percent live and 3 percent frozen to small neighborhood stores, and 25 percent frozen to supermarkets. The final consumer purchases 61 percent of the broilers as fresh dressed, 11 percent live, and 28 percent frozen.

Producers receive approximately 81 percent of the retail price of chickens sold live and 86 percent for dressed chickens. Processors earn a 6 to 7 percent margin. Retailers earn 12 percent on live chickens and 8 percent on processed chickens (Table 5.6).

Per capita consumption of chicken has increased from roughly 9 pounds annually in the early 1970s to nearly 15 pounds annually in 1975-76. Families with under RD$100 per month income consume less than 4.4 pounds of chicken per capita annually. Families with over RD$300 monthly consume approximately 58 pounds per capita annually.

The producer price of broilers remained fairly constant during the 1966-72 period with an average price of nearly 29¢ per pound. Prices began to increase in 1973 and reached an average level of 40¢ per pound by early 1977. Prices vary much less during the year for chickens than for most other food items. The seasonal farm price index for the 1966-76 period ranged from a low of 93 in November to a high of 108 in July.

5.5.4 Eggs

Egg production is centered in the Cibao region around Santiago. Based on SEA estimates, total production of eggs increased by 272 percent between 1970 and 1976. This reflects a more general change in consumption patterns with chickens and eggs apparently replacing fish, beef, and milk as sources of protein.

The rapid increase in egg production has resulted in a substantial decline in the relative importance of small producers. At present, farms with fewer than 5,000 hens are classified as "small" producers. Some of the larger producers have 50,000 to 100,000 hens handled in highly integrated operations. These larger producers control a much larger percentage of the total sales than they did then years ago. Essentially, the Dominican Republic has imported capital-intensive production technologies, improved breeds, and feed ingredients to rapidly build both its broiler and egg industry.

Approximately 70 percent of the eggs produced in the Cibao region are sold in Santo Domingo. The remainder are sold regionally in Santiago, Moca, La Vega, and Puerta Plata. The Cibao region supplies nearly two-thirds of the eggs consumed in Santo Domingo.

Producers receive 86 percent of the retail price, wholesalers 5.4 percent, and retailers 8.6 percent (Table 5.6). Although the production and marketing of eggs appears to be relatively efficient, there is room for improvement in the handling of eggs, particularly in storage at the wholesaler level.

The average farm price of eggs fell from RD$5.47 per 100 in 1974 to RD$4.57 in 1976 and then increased to RD$6.00 by mid-1977. Within-year

price swings have tended to be greater during the past three years than in the early 1970s. Prices tend to follow roughly a six-month cycle. As prices fall, producers begin to sell off older hens. When prices begin to recover, they buy more chicks with a resulting increase in production and lower prices about six months later.

5.6 Improving the Food Marketing Systems

5.6.1 General Objectives and Strategy

One of the structural characteristics of major importance in the agricultural sector is the co-existence of large, highly commercialized farms with very small, semi-subsistence farms. Programs designed to change the food marketing system will affect different types of producers in different ways. Some programs may benefit large (or small) producers at the expense of small (or large) producers. Others may benefit both. Similarly, government marketing programs are likely to affect market intermediaries differently and to be of greater benefit to some consumers than to others.

In December 1977, SEA proposed a National Marketing Plan designed to improve the marketing of food products.[1/] In the form presented, the plan is more general than specific and is expected to be modified prior to implementation. Its basic objective is to improve the food marketing system in ways that would help both small farmers and low-income urban consumers. (Low income families are defined as those with less than RD$100 income per month.) These two groups constitute approximately 75 percent of the total population.

[1/] Secretaría de Estado de Agricultura, Departamento de Economía Agropecuaria. Plan Nacional de Comercialización. Santo Domingo, R.D., 1977.

In reviewing the agricultural situation, SEA concluded that there are several important problems that must be kept in mind in developing a marketing improvement program. These are:

1. The small scale of production of most farmers and the wide dispersion of production.
2. Farmers' dependence on intermediaries for credit, and the high price of such credit.
3. The absence or lack of consistency in farms level grades and standards for agricultural products.
4. The high degree of centralization of marketing services in urban areas.
5. Government marketing programs that have been concerned primarily with buying and selling food to lower consumer prices and have not given enough attention to ways to improve the efficiency of the marketing system.
6. The concentrated control of food marketing by wholesalers located in Santo Domingo, which frequently results in retail food prices that are higher in rural areas than prices in Santo Domingo.
7. The large number of vehicles operating in the principal wholesale markets in Santo Domingo and the resulting congestion and reduced efficiency of these markets.
8. The large losses of some products due to improper packing and handling, particularly potatoes and tomatoes.
9. The lack of adequate retail marketing facilities in some parts of Santo Domingo.
10. The poor state of repair of many public markets throughout the country.

11. The lack of uniformity in wholesalers and retailers units of sale, which reduces the value of market information and complicates marketing transactions.
12. The lack of food storage facilities.
13. The inadequate size of the Nuevo and Modelo markets in Santo Domingo.

The general objectives of the SEA National Marketing Plan are certainly consistent with the broader objectives of agricultural development. It is recognized, however, that marketing programs can contribute more to the achievement of some objectives than to others. For example, programs to promote agricultural exports frequently would be of most direct benefit for larger commercial farmers. If emphasis is placed on helping small farmers, then fewer resources would be devoted to export promotion. Furthermore, the export promotion activities that were undertaken would emphasize programs such as the development of export associations for small farmers rather than such policies as tax incentives for food processing facilities.

SEA's general strategy for improving the marketing system is to work initially with associations of small producers in an effort to increase their market power and their share of the final market price. Some of the producers' associations would deal primarily in traditional foods for the national markets. Others would promote small farmers' production of non-traditional crops for export. The low income consumer would be most directly affected by the development of public retail food stores in some areas and improvements in public markets in others. The next step would be to link producers' associations more directly with the new retail or improved public market outlets. In summary, the first step is to involve

the small farmer more directly in marketing through farmers' associations and then try to develop new, more efficient, marketing channels to by-pass some of the traditional market intermediaries. The ideas is less to try to replace all of the traditional market intermediaries than to develop and test some new marketing channels and ways to increase small farmers' and consumers' market power.

The National Marketing Plan recognizes that implementation of the general strategy will require:

1. close coordination among several government agencies: (Particularly SEA, INESPRE, BAGRICOLA, IAD, CEDOPEX, and the municipal governments),
2. changes in price control policies in an effort to benefit small producers without hurting low income consumers,
3. increased availability of credit for small producers and producers' associations,
4. changes in import and export policies for basic foods in order to maintain reasonable farm price levels for small farmers.

5.6.2 Elements of SEA's National Marketing Plan

The specific details of the National Marketing Plan have not yet been developed. As a result, it is impossible to determine how the plan will be implemented or how much it will cost. As presently conceptualized, the components of the plan cover a wide range of market activities. Some of the components affect producers more directly, others emphasize helping consumers, and many are concerned primarily with wholesalers' operations.

5.6.3 The Producer Level

The plan calls for the creation of a program (or group) to promote

Integrated Centers for Marketing and Rural Services (CENSERI).[1/] This program includes three types of centers:

1. Farm supply centers
2. Retail marketing outlets for basic foods
3. Rural marketing and service centers

The farm supply centers would operate under SEA's farm inputs program.[2/] The retailing of basic foods would be carried out through a chain of existing retailers who would agree to handle selected basic foods. The rural marketing and service centers would be operated through farmers' associations and take different forms depending on the needs of the associations' members. As examples, the centers might provide weighing services, price information, contract to sell members' production, or serve as rural collection and classification centers.

In addition to CENSERI development, efforts would be made to involve other farmers associations more directly in food processing and agri-related industries.

5.6.4 The Consumer Level

At the retail level, the plan suggests that consideration be given to the creation of an Urban Marketing Corporation (CMU) which would serve to coordinate the activities of various organizations and government agencies involved in urban food marketing.

In addition to CMU, efforts would be made to improve the infrastructure and operation of public markets. Furthermore, efforts would be made to

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[1/] Centros Integrados de Comercialización y Servicios Rurales.

[2/] See Section 5.8.1.

assure the supply of basic foods through improvements in the operations of government agencies such as INESPRE.

5.6.5 The Wholesale Level

The plan calls for increased attention to be given to:

1. providing better price and market outlook information,
2. promoting the sale of products produced by small farmers in both the internal and external market,
3. training agricultural marketing specialists and developing a marketing extension program,
4. programs to .omote improved food handling and to reduce post-harvest marketing losses,
5. the promotion of standard weights and measures based on the metric system,
6. improving the infrastructure and operation of wholesale markets,
7. providing more opportunities for small farmers' associations to act as wholesalers in public markets.

Obviously, there is a great deal of work to be done yet in developing the specifics for implementation of the National Marketing Plan. Nevertheless, the existing plan provides an excellent starting point by outlining general objectives and a strategy for achieving those objectives.

5.7 Government Price Control and Marketing Programs

The government has played an increasingly important role in food marketing and the control of food prices since 1963 when it first established the Directorate General of Price Controls. The authority of the Secretariat of Agriculture (SEA) to directly participate in food marketing also was

increased gradually during the 1960s. In December 1969, the Price Stabilization Institute (INESPRE) was established. Eighteen months later, in May 1971, the Export Promotion Center (CEDOPEX) was created. These four institutions continue to play important roles in the establishment of key food prices and the control of some marketing channels. Their control in some cases is implemented through, or in cooperation with, institutions such as Instituto Azucarero and Molinos Dominicanos, C. por A.

INESPRE is the most visible government agency involved in price and marketing control operations. Its wide range of responsibilities include:

1. raising farm prices,
2. stabilizing farm revenues,
3. maintaining low consumer prices,
4. promoting agricultural development, and
5. improving the efficiency of food markets.

To achieve these objectives, it has the authority, or may receive special authority, to:

1. buy and sell food products domestically at the farm, wholesale, and consumer level;
2. to establish farm, wholesale, and retail prices;
3. to import agricultural products;
4. construct and operate food storage facilities; and
5. establish grade and standards for food products.

INESPRE has five general offices that operate 22 centers for buying and selling agricultural products. These centers include grain storage silos with a storage capacity of over 37,000 MT and approximately 35,000 MT of other types of food storage warehouse capacity. In addition, 26,000 MT

of conventional warehouse capacity is rented by INESPRE.

An analysis of the price policies of INESPRE suggests that it has placed higher priority on maintaining low consumer prices than on establishing prices to stimulate food production. It has not been unusual for INESPRE's domestic support prices for products to be lower than the costs of imports. Nor is it unusual for INESPRE to lose money on either domestic or import operations in order to maintain lower consumer prices. The rapid and substantial changes in the world prices of many food products, including rice, corn, wheat, beans, and vegetable oils, has made it difficult for INESPRE to meet its obligations to both farmers and consumers and still break-even on its marketing operations. In general, INESPRE's price and import policies appear to have been of more benefit to middle and higher income consumers (those with family incomes above RD$100 monthly) than to low income families. Some recent actions have been undertaken to change this situation. Greater emphasis has been placed, for example, on establishing low price food outlets in low-income neighborhoods of major urban centers.

INESPRE's aggressive efforts to rapidly reduce retail prices of beans, onions, and several other products in recent years may have caused more long-run damage than short-run benefits. Such efforts, at times, have substantially modified the roles of truckers and small wholesalers (or completely replaced them) and lowered prices to farmers. Many farmers apparently feel that the price floors set by INESPRE are either below than, or only slightly above, their costs of production while, at the same time, during periods of short supply, INESPRE's actions keep them from enjoying the rewards of higher prices. In the case of corn, wheat, soybeans, and peanuts, INESPRE's price and import policies appear to have

favored processors to the disadvantage of both farmers and consumers.

There is little evidence to suggest that INESPRE has improved the efficiency of food marketing. Its grain storage facilities are not fully utilized. Its storage losses for some products, such as onions, reportedly have been substantial. It has been able to change marketing margins and replace marketing middlemen but it has not been able to reduce actual marketing costs and simultaneously benefit both consumers and producers without incurring financial losses. INESPRE frequently has found itself involved in importing and domestic marketing operations for which it had little or no technical staff and inadequate facilities. Building staff and facilities requires time. Some progress apparently is being made in these areas.

It is doubtful that small farmers have benefitted much from INESPRE's operations. In general, INESPRE does not buy products at the farm gate. Farmers have to deliver their products to INESPRE's buying stations and usually have to wait several days for payment. Small farmers continue to deal with truckers who provide credit, pick up their products at the farm, and pay immediately in cash.

The successful implementation of price policies and market interventions requires a good deal of coordination and cooperation between various government agencies. The fairly rapid growth of INESPRE's involvement in numerous markets suggests that it has been reasonably successful in obtaining a good deal of cooperation from other agencies. Even closer cooperation will be needed, however, to implement a National Marketing Plan as outlined in the previous section.

5.8 Supply and Utilization of Inputs and Credit

Technical progress in agriculture involves complementing land and labor resources in the sector with purchased inputs that raise yields and lower costs per unit of output. Biochemical inputs and improved management raise labor productivity and employment through increased yields per unit of land. Mechanization, except in rare instances, raises labor productivity by substituting machines for humans but directly increases neither yields nor employment. This section of the assessment describes the use of purchased inputs, the marketing of inputs, and the credit system that facilitates access to inputs.

Data on the percentages of farms by size class employing fertilizers, insecticides, machinery, work animals, credit, technical assistance, and hired labor in production processes is given in Table 5.7. Despite more than a decade of rapid growth in farm input use (see Chapter 1), it appears that only about one-third of Dominican farms employ modern yield-increasing inputs such as fertilizers and insecticides. Improved seeds, fertilizers, insecticides, and irrigation are usually labor-using because higher output levels require increased labor for production and harvesting. On the other hand, when capital is used to purchase draft animals, tractors, and other farm implements that provide a work input, it is in effect replacing labor. Fewer than a third of Dominican farms employ machinery. About 37 percent of small farms, and almost half of the medium-sized farms have work animals. Farm machinery can be justified in some cases on the basis of more timely operations and increased yields. It is not clear what degree of mechanization is most appropriate for rural employment conditions in the Dominican Republic.

Table 5.7. Utilization of Inputs by Size of Farm, 1975.

Type of Input	Percentage of Farms Using Input		
	Small Farms	Medium-Sized Farms	Large Farms
Fertilizers	29.6	36.8	37.5
Insecticides	19.5	21.9	19.8
Machinery	31.1	33.7	28.6
Work Animals	37.2	47.9	35.9
Credit	22.4	32.6	42.4
Technical Assistance	16.9	23.0	26.0
Hired Labor	36.5	63.0	58.9

Source: Agricultural Sector Survey; unweighted preliminary data taken from Documento Metodologico 1, Análisis Sectorial, Santo Domingo, January, 1977, p. 66.

Note: The percentage figures are somewhat overstated because of problems of double-counting. Also, the results for large farms are surprising in view of the fact that sugar estates and large cattle ranches were not covered in the survey.

Only 22 percent of the small farms used credit in 1975 compared to more than 30 percent for the medium-sized and large farms. Less than 17 percent of the sampled small farms received technical assistance in 1975. Technical assistance programs to reach small farmers need to be tailored to farmers with relatively little formal education. Only about half of the small farm operators can read and write, and 79 percent of them have less than four years of schooling (Table 5.8). A need to develop technology packages appropriate for small farmers is discussed in Chapter 7.

Table 5.9 contains data on cash expenditures for 17 crops and crop combinations for small, medium, and large farms. In the small farms, average expenditures per hectare ranged from RD$6 for cacao to RD$453 for tomatoes. Very little effort is invested in cacao other than harvesting the fruit. Tomatoes are highly industrialized and tomato growing is considered to be demanding in terms of technical know-how and input requirements. Hired labor is the most important item in the average expenditure patterns for all of the crops. Rice, sweet potatoes, tobacco, tomatoes, coffee, and plantains are significant users of fertilizers and other chemical inputs. These crops are highly commercialized. Generally, chemical inputs are not widely used on the subsistence crops. As a rule, the large farms spend more per hectare on inputs than the small farmers. The large farmers spent RD$140 per hectare on chemical inputs for rice compared to only RD$87 by small farmers.

Small farm households frequently have difficulty in obtaining capital necessary to application of high-yielding farm technology. Cash expenditures on production activities in the small farms averaged RD$354 in 1975, which was equivalent to 69 percent of the average gross sales in small

Table 5.8. Education of Farm Operators, 1975.

Region	All Farms					Small Farms				
	Total No. of Farms	Number Producers who can read and and write	Percent	Producers with 3 years or less of education	Percent	Total No. of Farms	Number Producers who can read and and write	Percent	Producers with 3 years or less of education	Percent
Northern	78,183	43,293	55.4	62,219	79.6	44,840	23,027	51.4	36,509	81.4
Southwestern	30,020	19,808	66.0	20,975	69.9	17,734	11,035	62.2	13,300	75.0
Southeastern	37,711	25,197	66.8	29,930	79.4	17,279	9,056	52.4	13,476	78.0
Total Republic	145,914	88,298	60.5	113,124	77.5	79,853	43,128	54.0	63,285	79.3

Source: Agricultural Sector Survey, preliminary data.

Table 5.9. Value of Production and Cash Expenditures per Hectare for Crops, Small Farms, 1975.

Crop	Avg. Value of Production per Hectare	Avg. Cash Expenditure per Hectare	Composition of Cash Expenditures						
			Hired Labor	Seed	Fertilizer	Pesticides and Other Chemicals	Machinery	Animal Power	Other[a]
	(RD$/ha)	(RD$/ha)	Percent						
Rice	612	288	42.4	7.6	25.3	5.0	15.4	1.1	3.2
Rice-Corn	273	86	77.8	11.1	-	-	7.4	-	3.7
Sweet Potatoes	329	86	49.0	3.7	9.1	-	9.1	5.5	23.6
Pigeon Peas	199	54	67.8	2.9	-	-	17.6	5.9	5.8
Beans	277	103	40.9	42.5	4.5	1.5	4.5	3.1	3.1
Corn	149	52	61.3	9.7	-	3.2	12.9	9.7	3.2
Corn-Beans	590	95	30.5	32.2	-	-	11.8	22.1	3.3
Peanuts	180	156	40.8	37.8	1.0	2.0	13.3	2.0	3.1
Tobacco	781	153	49.0	8.3	14.6	3.1	9.4	2.1	13.5
Tomatoes	1,057	453	45.8	5.6	10.5	22.3	14.7	-	1.1
Cassava	394	80	64.0	-	2.0	2.0	12.0	8.0	12.0
Cassava- Pigeon Peas	728	19	58.3	8.3	-	-	8.3	16.7	8.3
Cacao	215	6	100.0	-	-	-	-	-	-
Cacao-Coffee	569	25	76.5	-	-	-	-	-	23.5
Coffee	197	56	82.4	-	11.7	-	-	-	5.9
Coffee-Banana	633	51	90.3	-	-	-	-	-	9.7
Plantain	657	67	60.9	4.9	24.6	-	4.9	2.4	2.4

Source: Agricultural Sector Survey - 1975, Secretariat of Agriculture.

[a] mainly land rental and preparation for marketing.

Table 5.9. Value of Production and Cash Expenditures per Hectare for Crops, Medium-Sized Farms, 1975.

Crop	Avg. Value of Production per Hectare	Avg. Cash Expenditure per Hectare	Composition of Cash Expenditures						
			Hired Labor	Seed	Fertilizer	Pesticides and Other Chemicals	Machinery	Animal Power	Other[a/]
	(RD$/ha)	(RD$/ha)	Percent						
Rice	625	315	48.3	4.5	20.8	6.0	14.7	1.0	4.5
Rice-Corn	488	100	71.0	9.7	-	-	-	11.3	8.0
Sweet Potatoes	412	103	58.4	1.5	-	1.5	4.6	12.3	21.5
Pigeon Peas	189	65	75.0	-	-	-	12.5	2.5	10.0
Beans	417	127	41.9	25.9	7.4	4.9	8.7	3.8	7.4
Corn	161	62	62.5	7.5	-	2.5	15.0	5.0	7.5
Corn-Beans	196	97	64.0	32.8	-	1.6	-	-	1.6
Peanuts	156	137	20.9	51.0	1.3	2.5	19.1	1.3	3.8
Tobacco	1,139	240	56.9	7.3	10.6	1.3	4.6	1.3	17.9
Tomatoes	986	390	52.3	6.5	8.2	17.1	14.7	0.8	0.4
Cassava	407	81	76.5	-	-	2.0	9.8	5.9	5.9
Cassava- Pigeon Peas	359	48	56.6	-	-	-	-	33.3	10.0
Cacao	355	29	94.4	-	5.6	-	-	-	-
Cacao-Coffee	407	54	94.1	-	-	-	-	-	5.9
Coffee	170	80	80.0	-	14.0	-	-	-	6.0
Coffee-Banana	240	83	94.2	-	-	-	-	-	5.8
Plantain	460	134	69.0	6.0	9.5	1.2	2.4	9.5	2.4

Source: Agricultural Sector Survey - 1975, Secretariat of Agriculture.

[a/] mainly land rental and preparation for marketing.

Table 5.9. Value of Production and Cash Expenditures per Hectare for Crops, Large Farms, 1975.

Crop	Avg. Value of Production per Hectare	Avg. Cash Expenditures per Hectare	Composition of Cash Expenditures						
			Hired Labor	Seed	Fertilizer	Pesticides and Other Chemicals	Machinery	Animal Power	Other[a]
	(RD$/ha)	(RD$/ha)	Percent						
Rice	642	413	43.9	4.6	24.2	9.6	12.7	0.8	4.3
Rice-Corn	555	135	82.4	8.2	-	1.2	-	-	8.2
Sweet Potatoes	202	35	62.8	-	5.3	-	-	-	31.9
Pigeon Peas	-	-	-	-	-	-	-	-	-
Beans	315	146	52.1	19.6	6.5	2.2	9.8	7.6	2.2
Corn	126	94	49.1	3.5	12.3	5.3	26.3	1.8	1.8
Corn-Beans	121	67	64.3	21.4	-	-	-	14.3	-
Peanuts	110	122	31.1	33.8	7.8	3.9	20.8	1.3	1.3
Tobacco	421	121	61.9	5.3	11.8	6.6	6.6	3.9	3.9
Tomatoes	835	569	73.5	2.5	7.3	8.1	8.4	-	-
Cassava	299	43	60.8	-	10.7	3.6	14.3	7.1	3.6
Cassava-Pigeon Peas	789	29	38.9	-	-	-	50.0	-	11.1
Cacao	329	52	87.9	-	3.0	-	-	3.0	6.1
Cacao-Coffee	216	21	100.0	-	-	-	-	-	-
Coffee	194	92	87.9	-	5.2	-	-	-	6.9
Coffee-Bananas	291	110	60.8	-	34.8	-	-	-	4.3
Plantain	184	105	57.6	1.5	19.7	-	21.2	-	-

Source: Agricultural Sector Survey - 1975, Secretariat of Agriculture.

[a] mainly land rental and preparation for marketing.

farms or 41 percent of the combined cash income from product sales and off-farm work (Table 5.10). Cash expenditures on production inputs as a proportion of gross farm sales increases with the size of farm. Medium and large-sized farms had cash expenditures amounting to 81 percent and 93 percent, respectively, of sales.[1/] Many of the small farm households experience "low" levels of living and use cash to purchase basic necessities. Consequently, they have less income left over for purchasing production inputs. Moreover, the small farmers obtained outside finance equivalent to only 21 percent of their input expenditures. Medium and large-sized farmers obtained credit for 27 percent and 38 percent of their cash expenditures, respectively. To some extent, small farmers may face serious problems of risk and uncertainty aversion which make them reluctant to borrow or to innovate even when other conditions are favorable. Thus, policy to reduce uncertainty and to increase farmers' ability to absorb risk could be especially important to improving incomes of small farmers. Simply providing access to credit may not be a sufficient condition for widespread participation by small farmers in yield-increasing technology. The system for supplying credit is analyzed in Section 5.9. But the demand for credit is equally important as a determinant of its impact on production, incomes, and welfare of small farmers.

5.8.1 Input Distribution Centers

Besides risk and uncertainty problems and shortage of credit, the small farmer may lack access to critical inputs such as fertilizer due to

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[1/] These data were taken in a drought year that greatly influenced the receipts-expenditures comparisons.

Table 5.10. Gross Farm Production, Sales, Expenditures, and Credit by Size of Farm, 1975.

	Small Farms	Medium Farms	Large Farms
Gross Farm Production	895	2,477	8,602
Gross Household Revenue	870	2,100	8,079
Farm Sales	516	1,696	6,955
Off-Farm Income	354	404	1,124
Cash Expenditures on Production	354	1,373	6,437
Credit	109	372	2,416
Cash Expenditures as percent of Sales	68.6	81.0	92.6
Cash Expenditures as percent of Sales and Off-Farm Income	40.7	65.4	79.7
Credit as percent of Cash Expenditures	21.1	27.1	37.5

Source: Agricultural Sector Survey - 1975, Secretariat of Agriculture

general scarcity and control of distribution by larger farmers. Frequently, the more dependent agricultural production becomes on cash inputs, the greater the advantages the large farmer may enjoy over the smaller farmer. Large farmers can achieve economies of volume buying. Smaller farmers can achieve these economies through group buying or cooperative arrangements.

The SEA reviewed the farm input situation of small farmers in 1975 and found that the existing input marketing network was not serving small farmers adequately. A public input marketing program was developed, based on a system that had been applied with good results in Puerto Rico.

Funds from the AID Agriculture Sector Loan I Program were made available for the pilot phase of the input centers program. The first three centers opened in late 1975, and 15 more were established in 1976. These centers were located throughout the country, in priority areas where the need was felt to be greatest. Expected return on investment was not a determining factor in initial site selection. The centers offered small farmers a selection of production inputs tailored to the needs of each area, and packaged in quantities practical for small producers. Prices were kept to a minimum to just cover costs. The opening of input centers forced some of the commercial outlets to reduce their prices. In most cases, however, unit prices were not lower in the SEA input stores, but small quantities were available and the geographic dispersion of the centers lowered the farmers' transportation costs, reduced travel time, and made appropriate inputs available to many farmers for the first time.

There is little doubt that this program is benefitting small farmers. During 1976, its first full year of operation, the program reported over

28,000 individual sales which averaged just over RD$39 per purchaser. Total sales were RD$1,217,269 for 1976, and RD$2,842,757 for 1977. Chemicals (fertilizers and pesticides) typically make up about 80 percent of sales by value, while the remaining 20 percent of sales are divided among implements and small machines, seeds, and other inputs.

The program for developing input supply centers has been very well received. Seven additional centers were established in 1977, 12 were planned for 1978, 12 for 1979, and 11 for 1980, for a total of 60 Input Centers to provide the required geographic coverage so that the majority of small Dominican farmers will have reasonable access to input supplies. Plans are underway to locate farm production credit offices, machinery service units, and extension offices at some input center locations to provide small farmers with full services at convenient locations.

5.8.2 Fertilizer

In early 1975, SEA, through USAID, requested that the International Fertilizer Development Center (IFDC), a branch of the Tennessee Valley Authority (TVA), survey the fertilizer situation and, in particular, the efficiency of the fertilizer marketing system in servicing small farmers.[1/]

The study found that although the fertilizer distribution system functioned reasonably well for the commercial farmer group, small or less commercial farmers were inadequately served by the system or not served at all. For a variety of reasons, private service to the small users was found to be generally not "economical". As described above, in order to address this situation, funds were made available under AID Loan 027 for the establishment of a network of government operated agricultural input

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[1/] J. Free, C. Kresge, T. H. Foster, "The Dominican Republic Fertilizer Situation," 1976, Tennessee Valley Authority for USAID/

distribution centers.

In addition to access to fertilizer, there are other related constraints on fertilizer use. In the more productive areas of the country, much of the land in cultivated crops is under irrigation. One of the main factors limiting crop response to fertilizer in these areas is inadequate water supply and/or ineffective water management. These problems are often beyond the control of the individual producer. However, they seriously affect fertilizer use (see Chapter 2).

5.8.3 Seeds and Plant Materials

High quality seed and plant materials of adapted varieties are important factors for increased agricultural production by small and medium farmers. However, they are among the most difficult inputs to develop and deliver on a timely basis. Since 1974, SEA has reviewed the entire adaptive research, seed multiplication, and seed distribution system. Despite less than optimum results from research efforts, a functional system is in place. Much in-country research has been done on several varieties. A germ plasm bank of improved varieties of citrus, mango, and avocado exists in-country, and these trees will soon be of sufficient size to begin a grafting and distribution program. A seed and plant materials multiplication and distribution program has been initiated by the SEA under the AID Loan 029 Program. As of 1979, the results of this effort are unknown. However, it is anticipated that for many small and medium farmers the constraint of unavailability of improved seeds will be alleviated under this program.

5.9 Agricultural Credit

During the last decade, the government has undertaken a number of activities designed to increase the supply of credit to agricultural

producers. Policies designed to increase agricultural lending by private banks have been implemented. Programs to provide credit to small farmers through a public bank, supervised credit programs and cooperatives, and other farmers' associations have been initiated. Much attention has been given to creating, expanding, and improving public institutional mechanisms for providing credit services. As noted in Chapter 1, USAID and the Inter-American Development Bank have made large loans to the government that have increased the supply of credit, especially to small farmers.

Estimates for 1974 indicate that about 45 percent of the agricultural loans came from informal sources, primarily individual lenders, and the remaining 55 percent from formal sources, primarily the Agricultural Bank. A large portion of total loans from formal sources are for rice, coffee, fruits, tobacco, and cattle. Sugar production is financed principally by the sugar mills rather than through the institutional credit system.

The principal institutions providing formal agricultural credit are: (1) the Agricultural Bank, (2) nine commercial banks, (3) three financieras (private investment companies), (4) the Dominican Development Foundation (DDF), (5) the Community Development Office (ODC), and (6) the Cooperative Credit and Development Institution (IDECOOP). The Agricultural Bank is an autonomous state institution. In 1975, it provided an estimated 60 percent of the total formal agricultural credit in the country.[1/] The Agricultural Bank charges an interest rate of 8 percent per year plus one percent closing costs on its loans; other sources charge about 12 percent per year. Commercial banks accounted for about 36 percent of the agricultural credit available from the formal market in 1974.

[1/] Adams, D. and J. Ladman. Assisting the Rural Poor Through Financial Market Activities in the Dominican Republic, USAID/DR Report, Sept. 1977.

This amounted to about 8.5 percent of their total loan portfolio.[1/] The financieras accounted for only two percent of all agricultural loans. The DDF and ODC provide credit to low income persons without access to commercial bank credit, but have provided only a small amount of total agricultural credit.

In 1972, less than 20 percent of Dominican farmers received any form of institutional credit. Most who did were larger, more commercial farms and cattle ranches. Most smaller farmers had little access to credit since they could not qualify for commercial loans not compete with larger farmers for the limited supply of public credit then available. Informal credit from merchants and money lenders was the only source of financing, other than personal or family funds, for most small farmers.

In 1975, the percentage of farms using credit from all sources was 27.9 (Table 5.11). The percentage for small farmers was 22.4, 32.6 for medium farmers, and 42.4 for large farmers. The average size of loan was RD$ [illegible] RD$999, and $RD4,908, for small, medium, and large farmers, respectively. About two-thirds of the credit was for crop production, 25 percent was for livestock, and the remaining 8 percent for other uses. The percentage breakdown between crop and livestock loans was similar for the three farm size groups.

In addition to the internationally supported public efforts to provide more farmers with production credit, one of the stated government policies

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[1/] The percentage has ranged from 7.7 to 9.3 through the 1970s. Commercial bank credit for agriculture is divided about 55 to 65 percent for crop loans, and 35 to 45 percent for livestock loans.

Table 5.11. Percent of Farms Using Credit and Average Size of Loan by Size of Farm and Region, 1975.

Farm Size Class	Percent of Farms Using Credit - all sources[a]	Average Size of Loan	Percent of Farms Using Credit - from the Ag Bank & SEA[a]	Average Size of Loan
		(RD$)		(RD$)
		(Total Republic)		
Small Farms	22.4	432	9.5	597
Medium Farms	32.6	999	17.4	1,183
Large Farms	42.4	4,908	23.9	4,611
All Farms in Survey Universe	27.9	1,318	13.7	1,571
		(Northern Region)		
Small Farms	21.7	317	7.9	584
Medium Farms	27.0	1,233	14.7	1,337
Large Farms	28.1	5,734	21.8	5,138
Region	24.1	1,320	11.4	1,862
		(Southwestern Region)		
Small Farms	29.0	261	11.7	281
Medium Farms	55.2	910	19.2	1,235
Large Farms	63.6	3,791	38.0	4,341
Region	40.3	921	18.0	1,224
		(Southeastern Region)		
Small Farms	17.3	941	11.6	757
Medium Farms	27.6	479	17.0	666
Large Farms	56.5	3,709	20.5	3,374
Region	26.1	1,397	14.9	1,146

Source: Agricultural Sector Survey, 1976; preliminary weighted data.

[a] percentage figures are somewhat overstated because farms that receive more than one loan are double-counted among farms using credit.

in recent years has been to orient a larger share of private bank credit to productive sectors (industry, construction, services, agriculture). In spite of this policy, the proportion of total private credit going to the productive sectors has not increased significantly in the 1970s. Furthermore, as noted earlier, agriculture's proportion of total private credit has varied between 8 and 9 percent (14 to 15 percent of credit for productive sectors).

A number of incentives and monetary policies have been used to encourage private-bank lending to agricultural producers. These have not resulted in any significant increase in the proportion of loans going to finance crop and livestock production. Nor have they been successful in overcoming the risks and lower returns inherent in loaning to large numbers of small farmers.

The Agricultural Bank had a total loan portfolio of RD$39 million in 1972. By 1976-77, its total loan portfolio had doubled (Table 5.12). About 80 percent of the bank's total credit went for crop production in 1976.

It is estimated that roughly 40 percent of the Agricultural Bank's credit was for small farmer loans during the 1965-74 period. This percentage varied somewhat from year to year but has shown no consistent upward or downward trend. The distribution of loans by size for 1973 through 1976 is given in Table 5.13. Agricultural loans from DDF, IDECOOP, and ODC go to small farmers. These institutions, however, provided only about 3 percent of total agricultural credit in 1974.

A commitment has been made by the Dominican Government to reach a greater number of small and medium farmers with credit and other agricultural inputs. The full amount of credit funds (about $17,000,000) under

Table 5.12. Agricultural Bank Loans by Use, 1975 and 1976.

Use	1975		1976	
	Number	Value (000 RD$)	Number	Value (000 RD$)
Crops	46,610	56,339.5	47,430	63,999.0
Cattle	7,080	19,171.2	5,830	15,664.6
Poultry	183	2,149.1	135	1,571.5
Other	97	374.6	97	305.7
Total	53,970	78,034.4	53,492	81,480.8

AID Loan 027 was specifically directed at farmer loans of RD$2,000 or less, resulting in a need for new employees to service the larger number of small loans (Table 5.13). Funds under the PIDAGRO programs can be used for larger loans, however. Under both programs, credit policies have been clearly articulated and widely publicized. A large number of additional staff members (more than 375 under Loan 027 and approximately 40 under PIDAGRO) have been employed by SEA and the Bank in an effort to manage these new credit resources.

Through the credit portion of the USAID Loan Program, the Agricultural Bank formalized over 10,000 small farm loans during 1974-mid-1977 (Table 5.14). The 12,094 loans formalized through the SEA Supervised Credit Program were also administered through the bank facilities. DDF loans were made to 296 groups, comprised of 5,383 farmers. The average loan size for all three programs was between RD$500 and RD$600 per farmer. An additional 917 loans were formalized under the SEA Custodial Accounts Program, bringing the total number of subloans to 28,645 through late 1977. All of these credits accrued to farmers between October, 1974, and October, 1977, as a direct result of the SEA/AID Sector Loan I Program. A second agricultural sector loan program was initiated during 1977, and will disburse funds through 1980. The second program includes additional farm credit components that total RD$9 million, to be implemented through the SEA and Agricultural Bank, again to benefit the small farmers whose alternative credit sources are nonexistent or extremely expensive.

The largest portion of agricultural credit, especially to small farmers, is likely to remain in this public sector for some time. The public agencies

Table 5.13. Number of Agricultural Bank Loans by Size, 1973-1976[1/]

Loan Size	1973	1974	1975	1976
RD$0 - 2,000	37,179	40,747	44,986	44,311
RD$2,001 - 10,000	2,191	3,690	8,271	7,972
RD$10,001 - 20,000	234	440	423	451
RD$20,001 - 50,000	87	240	227	377
RD$50,000 and above[2/]	55	86	63	381

Source: Banco Agrícola de la República Dominicana, Departamento de Programación

[1/] These data reflect the size distribution of loans. Data to show the size profile of the farmers to whom the loans are made are not available. To the extent that several small loans are made to a former large borrower, the costs of administering the loans will rise and the spirit of policies to increase the supply of credit to small farmers will be violated.

[2/] In the category RD$50,000 and above, no loans were granted to individuals but only to intermediate lenders, such as the Land Reform Institute (IAD), who make subloans to small farmers.

Table 5.14. Small Farmer Production Loans Formalized Under the SEA/AID Sector Loan I Program, 1974-1977.

AgBank (Plan 22)		
Program Inception thru July 8, 1977		
Total Allocation Loan Funds		RD$5,000,000
Subloan Formalizations	10,251	RD$5,930,601
Subloan Average		RD$578
Average Land Area		3.3 hectares
Land Tenancy	51% owners	49% leased, IAD, other
SEA SUPERVISED CREDIT (Plan 23)		
Program Inception thru June 30, 1977		
Total Allocation Loan Funds		RD$3,228,394
Subloan Formalizations	12,094	RD$6,234,775
Subloan Average		RD$515
Average Land Area		2.1 hectares
Land Tenancy	22.7% owners	77.3% leased, IAD, other
D.D.F.		
Program Inception thru December 31, 1976		
Total Allocation Loan Funds		RD$3,000,000
Subloan Formalizations	296	RD$3,050,579
Average Group Size	18	
Number of Individuals	5,383	
Average per Individual		RD$566
Average Land Area		1.25 hectares
Land Tenancy	Not available	

Source: Banco Agrícola, SEA, DDF

will require continued budgetary support to overcome the tendencies toward decapitalization that inherent in credit systems serving large numbers of dispersed, high-risk, small borrowers. Generally, pay-backs on group loans have been quite good, especially in the case of rice farmers which are closely supervised by the Bank. In the future, more attention should be placed on coordinating production planning and price, policies with credit programs. These complementary policies are important in determining the demand for credit, as discussed in Section 5.9.1.

Agricultural credit availability was identified in the early 1970s as one of the principal constraints to increased agricultural production. Institutional credit was deemed to be in especially short supply, and allocations of institutional credit favored the more affluent borrowers. Further, credit policies were not well articulated and credit personnel were not adequately trained. Credit delivery was often untimely and allocations often were not related to stated national priorities.

In spite of the improvements that been achieved to date, credit availability to small and medium farmers is still a constraint. The amount of institutional credit available is not sufficient to meet the total need for widespread adoption of improved technology by small farmers. Even for those funds which are available, geographic constraints preclude access by many small farmers. Mechanisms necessary to deliver credit to all rural areas do not yet exist.

5.9.1 Factors Affecting the Demand for Credit[1/]

To be successful, programs that increase the supply of credit must be synchronized with demand for credit. An increase in the demand for agricultural credit comes from the added cost of new inputs, or changes in inputs, farm organization, or marketing required to achieve a given increase in output but which cannot be financed from the farmers' own savings. Implied, of course, is that such expenditures must be profitable for the farmer. Even though the demand concept is relatively clear, actual measurement or prediction of credit demand is far from easy since the increase in demand may reflect more than just changes in agriculture. A number of factors will influence the demand for credit and, more important, for public credit programs -- the proportion of the demand that will impact on the demand for formal institutional credit.

The type of technology used by, or recommended to, a farmer affects input use and thus credit demand. For new, yield-increasing technology that is highly divisible (e.g., new crop varieties), a farmer may be able to finance its adoption by using his own savings. For less divisible or lumpy investments, like an irrigation pump, credit may be required. The more capital-intensive the technology, the more likely credit will be needed.

Furthermore, farmers often face considerable risk and uncertainty when borrowing money to finance new technology or inputs. Yield and price variability can cause large fluctuations in farm incomes from year to year.

[1/] Based on Tinnermeir, R. "Agricultural Credit Demand--A Discussion," Paper presented at Workshop on Rural Finance, sponsored by Ohio State University, USAID/DR, and the Central Bank of the Dominican Republic, Santo Domingo, Dominican Republic, December 12-13, 1978.

In addition, the farmer faces other uncertainties. Can he be sure of external financing after a crop failure? Will the technical and marketing assistance be provided as promised? Will changes in government policies make agriculture less profitable? Generally speaking, the greater the risk and uncertainty faced by the farmer, the slower will be the adoption of technology, and a smaller proportion of production costs will be finnaced from credit sources. Thus, the characteristics of the technology and the rate at which it is adopted directly affect credit demand.

Existing land tenure patterns also affect credit use and demand, especially where renters or share-croppers do not share returns in the same way they are expected to share costs, either through contract or custom (this is particularly true for long-term, investment credit for land develop ment and improvements). Generally, the more concentrated is the land ownership and the slower is the adoption of new technology, the less is the deman for credit.

Savings by farm households directly affect their ability to finance new investments on their own. However, knowing the average level of rural savings still is not adequate since such savings can be used for personal consumption and non-farm investments, as well as for farm investments. The allocation of family savings among competing purposes is difficult to predict and varies with the relative costs and returns or utility to the family of the alternative uses. Cheap credit (subsidized interest) will tend to cause farmers' savings to be used for purposes other than farming and, thereby, increase the demand for agricultural credit. On the other hand, higher rates of interest tend to make the farmers use more of their own money for farm investments at the expense of personal consumption or

non-farm investments. The extent to which these shifts take place depends on relative prices and the particular production and utility functions of the farmers and their families. Field surveys often reveal that major portions of small farmer borrowed funds (usually subsidized), including those specifically earmarked for purchasing agricultural inputs, are used for family consumption and other expenses. This phenomenon suggests such shifting is taking place and illustrates a major problem of subsidized credit -- the fungibility of money.

Money and, therefore, credit are fungible. That is, one dollar may be used in the place of another, or credit may be used in the place of one's own savings. Loans which are made ostensibly for purchasing agricultural inputs can be very easily transformed into other uses.[1/] A loan to purchase fertilizer may replace the farmer's own capital that would have been used to purchase the fertilizer if credit had not been available. Such a loan, then, might free the farmer's one hundred dollars to finance consumption or other expenditures. In this event, did the credit effectively finance fertilizer or consumption? Or, conversely, what caused the increase in demand -- farm inputs or consumption expenditures? Because money is fungible, it should be clear that it is not easy to measure the real or true impacts of credit nor to identify the factors that cause an increase in credit demand.

Finally, even if it were possible to estimate the changes in demand for credit, it is unclear where the demand will appear -- in the formal

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[1/] Credit provided "in kind", e.g., fertilizer, seed, can be transformed into cash by selling the inputs to other farmers.

or informal market. This raises questions about the capacity of the informal sources of credit to meet the increasing demand for agricultural credit and under what conditions farmers will choose to utilize that credit. If more money is unavailable, or farmers do not borrow more, in the informal market, then all of the increase in demand will end up in the formal market. Obviously, to adequately estimate future institutional or formal credit demand, it will be necessary to understand the characteristics of the informal market and how responsive it will be to an increased demand for credit.

5.9.2 Improving the Credit System

Due to the risks and costs involved in providing credit to small farmers, the private banking system is not serving the needs of the majority of Dominican farmers. Hence, the burden of providing agricultural credit, as well as the complementary technical assistance inputs, is likely to remain in the public sector for some time. Nonetheless, policies to improve the organization and operation of private rural financial institutions and agencies that mobilize savings and make timely loans for productive uses are equally important along with programs to strengthen public institutions serving the large number of spatially-dispersed, high-risk, small farmers. The following priorities are based on this review and the results of the Seminar on Credit for Small Farmers, held in Santo Domingo, December 12-13, 1978:

1) Better coordination between the Agricultural Bank and SEA in further developing an overall system to supply credit to small farmers, but also to provide the inputs and technical assistance that are required to make credit use by small farmers more profitable.

2) Policies to improve the organization and operation of rural financial markets to encourage the mobilization of the private financial system in farm lending.

3) Realistic interest rate policies that recognize the risk and costs of small-farmer lending and that low-cost loans often intensify problems of credit rationing for small borrowers.

4) Policies to increase loan repayments and reduce risks of lending to small borrowers so that the viability of the credit system can be enhanced.

5) Expanding and strengthening credit cooperatives and farmers' associations as a means of reducing the cost and extending the scope of the small-farmer credit system.

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Chapter 6

AGRICULTURAL PUBLIC SECTOR INSTITUTIONS AND PROGRAMS

The existing institutional organization of agriculture and the rural sector has largely developed since 1961. It is composed of a key ministry, the Secretariat of State for Agriculture (SEA), and a number of decentralized agencies, some of which were established outside the control of SEA. This structure has emerged over time as the government has responded to the needs of a crucial sector, frequently in piecemeal terms and reflecting the particular political circumstances of the period.

This chapter reviews the major public agencies involved in agricultural production, planning, policy, research, extension, and training. It reflects the situation that existed in 1978-79 as the new government entered office. Some assessment of the public sector is offered and a few likely administative reforms are described. However, no attempt to systematically evaluate organizational weaknesses nor to propose a sweeping institutional reorganization of the agricultural public sector will change in response to the economic and political perceptions of Dominican officials. Substantial changes are planned in the near future as the new government moves to reorganize the political-administrative system to implement its policies and programs.

6.1 The Secretariat of State for Agriculture (SEA)

In recent years, the Secretariat of State for Agriculture (SEA) has taken an increasingly important role in integrating and coordinating public sector activities affecting agriculture. The emergence of the SEA as the key institution in the sector is due to its relatively ample resources; an increasingly effective data gathering, evaluation, and planning capacity;

and its achievement in the 1970s of a stable, dedicated, and capable cadre of mid- and high-level technocrats below the top-level political appointees. The SEA offers a growing potential as an effective instrument for public sector intervention to encourage and manage agricultural and rural development.

The legal mandate of SEA includes the formulation and direction of the country's agricultural policy, provision of essential services for agriculture, and coordination with related agencies on virtually all aspects of agricultural and rural development. Many aspects of policy and public investment, however, are the responsibility of other institutions, leading to severe problems of coordinated actions and integrated programs in the public sector.[1/]

The SEA's primary location of activity includes its national administrative offices at the Centro de los Heroes in Santo Domingo, the Center for Agricultural Research and Extension (CNIECA) in San Cristobal, the National Agriculture and Development Center (CENDA) in Santiago, seven regional offices, and five regional agricultural research stations.

The basic functional organization of the SEA includes two staff subsecretariats (Planning and Administration) and four technical subsecretariats (Crop Production, Livestock, Natural Resources, and Rural Development[2/]). Through its subsecretariats, the SEA undertakes developmental and adaptive research; performs periodic production surveys; distributes seed and plant

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[1/] Aquino, Carlos. Fundamentos para una Estrategia de Desarrollo Agricola, ISA, Octubre 1978.

[2/] An organizational chart is not shown due to the uncertainties about the reorganization of SEA that existed at the time this material was last revised (August 1979).

materials; provides farmer training, credit, inputs, technical assistance, market information, and other services; promotes conservation measures and rural infrastructure development; assists agri-businesses; and performs an increasingly effective role in sectoral planning and policy analysis for agriculture. The SEA employs about 3000 individuals, of whom some 1800 are in administrative and support roles and the remainder are classified as technicians.[1/]

Despite problems of low qualifications of mid- and low-level technicians, lack of field experience, and a large number of non-professional positions, the Secretariat is asserting increasing leadership in the public sector. SEA has accelerated the professionalization process and its service orientation. Qualified professionals have been placed in many key positions and improved coordination is evident within SEA and between SEA and other public sector institutions.

By law, the Secretariat of Agriculture forwards annual budget requests of all agricultural-sector institutions to the National Budget Office, where the final budget is prepared. Subsequent requests for disbursements are similarly forwarded to the Secretariat of State for Finance through the SEA, which in addition must approve individual expenditures against those disbursements. This mechanism gives the SEA theoretical control over both the programs for which funds are budgeted and over actual disbursements. In practice, the control has not been effective. Until recently, the Secretariat has lacked the staff to analyze program expenditures effectively. Its authority to enforce its budget role has not been adequately supported

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[1/] 1978 estimates.

at the level of the Presidency. Nevertheless, its capacity to exercise this role is improving with the continuing upgrading of the professional competence of SEA personnel and a growing recognition of its capability throughout the government.

In 1977, the SEA began a program of decentralizing its operations by setting up regional offices. The idea of this reorganization was to make the regional offices responsible for executing all programs of the SEA within their regions or responsibility. Technical support would be provided by the staff of the central departments. The organization of the regional offices includes advisory councils and committees, which can serve as a basis for increased local participation in planning and programming.

Total SEA expenditures for 1967-77 are shown in Table 6.1. Some increases in nominal expenditures have occurred in recent years. In real terms, however, budget levels have changed very little. Foreign resources have represented 25-35 percent of SEA expenditures during the 1970s.

The SEA expenditures are only part of total governmental spending for agriculture. In fact, in 1976-77, SEA controlled directly only 30-40 percent of total agricultural expenditures.

Total public expenditures for agriculture and irrigation grew from RD$11.8 million in 1966 to RD$87 million in 1976. In 1976, expenditures budgeted to agriculture were RD$52 million, while RD$25 million was spent on irrigation. Agricultural expenditures (excluding irrigation) on current and capital accounts in 1977 totaled RD$50 million. In 1978, expenditures at the level of RD$59 million were planned. There is an obvious need to increase the scale of public expenditures in support of agricultural and rural development. To be convincing to usually conservative public officials,

Table 6.1. Secretariat of Agriculture Expenditures, 1966-77.

Year	Current Expenditures[a] (current DR$000)			Real Expenditures[b] (deflated DR$000)
	Domestic	Foreign	Total	
1966	11,337	7,822	19,159	17,905
1967	10,567	5,269	15,836	14,786
1968	9,881	205	10,086	8,997
1969	9,937	2,223	12,160	10,555
1970	10,236	3,403	13,639	11,687
1971	10,300	3,429	13,729	11,594
1972	10,376	3,167	13,543	10,774
1973	10,657	2,618	13,275	10,034
1974	10,993	98	11,091	7,257
1975	15,879	3,411	19,290	10,716
1976	17,475	2,988	20,463	11,127
1977	19,929	2,582	22,511	11,167

Source: USAID, Santo Domingo

[a] Reflects actual expenditures, which are frequently less than budget allocations.

[b] Deflated by GOP implicit price deflator, 1962 = 100.

the case for increased funds must be made on the basis of programs that are productive in terms of output growth, job creation, improved nutrition, and reduction of poverty. This linkage of objectives to policies and programs is the theme of Chapter 7.

6.2 The Agrarian Reform Institute (IAD)

IAD is a semi-autonomous agency with a broad set of responsibilities and powers related to agrarian reform. In administering its agrarian reform projects, IAD often undertakes public works, irrigation, extension, and credit functions, as well as land distribution. IAD has approximately 450 permanent employees in Santo Domingo and 250 distributed throughout the country. Its land reform programs are analyzed in Chapter 3.[1/]

6.3 Agricultural Bank

This autonomous institution was founded in 1945 to provide credit to the agricultural sector. Its present structure and functions were legislated in 1963. The Bank's primary goal is to provide the credit facilities needed for the growth and diversification of agricultural production in order to raise the level of rural living and contribute to the country's economic development. Another major responsibility is to complement the program of the IAD in agrarian reform.

The Bank's facilities include a head office in Santo Domingo and a series of regional offices that coincide with the regions of SEA. The Bank also operates about 23 branch offices throughout the country.

Principal sources of the Bank's resources are its capital stock and reserves, discounts from the Central Bank, government trust funds, and

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[1/] The new government stated its intentions to place IAD under the control of SEA. However, problems associated with the land-owning status of the Institute apparently make it necessary for IAD to continue as a decentralized entity. Thus, coordination problems are likely to continue.

international loans. Loans from international aid agencies have been the major source of increases in the Bank's resources since 1966. The Bank does not employ any means for directly mobilizing domestic resources in that it does not provide checking-account or time-deposit services.

Among the Bank's many lending programs, there are two of special concern to small farmers. One if the Bank's obligation to lend to the beneficiaries of the land reform program, although the government has the ultimate responsibility through the Agrarian Reform Institute to cover any bad debts that result. Second, since 1974, under the Agricultural Sector Loan 517-T-027 from AID, the Bank has implemented a supervised credit program for small farmers in collaboration with SEA. The essence of this program is that the technicians of SEA identify credit prospects among small farmers and help them work out a farm management plan which incorporates the use of new inputs and technology. The Bank then approves the plan and makes loans to the farmers. SEA continues, however, to provide advice and technical assistance. (Credit programs were described in more detail in Chapter 5).[1/]

6.4 National Water Resources Institute (INDRHI)

This organization is the key public sector institution for the construction, operation, and maintenance of irrigation systems. It identifies and evaluates irrigation project proposals and carries out construction

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[1/] The government also considered placing the Bank in the SEA but, again, discarded the idea in light of problems of legal status and responsibilities. It does not seem, therefore, that the expected reorganization will solve problems of duplication and coordination (see Section 6.10).

of small systems. Large dam construction projects are carried out by corporations created for that purpose. Five of these corporations are in operation (Valdesia, Sabana Yegua, Rincón, Sabaneta, and Este).

Over the past decade, the government has invested an estimated 60 million pesos in irrigation infrastructure.[1/] INDRHI, with assistance from the InterAmerican Development Bank, has completed a national inventory of water resources and a plan for irrigation development. The projects under construction and planned will more than double the irrigated area.

By the end of this decade, a great deal will have been accomplished in engineering and structure, but much less attention will have been given to actually managing the use of the water resources. A conclusion of this assessment is that the time is appropriate to implement a water management program complementary to the construction program. Broad outlines for a management program covering both land and water were given in Chapter 2. More specific recommendations, emphasizing the role of SEA's new Subsecretariat for Natural Resources, are provided in Chapter 7.

6.5 The Price Stabilization Institute (INESPRE)

In 1969, INESPRE assumed the price stabilization functions for agricultural commodities. Its basic mandata is to assure fair prices to consumers and producers in basic commodities. It has an authorized capital of RD$25.0 million and employs approximately 200 operational, administrative, and management personnel. The Institute has the physical capacity to dry, grade, store, and merchandise paddy rice, corn, and beans. At present, INESPRE regulates support prices and marketing for a dozen commodities

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[1/] Speech by Pedro A. Breton, Secretary of State for Agriculture, "Hacia un Nuevo Enfoque del Process de Desarrollo del Sector Agropecuario," Santo Domingo, November 24, 1977.

(see Chapter 5).[1/]

Initial operating capital and funding for construction of primary facilities of INESPRE were USAID-sponsored. The Institute has become a significant factor in the internal market for some important food commodities. To resolve problems of policy and operations, the Institute has developed departments of marketing and special studies, and has received foreign technical assistance and initiated some market investigation work. In addition to its regular budget, INESPRE uses funds derived from commodity sales to carry out its functions. The operations of INESPRE were described in more detail in Chapter 5.

6.6 The Institute of Cooperative Development (IDECOOP)

IDECOOP is an autonomous agency that was formed to administer cooperative activities. In 1974, IDECOOP was involved with 236 cooperatives, of which 46 were agriculturally-oriented. Total cooperative membership was about 53,000, including the 8,000 members in the agricultural cooperatives. IDECOOP's recent major activities have been in agriculture, however, since loan assistance has been available to it for that purpose.

Total employees in IDECOOP and its eight regional offices number about 250, of which few can be classified as professionally-trained agriculturalists or management specialists. Additionally, IDECOOP receives technical assistance from SEA, which assigns some personnel to IDECOOP's regional offices. Even though major improvements have been made in IDECOOP's organizational structure over the past few years, it still lacks sufficient operating funds, policy guidance, and personnel to be an effective stimulant to

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[1/] Rice, beans, corn, sugar, onions, garlic, chickpeas, plantains, bananas, potatoes, peanut oil, and soybean oil.

cooperative development.

Although its operational budget comes directly from the GODR, IDECOOP has depended to some extent on AID and the IDB for program financing. A serious lack of trained personnel has been somewhat overcome by a series of in-country training programs, started in 1972 and financed under USAID Loan 517-L-020.

In 1974, IDECOOP listed 8,000 members in 46 agricultural cooperatives, perhaps 20 of which had achieved a degree of viability. In terms of technical assistance and credit, the cost of cooperative development in the Dominican Republic has been quite high in terms of the number of cooperatives reaching a threshold level of operating stability.

Very few cooperative managers in the system have had formal training beyond high school. For this reason, IDECOOP often assigns its employees to serve in management roles. Since government employees do not gain any direct benefit from profitable operations of the cooperative, they usually take no more than a moderate interest in the management of the cooperatives.

6.7 The Dominican Center for the Promotion of Exports (CEDOPEX)

CEDOPEX was created in April 1971, and in September 1972 became the single public agency responsible for promoting exports and servicing export industries.

With the Dominican Exporters Association (ADOEXPO), a private group, CEDOPEX has begun publication of a professional magazine to provide general information on export opportunities. It has established a technical reference library on markets, prices, grades and standards for the use of exporters and planners. CEDOPEX also publishes up-to-date data on foreign markets.

6.8 Community Development Office (ODC)

The ODC is oriented toward the development of low-income groups. It lends to groups who do not have access to commercial bank credit. The office receives funds from the government, and makes loans for many purposes, including agriculture. Most loans are made in small amounts. In 1974, total ODC loans for agricultural purposes were very limited, and most went for livestock activities.

6.9 The Dominican Development Foundation (DDF)

The DDF was founded in 1920 and reorganized in 1966 with the objective of promoting social and economic development among low-income groups.

The Foundation, a private nonprofit organization, receives funds from donations of members and non-members (including domestic and foreign sources), domestic and international loans, operations and other sources. The basic lending instrument is a rotating fund for organized groups that do not have normal access to commercial credit. By mid-1977, the DDF had formalized 329 group loans benefiting 6,055 individuals for a total of RD$3,473,449.[1/] The associations are responsible for making subloans to individuals and for repaying the loan to DDF. Technical guidance and education to improve the functioning of the associations are also provided.

6.10 Reorganization of the Public Agricultural Sector

The new government is taking steps to reform the organization and

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[1/] DDF has requested an AID loan of $10 million and a grant of $509,000 to expand and improve its assistance to the rural poor. Loan funds would be used for production and marketing credit, rural small enterprise loans, and rural home improvement loans. DDF expects to obtain a loan repayment guarantee from the Central Bank. See USAID, Dominican Development Foundation, project no. 417-0124, July 1978.

administration of the agricultural sector.[1/] Its intention is to give to the SEA primary responsibility for policy determination and coordination. The reorganization will include the following:

1) Activiate the Consejo Nacional de Agricultura as a means for policy coordination, chaired by the Secretary of Agriculture with participation from public institutions and private organizations;

2) Create a Junta Directiva for the public agricultural sector, chaired by the Secretary of Agriculture with membership including the subsecretaries and directors of decentralized institutions;

3) Maintain the Subsecretariats for Sector Planning and Administration as support groups and organize operational Subsecretariats as follows:

   a. Renewable Natural Resources
   b. Crop Production
   c. Livestock
   d. Rural Development (Research, Extension, and Training).

4) Reorganize and continue as decentralized institutions dependent on the SEA:

   a. Agrarian Reform Institute
   b. Agricultural Development Bank
   c. Agricultural Marketing Institute (INESPRE).

5) At a later date, integrate the functions of INDHRI with the operation of SEA;

6) Continue the seven regional offices of SEA as the primary level for program implementation.

[1/] Mejia, R. Hipolita, Secretary of Agriculture, "La Politica de Desarrollo Agropecuario del Nuevo Gobierno Constitucional," Santiago, October 25, 1978.

The thrust of these changes is to strengthen the coordinating and integrating role of SEA in agricultural policy and programs. It is not yet known when this reorganization will be implemented nor how these reforms will work in practice.

6.11 Higher Education

Professional and technical level training and research are carried out at the Autonomous University of Santo Domingo (USAD), the Catholic University of Madre y Maestra (UCMM) of Santiago, and the Pedro Henríquez Ureña University (UNPHU) of Santo Domingo. The relationships between the SEA and these institutions have been steadily improving in recent years, and full cooperation in all phases of agricultural education and research is rapidly becoming a reality.

The Superior Institute of Agriculture (ISA), associated with UCMM in Santiago, has emerged as high-quality agricultural secondary school and two-year agricultural college. Its physical facilities and staff resources have improved significantly in recent years.

Under AID loans 027 and 029, steps are being taken to enlarge a number of existing university faculties to accelerate the training of specialized professional technicians. Additionally, new disciplines are being developed at each of the three principal Dominican universities to supply graduates in fields where shortages are anticipated. However, even with such improvements, the supply of graduates is likely to be insufficient to meet the anticipated demand (see the appendix to this chapter).

6.12 Agricultural Research and Extension

Efforts to develop an agricultural research system in the Dominican

Republic date only from 1965. The present research program began with the establishment of the National Center for Agricultural Research, Extension, and Training (CNIECA) in San Cristobal. The 1974 Sector Assessment identified several constraints to agricultural research development and the effective utilization of research results. First, the organizational structure was found to be inadequate; second, budget allocations were insufficient and often irregular; and third, the staff was not adequate to meet the requirements placed on the Center. Finally, dissemination of results was ineffective, partially due to the lack of coordination with the extension service.

Since 1974, several actions have been taken to improve the research system. In 1974, the Northern Center for Agricultural Development (CENDA) was created in Santiago. CENDA forms a component of the national agricultural research system. In addition to CNIECA and CENDA, the research complex of the country includes seven substations located to cover the principal crop and livestock producing areas of the country. Presently, a total of 118 SEA researchers are working in all research centers. A reasonably good research program and administrative system is in operation.

Research efforts are directed increasingly toward the small and medium-sized farmer. Specialists at the Rice Research Center in Juma believe that rice production could be doubled if farmers would adopt improved practices and varieties now in existence. A similar situation exists with respect to other crops, as shown in Table 6.2.

An AID-financed study of crop research and administration in the Dominican Republic, completed in August 1975, indicated that one of the main continuing problems faced by CNIECA is a lack of adequate budget

Table 6.2.

YIELD TRENDS FOR PRINCIPAL AGRICULTURAL PRODUCTS
BASED ON THREE-YEAR MOVING AVERAGES
1962-64; 1968-70; 1974-76

	1962-64	1968-70	1974-76	SEA Target 1977 a/	Yield Expected with good Management b/
		(MT/ha)			
Sugar	70.9	58.6	60.5	-	80.0
Rice (Paddy)	1.6	2.5	2.1	2.4	1.8- 3.6
Red Beans	0.8	0.9	0.9	1.0	1.4- 2.2
Sweet Potato	8.7	9.3	8.1	8.5	14.4
Corn	1.4	1.8	1.3	1.5	1.8- 2.2
Plantain	4.7	4.4	5.9	7.3	n.a.
Cassava	8.4	10.5	7.9	8.0	10.8-14.5
Cacao	0.6	0.5	0.5	-	2.2
Coffee	0.6	0.6	0.5	-	2.2
Tobacco	0.9	1.2	1.0	-	1.4
Pidgeon Peas	n.a.	n.a.	1.8	-	4.3
Peanuts	n.a.	0.8	0.8	-	2.2

a/ As stated in the SEA Annual Plan, 1977.

b/ Based on findings of a study team from the International Fertilizer Development Center which visited the Dominican Republic in 1975. For sugar, based on recommendations of Bookers' study.

Source: National Statistical Office; Central Bank; SEA; USAID.

allocations.[1/] The study also estimates that shortages of trained personnel will continue to be a serious constraint for some time in spite of special efforts to meet the expanding need for trained personnel in the agricultural sector. Such shortages of personnel and other resource limitations dictate the need to take maximum advantage of original agricultural research work done in other countries by adapting applicable findings to the Dominican situation. An attempt to utilize existing sources of applicable research is now underway under SEA's Adaptive Research Program, partially funded by AID. However, if group farming concepts become more widely applied in the Dominican Republic, new research directions may be required to adapt technology to changing land use systems.

The status of agricultural extension is similar to that of the research system in that it started with a base of near zero in the mid-sixties and now has an operating structure in place. Also, similar problems exist. First, there is an inadequate number of agents in relation to the number of farmers needing assistance. Second, backed with only limited applied research the agents do not have access to relevant information on needs and requirements of the majority of the small farmers. More emphasis is needed on developing and transferring information that takes into consideration the environmental and economic conditions and attitudes of the rural farmer; e.g., high risk aversion, poor access to markets, limited access to irrigation, poor soil conditions, high cost or unavailable inputs.

Thus, although the dissemination of research results has improved considerably since 1974, the system still falls short of meeting needs.

[1/] William C. Kennard, "Crops Research and Its Administration in the Dominican Republic," mimeo, USAID/DR, August, 1975.

Additional extension agents funded under the PIDAGRO program are being utilized in an effort to strengthen the linkage between research and extension. Moreover, CENDA has recently appointed several "disseminators" or "communicators" for the same purpose, and the SEA, as a component of AID Loan 029, is further strengthening research/extension linkages.

Some indication of the gap that remains is given by the small percentage of small, medium, and large farms that received technical assistance in 1975 which were 16.9, 23, and 26, respectively.[1/] These figures suggest that not more than 20 percent of the farms are being reached by the existing extension system. There is, therefore, need to define a strategy for developing research/extension programs that can effectively and efficiently serve small farmers. Farmer organizations may well be an important element in these programs.

6.13 Agricultural Policy Formulation and Implementation

This section briefly reviews the institutional structure of the planning system that has evolved in the country. Planning offices exist both at the global, or macro, level and at the sector level. In addition to the sector planning office in SEA, several of the decentralized agencies related to the sector have planning and programming units that do planning and project preparation related to the functions of their specific organizations.

Although a Junta Nacional de Planificacion was created in 1961, it was not until the organization of the Oficina Nacional de Planificacion (ONAPLAN) that formal institutionalized planning began to be utilized. ONAPLAN is responsible for the preparation of plans for the country's socioeconomic development and for the coordination of the overall developmental efforts of the public sector. In addition, this office coordinates

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1/ Agricultural Sector Survey data.

the activities of the international donor agencies and manages feasibility studies for proposed investment projects. The office has a staff of approximately 75, some 30 of whom are professional-level technicians.

One of ONAPLAN's principal activities has been the publication of studies of the development process, among which one of the most important was the Plataforma para el Desarrollo Económico y Social de la República Dominicana, 1968-85. More than a plan, the Plataforma was a diagnostic essay on the nature of the economy, its performance, and major structural reforms, especially agrarian reform, needed to improve the welfare of the rural poor.

In recent years, useful annual reviews of the economy have been published by the Comisión de Economía of the Academia de Ciencias de la República Dominicana. The first, Economía Dominicana, 1975, was issued early in 1976, and has been followed by Economía Dominicana, 1976, (published in 1977), and Economía Dominicana, 1977 (published in 1978). These studies are widely recognized for their analysis of the structure and performance of the economy and for their recommendation for policy modifications.

The First National Development Plan, 1970-74, was developed by ONAPLAN and adopted in preliminary form in 1970. A final version was never approved, however. This plan established macro and sector growth targets and recommended a large-scale program of public investments in infrastructure and service projects.

An agricultural development plan was published in 1971 for the 1970-74 period. It emphasized the necessity for increasing agricultural ouput and recommended substantial investment in irrigation systems. Production goals were to be reached by raising yields on 2.9 million tareas in production

and bringing 640,000 "new" tareas into production. The plan recognized the need to improve credit, research, extension, marketing, and other services. A modest program of land redistribution was included, in contrast to the massive, large-scale agrarian reform proposed in the Plataforma.

From 1972 to 1975, the OAS sponsored the research and design of the first Dominican regional development plan known as Plan DELNO. This major regional project had as its main goal the integrated development of 9,562 square kilometers in the poor and isolated northwestern region bordering Haiti and containing approximately 16 percent of the nation's population. Plan DELNO, concentrated on the design of 22 specific projects that ranged from forest use to telecommunication systems, calling for a total investment of RD$34,000,000. The plan was supported by the government. However, other than the Nagua-Chacuey irrigation project and an increase in pigeon pea acreage, no major effort to implement this multi-project regional development plan has taken place.

In 1976, ONAPLAN published a new planning document, Posibilidades para el Desarrollo Socioeconómico de la República Dominicana, 1976-86. This study also proposed a combination of structural reforms and policy changes to create a more equitable distribution of the benefits of economic growth. In the agricultural sector, the relationship between income and structural levels was explored, and a land reform program to improve incomes and employment of the rural poor was recommended.

Within the agricultural sector, steps to improve the SEA's planning and policy analysis capabilities were begun in the 1970s. In 1976, the Subsecretariat for Sector Planning was created with AID and FAO support. This unit became a major subsecretariat in SEA with a core group of about

ten capable and well-trained professionals. Initially, the group was under considerable pressure to design and promote programs to rapidly increase agricultural production. There was obvious concern whether such programs would do much to benefit the 75 percent of the rural population that barely subsist at present. The planning, research, and policy analysis activities of this group focused attention on this issue, which was clearly consistent with AID's mandate to assist the government in reaching the rural poor.

With technical assistance from an FAO advisor, the Subsecretariat prepared an agricultural development strategy, Diagnóstica y Estrategia del Sector Agropecuario, 1976-86. This document, consistent with the contemporary ONAPLAN publication, concentrated on the serious malnutrition of the 75 percent of the rural families with inadequate income to meet their food needs. It proposed a massive agrarian reform program to improve income distribution and increase production of domestic food products. This document was extremely effective in calling attention to the nutritional consequences of rural poverty and has stimulated additional planning and policy analysis efforts.

In 1977, the Planning Subsecretariat began to publish annual operational plans (Planes Operativos). These annual plans contain budget information for the SEA programs and also set production targets by crops. It is not clear how these targets are selected nor what relationship exists between the programs, the targets, and the budget allocations.

Based on the 1976 Estrategia, a medium-term Agricultural Development Plan was prepared for 1978-82. This plan reviewed the performance of the economy with special emphasis on employment, agrarian reform, credit, and

marketing. Growth targets were set overall and by products, taking into account domestic consumption and export markets. The plan then presented production programs by commodity and programs to expand agrarian reform and technical services reaching the rural poor. A total investment in excess of two billion pesos was proposed. One part of the plan -- known as Plan Sierra -- is a regional development project for the poorer, higher-altitude region of the northwest.

The 1976-82 Plan is being revised by the new government. Fortunately, the technicians who prepared it continue in key planning positions, and are working on the revised version, which is expected to be completed late in 1979. In comparison to the situation five years ago, a competent agricultural planning and policy analysis capability exists and is producing planning and analytical information.

Two major deficiencies can readily be identified. The first is that the SEA Planning Subsecretariat of the existing system has been limited by SEA's mandate to concern with programs to be implemented by SEA itself. A sector-wide orientation that can develop an information base, assess policy alternatives, and design programs that will result both in increased production and benefits to the rural poor. (This change is implicit in the organizational changes instituted by the new government.) To develop this information base and the capability to use it to identify a full range of policies, programs, and projects to simultaneously meet nutrition, output, income, and employment objectives is a difficult and challenging job. Although considerable progress has been made, much still needs to be accomplished to achieve the required sector planning and policy analysis capability.

The second deficiency is in planning and policy analysis at the macro level. Actions at the sector level are often limited by the constraints and effects of national policies. Two obvious examples cited in Chapter 1 are monetary/fiscal policies favoring capital-intensive techniques in construction and industry, and exchange-rate/trade policies that result in low-cost food imports competing in domestic markets and low incentives for exports sold in international markets. In addition, questions of investment priorities for irrigation, roads, electrification, and social services for the rural sector must be settled in a macro, intersectoral context. Thus, the identification and implementation of coherent and effective agricultural/rural development strategy will be made much easier if a complementary macro planning and policy analysis capability exists.

The government has prepared a 1980-82 public-sector investment plan in which it has stated its goals and specified its investment priorities. The goals of this program are growth of 5.5 percent annually for GDP and 6.1 percent annually for exports, and creation of 56,000 new jobs yearly. Imports are to be limited to not more than 21 percent of GDP.

Among economic sectors, highest priority has been given to agriculture, for which a sectoral growth target has been set at 4 percent per year, and within which targets have been specified for expansion of the land reform and irrigation programs. Among the social sectors, health and education have been assigned highest priority. Consistent with these priorities, investment in economic and social infrastructure has also been given high priority, with emphasis on the reconstruction of the road network, and on the increased generation capacity and improved distribution of electricity.

The government has made it clear that the future spatial/sectoral emphasis of public expenditures will be rural, where most of the poor reside. The three-year plan includes programs and projects with a total investment cost of RD$2,676 million. Of this amount, RD$212 million will have been spent before 1980 and RD$760 million will be spent after 1982. The balance of RD$1,705 is to be spent between 1980 and 1982. The distribution of the 1980-82 investment among major sectors is given in Table 6.3. However, the development program includes not only fixed investment, but also financial expenditures of a current nature, which will amount to RD$5,092 million (RD$2,878 will be spent in 1980-82). It is the current development oriented outlays that more accurately reflect the government's priorities, but the distribution of these planned expenditures among sectors is not yet available. The major share of resources is intended to go for agricultural development and is reflected in allocations to the Secretariat of Agriculture, the Agricultural Development Bank, the Agrarian Reform Institute, and the Water Resources Institute. Infrastructure development programs, mainly road network reconstruction and maintenance, are included in the provisions for the Public Works Secretariat. Major social programs include funds to the Secretariat of Public Health for the construction of rural clinics and hospitals, and to the Secretariat of Education for the construction of rural schools and training centers.

Although concern with the need for equity-oriented growth is evident, not much progress has been made in obtaining facts on employment, understanding the processes that skew the benefits of development to the few rich, and designing programs that will result in growth with redistribution. A planning framework to guide efforts in this direction is presented in Chapter 7.

6.14 External Financial and Technical Assistance for Agricultural Development

6.14.1 Integrated Program for Agricultural Development (PIDAGRO)

As an outgrowth of the 1970-74 Agricultural Development Plan, the government secured a RD$24.8 million loan in 1973 from the InterAmerican Development Bank that was expected to have a major impact on the sector. The IDB funds were to be used in conjunction with RD$12.4 million government contribution for a four-year program that covered five major areas[1/]:

Activity	IDB Funds	GODR Funds (million RD$)	Total
Agricultural Credit	14.2	3.3	17.5
Agricultural Technology	6.0	6.3	12.3
Annual Health	2.4	2.2	4.6
Rural Cadastre	1.9	0.6	2.5
IAD	0.25	0.05	0.3
TOTAL	$24.8	$12.4	$37.2

The general objectives of this program (PIDAGRO) were:

(1) Meet the increased demand for food from an improved national diet and larger population,

(2) Diversify and expand agricultural exports,

(3) Create employment for the rural poor,

(4) Increase the small farmer income, and

(5) Set up the necessary pre-conditions to redistribute income among farmers.

The GODR, with the approval of IDB, created the "Fondo Especial para el Desarrollo Agropecuario" (FEDA) as a new institution responsible for funding, coordinating, and educating the PIDAGRO programs which would be

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[1/] This program was later enlarged by an additional grant of $833,000 for forestry, water resources, and program administration.

Table 6.3. Planned Distributions of Public Sector Investment by Sector

(millions RD$)

Sector	Total	Spending		
		Before 1980	1980-82	After 1982
Agriculture	612.7	44.6	281.8	286.3
Health	114.7	12.1	102.6	-
Education	82.1	-	82.1	-
Water Supply and Sewerage	194.3	-	122.6	71.7
Housing	349.0	39.0	310.0	-
Transportation	362.3	26.9	262.4	73.0
Power	698.3	84.5	341.5	272.3
Industry	126.8	-	121.7	5.1
Tourism	112.5	5.2	56.2	51.1
Other	23.6	-	23.6	-
Total	2,676.3	212.3	1,704.5	759.5

Source: ONAPLAN

carried out by the existing agencies. This resulted in drawing staff and resources away from existing institutions rather than strengthening their capacity. Also, as agencies prepared plans and projects for financing by PIDAGRO little, if any, inter-institutional coordination to resolve overlapping functions took place. For example, SEA, BAGRICOLA, IAD, CEDOPEX, and SEA each have credit programs. IAD and INDRHI are both involved in irrigation but little coordination has taken place between the two agencies even though IAD is the major beneficiary of the large scale irrigation development projects INDRHI has carried out.

A new IDB loan, PIDAGRO II, has been approved. This loan involves a total program of RD$27.4 million, of which IDB will provide RD$19.4 million, and the government RD$8.0 million. The allocation of funds by activity is:

Activity	IDB Funds	GODR Funds (million RD$)	Total
Agricultural Credit	16.7	5.5	22.2
Reforestation & Soil Conservation in the Tavera Watershed	1.2	1.5	2.7
INDHRI	.9	.4	1.3
IAD	.6	.6	1.2
Total	$19.4	$ 8.0	$27.4

The bulk of this new program is for credit for crop and livestock production. The forestation and soil conservation component is directed toward the rehabilitation of some 4,000 hectares in the watershed feeding the Tavera Dam. The other two components are designed to train staff and improve the organizational structure of two key decentralized agencies in the agricultural sector. PIDAGRO III, which could provide major support for an expanded land redistribution program, is under discussion with IDB.

In addition to PIDAGRO, IDB has provided large-scale funding for regional development, irrigation, power and rural electrification, port improvement, university development, and pre-investment studies.

6.14.2 National Program of Agricultural Development for Small Farmers (PPA)

In 1974, AID signed a loan agreement for $12 million as part of a RD$34 million for a program designed to address four constraints identified in the 1974 Sector Assessment:

1) scarcity of credit for small farmers,
2) limited use of modern production inputs,
3) marketing deficiencies, and
4) training for farmers and professional agricultural workers.

The general objectives established for the PPA program were:

1) Increase production of domestic food crops,
2) Increase productivity of small farmers,
3) Increase agricultural employment,
4) Human resource and institutional development, and
5) Increase, and improve distribution of, rural income.

The original PPA-I program consisted of five components:

Activity	AID Funds	GCDR Funds (million RD$)	Total
Credit	9.0	14.0	23.0
Marketing and Farm Management Research	.3	1.0	1.3
Human Resources	1.7	1.0	2.7
Roads	1.0	1.0	2.0
Guarantee Fund	-	5.0	5.0
Total	$12.0	$22.0	$34.0

In 1976, a subsequent AID loan of $15 million was provided as a part of PPA-II, a program that totaled RD$30 million. This program was designed to strengthen the capability of the SEA in formulating and implementing policies and projects that assist small farmers. PPA-II, now in execution, has three major components:

Activity	AID Funds	GODR Funds (million RD$)	Total
Sector Planning, Coordination, and Evaluation	1.5	1.5	3.0
Assistance for Small Farmers	11.8	11.8	23.6
Socioeconomic Rural Development	1.7	1.7	3.4
Total	$15.0	$15.0	$30.0

In 1977, funds from this loan represented 34 percent of total SEA expenditures. More recently, AID has provided a loan of $6,000,000 to support a program to combat African Swine Fever. Other than agricultural loans,AID lending in recent years has been limited to the health sector and support for regional development finance institutions that serve the Dominican Republic.

6.14.3 Other External Assistance

The World Bank has made no direct loans for agricultural development. Loans for Family Planning and Preventive Health Services and for Primary and Vocational Education are relevant to the needs of rural areas.

The United Nations, through the UNDP, provides significant grant funding, much of which goes to agricultural or related projects. The Organization of American States (OAS) provides small amounts of technical assistance.

APPENDIX

TO

CHAPTER 6

A6. Needs for Professional Agricultural Workers

The demand for trained manpower in the agricultural sector is a derived demand in that professional workers are needed for the contributions their services make to the sector's performance. The required services are those necessary to implement the country's agricultural development program. The demand for these services cannot be adequately estimated until the nature of the country's strategy and elements of its development program have been identified. In this appendix, preliminary estimates of numbers of professional workers needed to implement a wide range of activities to deal with urgent problems of output, employment, income and consumption are made. It begins with a listing of the types of activities that will be needed to carry out the objectives for the sector as discussed elsewhere in the assessment. From this listing of illustrative activities, estimates of the trained manpower that will be needed to meet specific objectives are derived and compared to available numbers.

(1) Agricultural Research: Research at the two national agricultural research centers and the five regional agricultural centers (to serve the five ecologic zones) need to be improved and greatly expanded in order to provide a basis for technological change:

(a) Variety testing for all the important crops, including fruit and vegetable crops

(b) Fertilizer trials for all the important crops

(c) Irrigation trials for all the irrigated crops

(d) Plant protection research for all the important crops

(e) Semi-detailed and detailed soil surveys for all the agricultural soils

(f) Soil conservation research

(g) Animal breeding and nutrition research for all the important farm animals

(h) Veterinary research

(i) Agricultural engineering research

(j) Ecologic studies

(k) Food technology research

(l) Forest research

(m) Social science research: agricultural economics and rural sociological research on farms in the different regions; input and output marketing research; agricultural sector analysis; agricultural policy research.

(2) Agricultural Extension: a complete dissemination system to farmers, agri-business firms and relevant public agencies with all the kinds of information listed above.

(3) Agricultural Input Distribution System: to bring all the needed inputs within physical reach of all the Dominican farmers.

(4) Agricultural Credit System: to bring all the needed inputs within financial reach of all Dominican small farmers.

(5) Seed Multiplication System: to multiply and make available the seeds of all the plant varieties developed or tested and to oversee private sector multiplication and distribution of seeds.

(6) Land Reform Programs: to carry out the distribution of land to small farmers and, in cooperation with the extension service and the credit system, to assist these small farmers in operating their land and other resources effectively.

(7) Agri-business Activities: whatever part of the input and output marketing, seed multiplication, and credit system that is carried on by the private sector will need to be closely coordinated with and, in some cases, assisted by the appropriate public sector agencies.

(8) Irrigation System Design and Management: what is referred to here is the design and operation of those parts of irrigation systems that are off the farmers' lands. These need to be designed and operated with full knowledge of the relevant on-farm agricultural requirements.

(9) Crop and Livestock Production Estimates, Agricultural Sector Accounts, and National Censuses of Agriculture: these are a very important part of the information system for agriculture; the different forms of information generated are very important inputs into the private and public decisions required for an efficient, productive agriculture. These activities should be closely related to the agricultural sector analysis listed earlier. These activities require a good deal of information about, and understanding of, agricultural activities and processes.

(10) Training Activities: large numbers of many different kinds of trained individuals will be required for the Dominican agricultural development programs, all the way from Ph.D.'s to provide research leadership to vocationally-trained small farmers. These training activities will include everything from graduate programs to vocational agriculture training in the middle schools. Among the institutions that might be involved are the three universities (USAD, UCMM/ISA, and UNPHU), the schools for perito agronomo's (PA's), bachiller agricolas (BA's), and maestras en cultivos (MC's); training centers for extension workers, rural high schools, rural middle schools, and universities outside the Dominican Republic.

To simplify the analysis, demands for the above activities will be estimated in the following categories: individuals holding advanced degrees (Ph.D. and M.Sc.) in agricultural specialties, individuals holding undergraduate (B.Sc. or B.A.) degrees in agricultural specialties, and individuals completing two or more years of post-high school training in agricultural specialties (such as peritos).

Agricultural specialties that are considered to require these three trained categories are listed below:

1. Soil science
2. Plant breeding
3. Plant production
4. Plant physiology and plant nutrition
5. Agricultural engineering
6. Hydrology
7. Animal science
8. Veterinary medicine
9. Experimental statistics and biometries
10. Ecology
11. Food technology
12. Forest scientist
13. Agrometeorology
14. Agricultural economics and farm management
15. Rural sociology
16. Agricultural extension
17. Agricultural education (vocational agriculture)

Persons trained at lower levels than the three categories considered

above will be needed in large numbers in all of the research, extension, and development support activities, but no attempt has been made to enumerate those needs here. Even more importantly, one of the effective means to develop competent small farmers is to provide opportunities for rural youth and adult farmers to study both the technical and the practical sides of farming. This certainly should be an important part of the public formal education of rural youth at the high school level. Because many rural youth will not finish high school (some will not have an opportunity to attend high school at all) it would also appear to be important to develop instruction in vocational agriculture at the middle school level. For female students in rural middle schools and high schools, similar instruction in home management should be available, including nutrition, food storage, and family and child care.

A6.1 Preliminary Estimates of Needs for Agricultural Specialists by the Year 2000.

Table A6.1 gives preliminary estimates of the total number of trained agricultural manpower that will be needed by the year 2000 in order to provide the Dominican Republic with agricultural development program capacity for reaching the country's nutritional, employment, output, and income goals. These estimates are broken down into the 17 agricultural specialties listed above. (No estimates are shown here for home economics (home management) because no clear basis exists for making them. Table A6.4 shows that there were 18 agricultural extension workers in home improvement in 1976. (It is not known whether suitable courses, curricula, or faculty are to be found in the DR's institutions of higher education or not.)

Table A6.1

Estimates of the Numbers of Trained Agricultural Manpower that Will Be Needed to Be in Place by the Year 2000, in Order to Meet the Needs of the Agricultural Development Strategy, by Specialty, by Level of Training, and by Development Activity.

Agricultural Speciality	Level of Training	National Research A	Regional Research B	Soil Surveys C	Soil Testing D	Sector Analysis E	Input Centers F	Extension Agents G	Extension Specialists H	Extension Evaluators I	Vocational Ag. Teachers J	Agri. Econ., Marketing Research K	Rural Sociology Ref. L	Seed Multiplication M	Agricultural Credit N	Land Reform O	Agribusiness P	SIEDRA Q	Irrigation Systems R	Crop, livestock estimates, Nat'l Acctg. & Plan S[a]	Water and drainage investig. T	Private LS support system U[b]	Policy research and extension V	Agricul. Instruction W	Total
1. Soil Science	Adv. degrees[c]	8	7	2	2	1	-	-	7	-	-	-	-	-	-	-	2	1	2	-	8	-	1	18	59
	B.Sc. degree	2	3	2	2	-	-	7	7	-	4	-	-	-	-	2	6	2	10	-	4	7	-	10	68
	Peritos, et.al.[d]	2	3	6	10	-	30	7	-	-	6	-	-	-	-	5	2	-	2	-	2	-	-	-	75
2. Plant Breeding	Adv. degrees[c]	7	3	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	1	9	26
	B.Sc. degree	5	2	-	-	-	-	-	-	-	4	-	-	14	-	-	6	-	-	-	-	-	-	5	36
	Peritos, et.al.[d]	3	2	-	-	-	-	-	-	-	6	-	-	4	-	-	-	-	-	-	-	-	-	-	15
3. Plant Protection	Adv. degrees[c]	8	7	-	-	-	-	-	7	-	-	-	-	-	-	-	3	-	-	-	-	-	1	18	44
	B.Sc. degree	2	3	-	-	-	-	7	7	-	4	-	-	4	-	4	12	-	-	-	-	-	-	10	53
	Peritos, et.al.[d]	2	3	-	-	-	30	7	-	-	6	-	-	8	-	3	10	-	-	-	-	-	-	-	69
4. Plant Physiology & Nutrition	Adv. degrees[c]	3	3	-	2	-	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-	-	9	20
	B.Sc. degree	1	4	-	2	-	-	-	7	-	4	-	-	2	-	-	-	-	5	-	-	-	-	5	30
	Peritos, et.al.[d]	1	3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
5. Agricultural Engineering	Adv. degrees[c]	6	3	1	-	-	-	-	7	-	-	-	-	1	-	4	2	2	10	-	10	-	1	10	57
	B.Sc. degree	2	4	-	-	-	-	-	7	-	4	-	-	-	10	10	6	2	20	-	5	-	-	5	75
	Peritos, et.al.[d]	1	3	-	-	-	-	-	-	-	6	-	-	-	-	-	2	-	10	-	5	-	-	-	27
6. Hydrology	Adv. degrees[c]	2	3	3	-	-	-	-	7	-	-	-	-	-	-	5	-	2	10	-	7	-	1	9	49
	B.Sc. degree	2	4	3	-	-	-	4	7	-	4	-	-	-	-	5	-	1	10	-	7	-	-	5	52
	Peritos, et.al.[d]	-	3	3	-	-	-	3	-	-	6	-	-	-	-	4	-	-	20	-	5	-	-	-	44
7. Animal Science	Adv. degrees[c]	2	3	-	-	-	-	-	14	-	-	-	-	-	-	5	-	-	-	-	-	5	1	18	48
	B.Sc. degree	2	4	1	-	-	-	7	14	-	4	-	-	-	10	5	-	-	-	-	-	15	-	10	72
	Periots, et.al.[d]	-	3	-	-	-	-	7	-	-	6	-	-	-	-	4	-	-	-	-	-	20	-	-	40

Table A6.1 (continued)

Estimates of the Numbers of Trained Agricultural Manpower that Will be Needed in Place by the Year 2000, in Order to Meet the Needs of the Agricultural Development Strategy, by Specialty, by Level of Training, and by Development Activity — Continued.

Agricultural Specialty	Level of Training	National Research A	Regional Research B	Soil Surveys C	Soil Testing D	Sector Analysis E	Input Centers F	Extension Agents G	Extension Specialists H	Extension Evaluators I	Vocational Ag. Teachers J	Agri. Econ. Marketing Research K	Rural Sociology Ref. L	Seed Multiplication M	Agricultural Credit N	Land Reform O	Agribusiness P	SIEDRA Q	Irrigation Systems R	Crop, livestock estimates, Nat'l acctg. & plan S[a]	Water and drainage investi. T	Private LS support system U[b]	Policy research and extension V	Agricul. Instruction W	Total
3. Veterinary Medicine	Adv. degrees[c]	2	3	-	-	-	-	-	14	2	-	-	-	-	-	5	3	-	-	-	-	5	1	18	53
	B.Sc. degree	2	4	-	-	-	-	7	14	-	8	-	-	-	-	5	12	-	-	-	-	15	-	10	77
	Peritos, et.al.[d]	-	3	-	-	-	30	7	-	-	6	-	-	-	-	4	10	-	-	-	-	20	-	-	80
9. Statistics and biometrics	Adv. degrees[c]	2	3	-	-	3	-	-	-	3	-	8	-	-	-	-	-	2	3	7	-	-	2	6	39
	B.Sc. degree	2	4	-	-	2	-	-	-	2	6	2	-	-	-	-	7	2	4	7	-	-	-	3	41
	Peritos, et.al.[d]	-	3	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	7
10. Ecology	Adv. degrees[c]	2	3	2	-	-	-	-	4	-	2	-	-	-	-	4	-	1	4	-	-	-	-	6	26
	B.Sc. degree	2	3	2	-	-	-	-	3	-	3	-	-	-	-	3	-	-	3	-	-	-	-	3	22
	Peritos, et.al.[d]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11. Food Technology	Adv. degrees[c]	4	3	-	-	-	-	-	8	-	-	-	-	-	-	-	10	-	-	-	-	-	1	6	32
	B.Sc. degree	4	3	-	-	-	-	-	10	-	20	-	-	-	-	-	10	-	-	-	-	-	-	3	50
	Peritos, et.al.[d]	-	-	-	-	-	-	-	-	-	30	-	-	-	-	-	10	-	-	-	-	-	-	-	40
12. Forest Science	Adv. degrees[c]	4	7	2	-	-	-	-	4	-	-	-	-	-	-	4	10	1	4	-	-	-	1	9	46
	B.Sc. degree	4	7	2	-	-	-	-	3	-	4	-	-	-	-	3	12	-	3	-	-	-	-	5	43
	Peritos, et.al.[d]	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	10	-	-	-	-	-	-	-	16
13. Meterology	Adv. degrees[c]	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	4	-	5	-	-	3	15
	B.Sc. degree	1	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	1	3	-	5	-	-	3	16
	Peritos, et.al.[d]	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2

Table A6.1 (continued)

Estimates of the Numbers of Trained Agricultural Manpower that Will be Needed in Place by the Year 2000, in order to Meet the Needs of the Agricultural Development Strategy, by Specialty, by Level of Training, and by Development Activity -- Continued

Agricultural Specialty	Level of Training	National Research A	Regional Research B	Soil Surveys C	Soil Testing D	Sector Analysis E	Input Centers F	Extension Agents G	Extension Specialists H	Extension Evaluators I	Vocational Ag. Teachers J	Agri. Econ. Marketing Research K	Rural Sociology Ref. L	Seed Multiplication M	Agricultural Credit N	Land Reform O	Agribusiness P	SIEDRA Q	Irrigation Systems R	Crop, livestock estimates, Nat'l acctg. & plans S/a	Water and drainage investi. T	Private LS support system U/b	Policy research and extension V	Agricul. Instruction W	Total
14. Agricultural Economics	Adv. degrees c/	2	7	-	-	-	-	-	7	1	-	10	-	-	10	4	10	2	4	8	4	-	2	10	81
	B.Sc. degree	2	3	2	-	-	30	7	7	-	6	10	-	-	20	3	20	1	3	6	3	-	-	6	129
	Peritos, et.al d/	-	3	-	-	-	-	-	-	-	4	5	-	-	10	-	5	-	-	4	-	-	-	-	31
15. Rural Sociology	Adv. degrees c/	1	-	-	-	1	-	-	-	1	-	-	7	-	-	-	3	1	-	-	-	-	2	6	22
	B.Sc. degree	-	-	-	-	-	-	4	24	-	6	-	7	-	-	-	2	-	-	-	-	-	-	6	49
	Peritos, et.al. d/	-	-	-	-	-	-	3	6	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	13
16. Agricultural Extension	Adv. degrees c/	-	-	-	-	1	-	-	10	7	-	-	-	-	-	-	-	-	-	-	-	-	2	6	26
	B.Sc. degree	-	-	-	-	-	-	500	10	7	6	-	-	-	10	-	10	-	-	-	-	-	-	3	546
	Peritos, et.al. d/	-	-	-	-	-	-	1500	-	-	4	-	-	-	10	-	10	-	-	-	-	-	-	-	1524
17. Agricultural Education	Adv. degrees c/	2	-	-	-	-	-	-	4	1	-	-	-	-	-	-	-	-	-	-	-	-	-	9	16
	B.Sc. degree	1	-	-	-	-	-	-	3	-	6	-	-	-	-	10	10	-	-	-	-	-	-	5	35
	Peritos, et.al. d/	-	-	-	-	-	-	-	-	-	4	-	-	-	-	5	5	-	-	-	-	-	-	-	14
ALL SPECIALTIES	Adv. degrees c/	57	55	10	4	6	-	-	93	15	2	18	7	2	10	31	49	13	43	15	34	10	17	170	661
	B.Sc. degree	34	48	12	4	2	30	543	123	9	96	12	7	20	50	50	113	9	61	13	24	37	-	97	1394
	Peritos, et.al. d/	9	29	9	12	-	90	1534	6	-	98	7	-	12	20	25	64	-	32	4	12	40	-	-	2003
GRAND TOTAL -- All levels		100	132	31	20	8	120	2077	222	24	196	37	14	34	80	106	226	22	136	32	70	87	17	267	4058

a/ Crop and Livestock Estimates, National Economic Accounting, and National Economic Planning. b/ Private livestock subsector support system.
c/ Master of Science and Doctor of Philosophy. d/ Perito Agronomo (PA), Maestro en Cultivo (MC), and Bachiller Agricola (BA).

Source: Domingo Marte who works for the Secretaria de Estado de Agricultura and the U.S. AID Mission, Santo Domingo.

Horticulture is not listed as a separate specialty, although the actual and potential contributions of fruit and vegetable production to nutrition, employment, output and income are large. If the horticultural specialists required for research, extension, and other development support activities are not included in plant breeding, plant protection, plant physiology and nutrition, and food technology, then additional estimates for horticultural specialists would need to be made.

The needs for the different agricultural specialties are broken down into the needs that would require advanced degrees (M.Sc. and Ph.D.), graduates (B.Sc.'s), and pregraduates. Estimates for the number of advanced degree holders needed are not broken down further into M.Sc.'s and Ph.D.'s. Some knowledgeable people believe that about 20 percent of the total advanced degrees should be Ph.D.'s and 80 percent M.Sc.'s. This proportion seems reasonable in light of the fact that Ph.D.'s would be needed largely for graduate instruction and for providing intellectual leadership to research programs or large research projects. The total number of advanced degree holders estimated to be needed by the year 2000 is 661. Using the 20 percent rule would call for about 132 Ph.D.'s distributed over 17 specialties and over the major instruction and research activities. Nearly 1400 B.Sc. degree holders would be needed, about 40 percent of them in extension activities. Slightly over 2000 pregraduates are estimated to be needed, over three-fourths of them in extension activities. These estimates are also shown by specialties, and training levels for 23 development activities deemed to be required in the agricultural development program. These estimates appear large in relation to the numbers of trained manpower now in place in research, extension, or other support activities as given below, but are conservative in the sense that

additional needs could easily be identified.

A6.2 Supply of Trained Agricultural Workers

The number of technicians working in agricultural research and/or instruction in 1976 is shown in Table A6.2. There were 169 technicians at work: 41 advanced degree holders, 94 B.Sc. degree holders, and 34 pregraduates. Ninety-nine of these technicians were working in public research, 13 in private research, and 57 in educational institutions presumably engaged in instruction and research. The colleges and universities had 73 percent of the advanced degree holders, while public research had 65 percent of the graduates and 85 percent of the pregraduates. Eighty-seven percent of the total number of technicians were in only five specialties - animal science, general agriculture, plant protection, soils and plant improvement.

The allocation of technicians to research or instructional units is shown in Table A6.3. Public research was conducted at 14 locations in 1976, including the two national stations: CNIECA at San Cristobal, and CENDA at La Herradura. CNIECA and CENDA accounted for more than one-half of the technicians engaged in public research, while USAD accounted for two-thirds of the technicians working at instruction and research units.

If the activities identified in Table A6.1 as A, B, I, K, L, Q, S, T, and V, are regarded as the whole of the public research sector, then the needs by the year 2000 would be 222 advanced degree holders, 149 B.Sc.'s, and 61 pregraduates. Table A6.2 shows present employment in public research as 9 M.Sc.'s and Ph.D.'s, 61 B.Sc.'s, and 29 pregraduates. This leaves a need for 213 M.Sc.'s and Ph.D.'s, 88 B.Sc.'s, and 32 pregraduates, or a total of 333 by year 2000.

Table A6.2

Number of Technicians Working in Agricultural Research and Instruction, 1976, by Level of Training, Work Sector and Specialty.

Agricultural Specialty[d/]	Post graduate work[a/]				University degree[b/]				Pregraduate[c/]				All levels of training			
	Public research	Private research	Instruction	Total	Public research	Private research	Instruction	Total	Public research	Private research	Instruction	Total	Public research	Private research	Instruction	Total
General agriculture (3)	1	-	4	5	16	1	1	18	9	-	2	11	26	1	7	34
Agricultural engineering (3)	-	-	-	-	-	-	2	2	-	-	-	-	-	-	2	2
Plant improvement (2)	1	-	2	3	6	1	1	8	5	2	1	8	12	3	4	19
Plant protection (5)	3	-	4	7	11	2	1	14	5	-	-	5	19	2	5	26
Soils (5)	3	1	6	10	9	2	-	11	3	-	-	3	15	3	6	24
Plant nutrition (2)	-	-	1	1	5	-	-	5	-	-	-	-	5	-	1	6
Ecology (1)	-	-	1	1	-	-	1	1	-	-	-	-	-	-	2	2
Plant physiology (1)	-	-	1	1	-	-	1	1	-	-	-	-	-	-	2	2
Food technology	-	-	-	-	-	-	1	1	-	-	-	-	-	-	1	1
Statistics and biometrics (3)	1	-	1	2	1	-	-	1	1	-	-	1	3	-	1	4
Forest management (5)	-	-	3	3	-	-	-	-	-	-	-	-	-	-	3	3
Animal science (3)	-	1	5	6	13	3	16	32	6	-	-	6	19	4	21	44
Agricultural meteorology (1)	-	-	1	1	-	-	-	-	-	-	-	-	-	-	1	1
Agricultural education (1)	-	-	1	1	-	-	-	-	-	-	-	-	-	-	1	1
Agricultural economics (2)																
Total	9	2	30	41	61	9	24	94	29	2	3	34	99	13	57	169

a/ Holders of M.Sc. or Ph.D degrees. b/ B.Sc. degree. c/ Pregrado degrees: Maestro en Cultivo (MC); Bachiller Agricola (BA); Perito Agronomo.
d/ The number in parenthesis is the number of options in this speciality.

Source: Diagnostico de la Investigacion Agropecuaria en la Republica Dominicana, working paper to be presented at the Seminar on Diagnosis of Agricultural Research in the Zone of the Antilles, Part an Prince, Haiti, December 1977. Institute Interamerican de Ciencias de la OEA and Departments de Investigacions Agro pecuarias de la Sub secretaria de Estado de Investigacion, Extension of Capacitacion Agropecuaria, Santo Domingo, November 1977.

For instruction, the needs are 170 M.Sc.'s and Ph.D.'s, and 97 B.Sc.'s. On hand are 30 M.Sc.'s and Ph.D.'s, 24 B.Sc.'s, and 3 pregraduates. Needs for the year 2000 would be 140 M.Sc.'s and Ph.D.'s, and 73 B.Sc.'s.

The largest single need for trained agricultural manpower is the extension service. Table A6.4 shows a total of 579 technicians employed in the extension service in 1976: 410 of them as area agents, and 117 as administrators or supervisors. Personnel by level of training are shown in Table A6.5 which shows 436 technical personnel, 96 B.Sc.'s, 298 pregraduates, and 42 without degrees. (No apparent way to reconcile the 579 technicians in Table A6.4 with the 436 in Table A6.5 was found.)

From Table A6.1 the needs in extension (GHI) by year 2000 are for 108 M.Sc.'s and Ph.D.'s, 675 B.Sc.'s, and 1540 pregraduates. Using 436 from Table A6.5 as the current availability, the requirements between 1977 and the year 2000 would be 108 M.Sc.'s and Ph.D.'s, 548 B.Sc.'s, and about 1240 pregraduates.

If we classify activities C, D, F, J, M, N, O, P, R, and U from Table A6.1 as development support activities[1/], then we can estimate a need for trained manpower by the year 2000 of 1,036 technicians - 161 M.Sc.'s and Ph.D.'s, 473 B.Sc.'s, and 402 pregraduates. While data on the numbers of trained technicians now working in these development support activities is unavailable, the number probably isn't very large and certainly far below these estimates of need.

In summary, needs for additional trained manpower by year 2000 are:

[1/] J (Vocational agriculture teaching) could quite logically be classified as instruction but isn't here, except for those who will teach the vocational agriculture teachers.

	Advanced Degree	B.Sc.	Pregrads	TOTAL
Public research	213	88	32	333
Instruction/research	140	73	--	213
Agricultural extension	108	548	1240	1896
Development support	161	473	402	1036
Total	622	1182	1674	3478
Annual	28	54	76	158

If the needs were equal in every year of the 1978-2000 period, then the annual needs would approximate 28 advanced degrees (6 Ph.D.'s, 22 M.Sc.'s), 54 B.Sc.'s, and 76 pregraduates.

But one other source of technicians has been neglected. In 1976 there were 169 individuals in training, 114 in the country and 55 abroad (Table A6.6). Of these 169 students, 26 were postgraduates (degree course and special studies), 92 were B.Sc. degree seekers, and 37 seeking pregraduate diplomas. Subtracting these from the totals above give totals of 596, 1090 and 1637, or annual flows of 27, 50, and 74 M.Sc.'s and Ph.D.'s, B.Sc.'s, and pregraduates, respectively. This calculation comes to an average number of 151 new technicians estimated to be needed each year between 1978 and the year 2000.

To establish an effective incentive system for trained agricultural workers it may be useful to reserve some proportion (say one-fourth) of the places in B.Sc. programs for technicians with pregraduate training and who have served effectively in an agricultural development program. Applicants from this source would be chosen on the basis of their academic records and their work experiences For the same reason, it might be useful to reserve some fraction of the places in the M.Sc. program, whether in-country or abroad, for B.Sc. graduates who have worked

Table A6.3

Technicians Working on Agricultural Research, 1976, by Level of Academic Training, Work Experience, Age, and Research on Instruction Unit.

Research and/or Instructional Unit	Highest academic level completed by technicians							Work experience			Age Group			Total
	Degree studies without title	Postgraduate M.C.	Postgraduate B.A.	Postgraduate P.A.	Baccalaureate degree (Grade)	Postgraduate M.Sc. M.A.	Postgraduate Ph.D	Up to 2 years	2-5 years	More than 5 years	Up to 30	30-45	More than 45	
Public sector research units	8	1	3	18	o2	9	1	16	46	40	62	38	2	102
CNIECA, San Cristobal	5	-	-	4	18	5	-	5	19	8	22	10	-	32
CENDA, La Herradura	-	-	3	2	14	4	-	1	9	13	13	10	-	23
Juma rice station	2	1	-	2	6	-	-	-	4	7	6	3	2	11
Azua fruit station	-	-	-	1	-	-	-	-	1	-	1	-	-	1
San Jose de Ocos station	-	-	-	-	1	-	-	1	-	-	1	-	-	1
Constanza horticultural center	-	-	-	1	3	-	-	1	2	1	2	2	-	4
Mata Larga Cacao station	-	-	-	-	3	-	-	1	-	2	1	2	-	3
Casa de Alto dairy station (SPE)	-	-	-	-	2	-	-	1	1	-	2	-	-	2
Palo Alto Baraho na station	-	-	-	-	1	-	-	-	-	1	1	-	-	1
San Juan de la Haguana	-	-	-	-	1	-	-	-	1	-	-	1	-	1
Bani kur:2 agricultural station	-	-	-	-	1	-	-	1	-	-	1	-	-	1
Higuey livestock station	-	-	-	1	1	-	-	2	-	-	2	-	-	2
CEAGANA, sugar cane	1	-	-	-	5	-	-	2	5	-	5	2	-	7
Duquesa la Isabela experimental division, sugar	-	-	-	7	5	-	1	1	4	3	5	8	-	13
Private sector research units	-	-	2	1	10	1	-	2	8	4	5	7	2	14
Dec. of research Ag. Central Resource	-	-	1	-	7	1	-	2	4	3	3	4	2	9
Northern research & improvement center for livestock, CIMPA, Santiago Yaque station	-	-	-	1	2	-	-	-	3	-	1	2	-	3
Vicini firm, San Felipe	-	-	1	-	1	-	-	-	1	1	1	1	-	2
Instructional or research units	-	-	-	4	30	18	1	5	14	34	15	35	3	53
UCSM, Superior Institute of Agriculture,	-	-	-	-	-	3	1	4	-	-	4	-	-	4
UNPHU, Center of Livestock Reproduction	-	-	-	-	2	8	-	-	4	6	2	8	-	10
UASD Engombe, research station	-	-	-	-	28	7	-	-	8	27	5	27	3	35
Loyola Polytechnic Institute, San Cristobal	-	-	-	4	-	-	-	1	2	1	4	-	-	4
GRAND TOTAL	8	1	5	23	102	28	2	23	68	78	82	80	7	169

rce: Diagnostico de la Investigacious Agropecuaria en la Republica Dominicana Working Paper Document to be presented at Seminar on the Diagnosis of Agricultural Research in the Antilles, Port an Prince, Haiti, December 1977, Institute Interamericano Ciencias Agricolas de la OEA and Departmento de Investigaciones Agropecurias de la Subsecretaria de Estado de Investigacion Extension of Capacetacion Agropecuria, Santo Domingo, November 1977.

Table A6.4

HUMAN RESOURCES IN EXTENSION: POSITIONS AND AREAS OF WORK OF THE TECHNICAL PERSONNEL OF AGRICULTURAL EXTENSION SERVICE, 1976

Position	Central Office	Region							Total
		Central	North	East	NW	SW	South	NW	
Regional supervisor	-	1	1	1	1	1	1	1	7
In charge, Zone	-	3	4	2	4	3	4	5	25
In charge, Subzone	-	11	18	6	11	9	14	16	85
Area agent	-	65	119	27	47	36	40	76	410
Veterinary doctor	-	4	1	4	2	2	2	4	19
Home improvement	-	2	7	-	-	4	2	3	18
Farmer organization	-	1	2	-	1	1	-	-	5
Subdirection	6	-	-	-	-	-	-	-	6
Applied research	2	-	-	-	-	-	-	-	2
Technical dissemination	2	-	-	-	-	-	-	-	2
Total	10	87	152	40	66	56	63	105	579
Hectares cultivated per technician		761	1,002	1,078	1,898	1,681	563	541	n.a.
Number of farms per technician		536	437	562	310	710	231	427	n.a.

Source: Diagnastico de la Investigacion Agropecuaria en la Republica Dominicana, Working paper to be presented at the Seminar on Diagnosis of Agricultural Research in the Zone of the Antilles, Institute Inter americana de Ciencias Agricolas de la OEA and Departmento de Investigaciones Agropecuarias de la Sub secretaria de Estado de Investigacion, Extension y Capacitacion Agropecuaria, Santo Domingo, November 1977.

Table A6.5

TECHNICAL PERSONNEL OF THE AGRICULTURAL EXTENSION SERVICE, BY ACADEMIC LEVEL AND REGION, 1976

Region	Grado Ingeniero Agronomo	Pregrads				Total of Technicians	Personnel Without Degree	Grand Total
		Perito Agronomo	Maestro en Cultivo	Bachiller Agricola	Agronomo			
Central	12	17	14	14	2	59	6	65
North	14	47	18	18	2	109	22	131
East	11	10	5	6	-	32	5	37
Northwest	2	4	12	5	15	38	2	40
Southwest	28	11	13	8	2	62	3	65
South	7	11	11	6	3	47	3	39
Northeast	12	27	9	8	1	57	2	59
Total	96	127	82	65	24	394	42	436

effectively in the agricultural development program for several years. Again applicants would be selected on the basis of academic record and work experience. The same suggestion could also be applied to the places in the Ph.D. programs. These two suggestions would require that estimates of numbers at the lower educational levels would need to be adjusted upward to account for this mobility through the educational system. Likewise, attrition needs to be considered.

This analysis supports the following tentative conclusions about priorities. Although the total needs for advanced degrees are high in agricultural engineering, hydrology, forest science, and statistics, apparently no 4-year B.Sc. programs are available in these specialties. High priorities should go to developing these undergraduate programs; these would require Ph.D.'s, M.Sc.'s, and B.Sc.'s. The question of M.Sc. programs can then be considered when these B.Sc. programs are will established. Not far behind in priorities for B.Sc. programs would be food technology, ecology, and rural sociology, none of which now has a four-year college program. Among the specialties with established four-year programs, veterinary medicine, soil science, animal science, plant protection, and agricultural economics appear to have the greatest needs for advanced degree holders. The possibility of establishing M.Sc. programs in soil science, plant protection, and agricultural economics should be studied carefully to see if the flows needed can be obtained more economically by establishing in-country programs in these disciplines than by sending the required numbers of qualified B.Sc. degree holders abroad for graduate studies. For the next several years, the needs for Ph.D.'s in agricultural sciences should be met by sending M.Sc.'s abroad for Ph.D. studies. When the required M.Sc. programs become well established,

Table A6.6

NUMBER OF RESEARCHERS STUDYING IN THE COUNTRY OR ABROAD, 1976, BY RESEARCH SECTOR AND LEVEL OF STUDY.

Sector and Academic Level	Graduate Students In Country	Graduate Students Abroad	Total
Public sector research units	69	33	102
Postgraduate, degree course	-	6	6
Postgraduate, special studies	-	4	4
Graduate (B.Sc. degree)	41	21	62
Pregraduate and nondegree graduate	28	2	30
Private sector research units	11	3	14
Postgraduate, degree course	-	1	1
Postgraduate, special studies	-	-	-
Graduate (B.Sc. degree)	8	2	10
Pregraduate and nondegree graduate	3	-	3
Instruction and research units	34	19	53
Postgraduate, degree course	-	19	19
Postgraduate, special studies	10	-	10
Graduate (B.Sc. degree)	20	-	20
Pregraduate and nondegree graduate	4	-	4
All research and instruction units	114	55	169
Postgraduate, degree course	-	26	26
Postgraduate, special studies	10	4	14
Graduate (B.Sc. degree)	69	23	92
Pregraduate and nondegree graduate	35	2	37

Source: Diagnostico de la Investigación Agropecuaria in la República Dominicana, Working paper to be presented at the Seminar on Diagnosis of Agricultural Research in the Zone of the Antilles, Instituto Interamericana de Ciencias, Agricolas de la OEA and Departamento de Investigaciones Agropecuarias de la Subsecretaria de Estado de Investigación, Extensión y Capacitación Agropecuaria, Santo Domingo, November 1977.

the issue of initiating Ph.D. programs in each of the M.Sc. areas can be studied separately. By that time, the country's needs for all four levels (Ph.D., M.Sc., B.Sc., and Perito) of each kind of specialty can be estimated with much more precision than was possible in this assessment.

The questions of M.Sc. programs in animal science and veterinary medicine are possibly more complicated than soil science, plant protection, and agricultural economics for two reasons. First, until more is known of the optimum role of livestock in Dominican agriculture, it is not clear how many technicians will be needed for research, instruction, extension, and development support activities. Should small-scale, mixed crop and livestock farms prove to be an effective means for achieving the employment, output, nutrition, self-sufficiency, and income goals of the Dominican society, then the trained manpower needs will be much different than if the optimum organization of livestock units turns out to involve large-scale ranches. Small-scale units are likely to require a heavier staffing pattern for research, extension, and other development support activities than large-scale units.

Secondly, the appropriate articulation of responsibilities between veterinary and animal science technicians in the Dominican environment is not clear. Until the allocation of these responsibilities is decided, not enough information even to make educated guesses as to the needs for each type of technician is available.

The situation with respect to the needs and the supply of trained personnel in home management specialties is also very unclear. There seems to be no question that development of greater home management skills in all the rural (and urban) households of the Dominican Republic

would contribute substantially to national goals, particularly with respect to nutrition but also family health, child care, and several other aspects of family well-being.

The present situation in these specialties with respect to instructional, extension, and research capacity was not investigated. It does seem clear that specialists will be needed in home management research, instruction, and extension activities. The largest, and perhaps the most important needs at this stage in the rural development of the Dominican Republic, would be for home management extension that would begin to reach home-makers on the small farms and for home management instruction for rural girls as a part of their middle and high school education. The requirements to meet these needs would be trained extension workers and public school teachers. As a starting point, and as a first priority, the training of those individuals who would become the instructors of the home management extension workers and the home management teachers in the public schools is recommended, if this capacity does not already exist. While these capacities were being put in place, time would be available for a study in much greater depth to determine what next steps would be optimal in the field of home management education.

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Chapter 7

GOALS, POLICIES AND PROGRAMS FOR AGRICULTURAL AND RURAL DEVELOPMENT

7.1 A Planning Framework Emphasizing Growth with Equity

The Dominican government is increasingly interested in the fulfillment of the basic needs of its citizens as the fundamental orientation of the economy. Growth is essential to this strategy since, without continued growth, average levels of living could not rise over time. Thus, although the country's strategy is shifting more towards equity, growth in output remains an integral part of it.

A planning framework reflecting a basic needs orientation begins with the conception of economic and social development as the attainment of higher living standards over time for all, but especially for the poorer segments of the population (Figure 7.1). Levels of living are determined by the quantity, quality, and distribution of privately produced and publicly provided goods and services. The effective demand by households is met by domestic production and imports. The total value-added by domestic production yields the aggregate factor income in the economy. This total income is then distributed to households and institutions which, in turn, provide the income flows that support private and public consumption and investment.

This framework emphasizes the mechanisms that translate demand into value-added in production activities and production into incomes of households and institutions. The level and structure of output generates income that flows to household and institutional owners of labor, land,

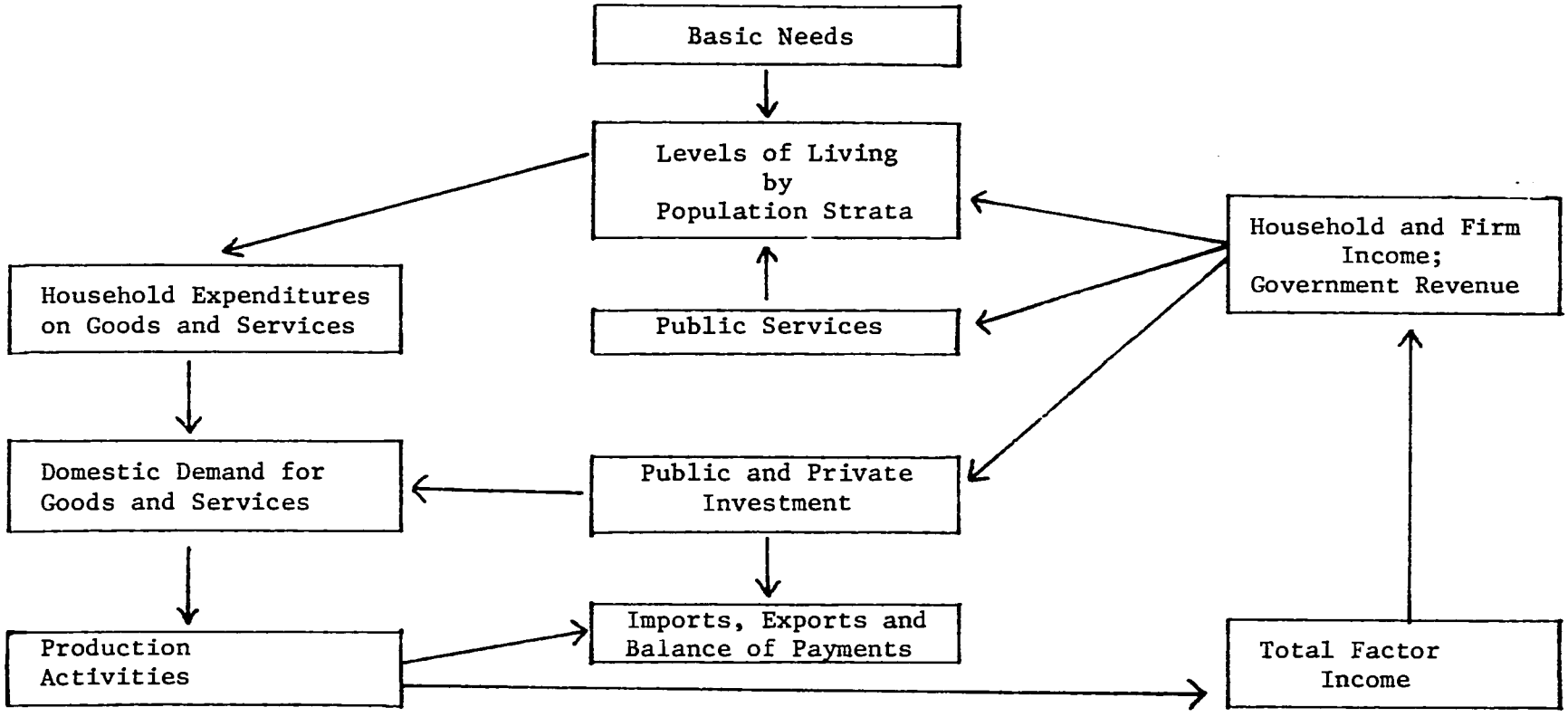

Figure 7.1. A Planning Framework Reflecting Basic Needs of the Population

and capital. Households receive income from production at home, earnings on owned factors, and public and private transfers. It follows that household income distribution can be changed by (a) altering relative factor earnings, (b) changing the distribution of factor ownership, or (c) changing the incidence of social services and transfer payments. A change in income distribution shifts demands which, in turn, generates a new pattern of production. This interdependence in the determination of output and income makes the goal of, and means for, changing income distribution much more complicated.

Given the interest of the government in improving the levels of living of the population and reducing poverty, it is essential to link the performance of the economy to the basic needs of households, particularly the poor ones. This approach involves analysis of the existing distributive mechanisms in the economy and evaluation of the consequence of alternative policies and programs on the living standards of different household groups. The multiplicity of objectives involved, such as growth, equity, balance-of-payments equilibrium, and price stability, requires explicit attention to trade-offs between goals in a consistency framework, among which the trade-off between present and future equity is especially critical. The fact that growth is not regarded as the sole economic objective in no way implies that it is irrelevant. On the contrary, growth is essential to the relief of absolute poverty where current production is insufficient to provide minimally acceptable levels of living <u>even</u> if existing income were equitably distributed.

This point leads to a major recommendation of this assessment: <u>that the Government undertake a more systematic evaluation of the effects of a</u>

decade of rapid growth on income distribution, employment, living standards and poverty in the country. Available information is sketchy and piecemeal.

Nonetheless, although the economy has grown rapidly, a number of serious socioeconomic problems obviously persist. Underemployment, poverty, and malnutrition are prevalent. Wide--and probably growing--disparities exist with respect to both rural-urban and regional differences in income and levels of living. Food production needs to increase if nutritional levels are to improve. Productivity and incomes of the poor need to rise if they are to benefit from a growing output of food and other goods. Achieving an adequate rate of growth in output while simultaneously improving levels of incomes and living for the bulk of the rural population is undoubtedly the major policy problem which the country must confront. The dimensions of that problem can only be fully understood through a major effort not only to describe the existing situation but also to understand the mechanisms that are at work to generate and distribute income over the population.

Several data collection efforts that will improve our understanding of the growth and distributive processes have been noted in the assessment. Household income and consumption, employment, and farm production have all been the target of recent large surveys. Completion of the rural cadastre would help to settle questions about the number, size, and tenure status of farm units. A new agricultural census is planned. The SIEDRA project is beginning to reach the operational phase in its evaluation of the productive potential of land resources.

Some gaps in these information-gathering efforts are evident. Data on the number, employment status, and incomes of landless-laborer households is an excellent example. Another is the nature and extent of non-agricultural production and work in rural areas, by both farm and nonfarm households.

There is a need to better define the main informational needs and to improve the coordination of data-collection activities. ONAPLAN could be assigned this responsibility. The first step would be to specify what the country's minimum data requirements for its planning and policy analysis activities are. Then a review could be made of the regular and special data-gathering activities to determine if there is any duplication and how the overall system could be made more efficient and effective.

7.2 Elements of an Agricultural Development Strategy

7.2.1 Agricultural Development Goals

A clarification of goals and objectives is an essential first step in the formulation and implementation of development programs. The five stated components of the country's agricultural development strategy for 1976-86 are:

1) Improve the diets of the poorest 75 percent of the rural households.
2) Increase agricultural production by increasing the average size of small farms through land reform, and provision of technical assistance, agricultural credit, and productive inputs.
3) Become self-sufficient in the production of basic foods, particularly rice and beans.
4) Promote agricultural exports and substitution of domestic products for imported products.

5) Increase rural employment opportunities.

The formulation of public policy usually involves a compromise that balances the different goals. While the output and employment goals identified above are not necessarily incompatible, an effective strategy often requires that weights be attahced to settle problems of precedence and priority among conflicting goals. How the various goals are interrelated can be easily illustrated.

The needs and prospects for additional production of food crops and export products was reviewed in an earlier chapter. The conclusion was that a major effort is required to raise the growth rate of output over that of recent years to meet goals for nutritional improvements. If total population continues to grow at 3.1 percent annually, and 0.7 is used as the average income elasticity of demand for food, then annual increase in real per capita income need to average about 3.6 percent over the next ten years to achieve stated goals for nutritional improvement. This would imply a minimal target rate of growth of GDP of about 6.6 percent. But, as analyzed in Chapter 1, if most of the increases in income are concentrated within narrow economic sectors, all of the "required" food can not be purchased, and the lower income strata will fail to achieve the recommended diet even though the targeted growth rate of GDP was achieved. Also, if per capita income does grow at the annual rate of 3.6 percent, and the assumptions about the income elasticity of demand for food and population growth hold, then food supplies will have to grow at 5.5 percent or more annually to avoid food-price inflation and/or increased food imports. Additional production is also needed for export. The Dominican Republic faces a balance of payments problem, both over the next five years and into

the future, reflecting poor market prospects for sugar. The projections in Chapter 5 suggest that sugar output can continue to increase at about 3.0 percent annually, which was the rate of growth experienced during 1950-75. Many small farmers produce coffee, cacao, and tobacco for export. These and new export products may offer good prospects for increasing income of small farmers as well as contributing to the balance-of-payments equilibrium of the country.

Agriculture is the largest source of employment for the labor force. As economic development takesplace, the new employment opportunities that are created are often located in the urban sectors. If workers forthcoming from the natural growth of the urban population are not enough to fill these new jobs, then these job opportunities will pull in members of the rural labor force. In fact, as development proceeds, more than enough individuals or families often migrate from the rural to the urban areas to fill available job openings. Unemployment frequently arises from the migration to the cities of many workers who are underemployed in agriculture. The principal reason why this migration to the urban areas takes place is that average incomes in the urban sector are almost always greater -- often much greater -- than in agriculture, both for landless workers and small farmers. However, the probability of finding urban employment is often low for the rural migrants. So, to refer to agriculture as the residual employer of labor describes a situation where much of the labor force is already found in agriculture and is held there until employment opportunities can be created elsewhere through the process of economic development. It is almost always the case that the needed agricultural output could be produced with less labor than is available, i.e., underemployment of the rural labor force exists.

Members of the rural labor force do not move into the surplus labor force; they are born into it. To remain in agriculture is costless to the individual, while to leave it is often costly economically and socially.

Few urban occupations have the residual employment characteristics of agriculture. Some of the service activities, like personal services and small scale retailing, do have this residual characteristic, although many fewer marginal workers are usually found in personal services and retailing than in agriculture. The residual employers -- agriculture and urban services -- are forced, in the case of agriculture, to retain or, in the case of services, to absorb the workers who are unable to find gainful employment elsewhere. The residual nature of employment in agriculture and urban services cause these activities to have very low rates of productivity per person employed.

What this means for the Dominican Republic's agricultural sector is that, while more employment must be created, the biggest challenge is to raise the productivity and incomes of the already underemployed small-farmer and landless-laborer work force. The absolute numbers in this group will continue to increase at least through 1990. And the higher the rate of capital deepening in the nonagricultural sector and the lower the rate of rural-urban migration, the greater will be the pressure on agriculture to provide more jobs as well as higher productivity for those already working in the sector.

If the Dominican Republic were in the position of having significant areas of arable land and unused water available to be brought into cultivation by young farmers establishing their own family farms, then the problem of providing employment would be a relatively simple one of

building institutions to facilitate the transfer of these presently unutilized land and water resources to the unemployed or underemployed farmers, as well as credit for purchasing the land and other inputs. Unfortunately, this is not the case. There is little additional land that can be brought economically into cultivation. Most of the land that might be brought into cultivation will require investment that could be more productive if used in other projects. This is because bringing land into production has costs, which rise rapidly the poorer the quality and location of the land. The Dominican Republic must find other ways of reaching its employment and output objectives, consistent with rising levels of nutrition and welfare of the poor.

7.2.2 A Strategy to Meet Output, Income, and Employment Objectives

One element stands out. Much of the land is in sugar estates and large private farms and cattle ranches. Employment and income can be created by designing small-scale sugar or small-scale mixed crop and livestock farms, and distributing the land to landless farm families and small farmers of less than minimum size following these designs. Land redistribution of this type will contribute both to the employment and to the income distribution objectives. Making land reform contribute to the output objective will also require an additional strategy element to assist the existing and newly created small farm units to raise their productivity.

The second major element, therefore, is to develop yield-increasing (but in general, not labor-saving) technology that can be introduced successfully on small farms as well as on whatever medium and large farms that are maintained. The four major elements of this alternative would be to put in place highly effective research, extension, farm input supply,

and output marketing systems. The broad purpose would be to create and bring within easy physical and financial reach of small farmers a "package of technology" (in the form of inputs and practices) that will assure farmers improved cropping systems, higher yields per hectare, and higher incomes. A typical package of technology might include a cropping pattern, higher yielding varieties, readily available fertilizer and plant protection items, readily available mechanical equipment that is required to achieve the higher yields, an effective extension program to disseminate the required information, and well-organized markets for the farmers' output.

The first purpose of these two strategy elements is to make available enough productive resources (including land) to small farmers to enable them to employ their labor resources more fully and thus to produce more with resultant higher income. The second purpose is to make available to as many of the landless farm workers and subsistence units as possible enough land and complementary resources to use the family labor supply fully.

With the institutional, organizational and human resource requirements for this yield-increasing technology in place and functioning effectively, then the nation would have several program options that could make significant contributions to the employment, output and income objectives. These options can be identified as follows:

1) To use technological change to increase crop and livestock yields on the small farms already in existence. This would contribute importantly to the output and income objectives even though many of the smallest farms may still have too few or too unproductive land resources to produce enough to earn an "acceptable" income. If land redistribution is to be an integral part

of the agricultural development, then some of the land to be redistributed may need to be reserved for the smallest farmers to bring the size of their units up to the minimum size for an "acceptable" income level.

(An "acceptable" income is defined as a minimum level of real income based on the size of the farmer's family. Whatever the family's land resource base to start with, enough land and complementary resources would be made available for the family to earn the acceptable real income. In effect, the "acceptable" income is the target income for small farmers. The higher the target income, the fewer the number of small farmers and landless farm families that can be provided with enough land and improved technology to reach the acceptable income level. The lower the target income, the more families that can be helped.)

(Real income is money income plus income in kind, which is the value of commodities produced <u>and</u> consumed on the farm.)

(Technological change means the use of different techniques of production. Usually technological change in agriculture refers to the introduction of new biochemical technology -- better seed varieties, fertilizer and plant protection chemicals, and, if necessary, mechanical equipment. For the biochemical technology to work well for the small farmer, input markets, output markets and credit usually need to be within easy physical and financial reach. A crucial element in the success of new technology is also to have the information on how to use it readily available to small farmers.)

2) To create on land taken for redistribution, small crop or mixed crop-livestock farms large enough for an "acceptable" income, and that would operate efficiently with the new technology. This option would contribute substantially to the employment and income objectives. It is

not certain that the land in these newly created farms would immediately be more productive than in their previous use, although with better technology available this outcome would be likely. In the case of the small-scale sugar farms or mixed crop and livestock farms, the output mix would be different than it is now on the large sugar plantations or the large cattle ranches. It would probably be desirable to provide effective incentives for small farmers to allocate less land to sugarcane and more to food crops in the first instance, and less land to livestock grazing and and more to food crops in the second instance.

3) To create, from the land suitable for but not now used for crops, small farms large enough for an acceptable income. In part, gains in cropland from this source might be offset by the transfer to grazing or forestry use lands that are now cropped but are not really suitable for cultivation. If the gain in cultivated area is positive, this would contribute to the employment objective and to each of the other objectives.

4) To create from newly irrigated lands small farms that with the availability of adequate and timely supplies of water could utilize land and labor very intensively. Fruits and vegetables would be likely possibilities for these small scale irrigated farms, but other high value crops could also be excellent alternatives. This option would also contribute substantially to all three objectives, with increases in employment, in value of output and income. Small and intensive farms would be highly dependent on the effectiveness of the marketing system. They would be likely to specialize in only one or two crops. (The level and dependability of output and input prices would be very important to the specialized intensive farmers in all options.)

Basically, the four options discussed above are largely comprised of the two complementary elements identified previously:

1) making more land available to the small farm sector, in order to increase output, income, and employment, and improve nutrition of the poor,
2) bringing technological change to small farms, in order to increase small farm production and income.

The complementarity of these two basic elements is quite apparent. Technological change will contribute greatly to the output and income objectives, and will do something for the employment objective. Land redistribution will do much for the employment objective, and can help the country's output and income goals as well. The conclusion reached here is that a coordinated attack on the twin problems of resource availability and technological change is needed.

The present situation does not afford the luxury of implementing these two elements in a leisurely manner. By 1990, the Dominican Republic needs to both increase the number of small farms and to make it possible for the existing and new small farms to have the technology and resources to produce an acceptable income for the farm family. Within that same period of time, the value of agricultural production (at constant prices) needs to increase 5 to 6 percent per year in order to provide the food needed for a growing population earning higher incomes, better nutrition, and export. Also within that same period of time, average earnings (at constant prices) of agricultural households need to more than double to keep pace with, or even gain a little on, the average earnings of urban households.

It needs to be stressed that these problems are not simply problems of the agricultural sector; solutions are not to be found wholly within the sector. Viable solutions will require actions and policies that will be felt across the entire economy, and throughout the entire society. Structural problems of this order of magnitude and importance must have the attention of the nation's top political and economic leaders. They cannot be left entirely to agricultural administrators, who have neither the instruments nor the resources to solve them unassisted.

Although this discussion has referred explicitly to employment, output, and income objectives, any combination of the four options discussed above that would fulfill these objectives could be designed to meet nutritional, self-sufficiency, and export objectives as well. For nutritional improvement, it is especially important that the options chosen raise the real incomes of the poorest farmers and landless laborers.

The suggested strategy is a combination of land redistribution complemented by other measures that favor small farmers. These measures include credit, resource development, extension, price policies, and a larger share of public investment to improve the economic and social infrastructure and services available to the poor.

On the production side, output and employment can be expected to increase through more intensive utilization of land, changes in products produced, application of biochemical technology packages, and more labor-intensive techniques. This production structure, in turn, will lead to a more equal family income distribution in rural areas, as labor and land income are spread more evenly. A further and important effect is a rise in food demand since the higher incomes of the poor will go largely for increased consumption of home-produced or purchased food. Demands for other labor-

intensive consumption goods -- many of which could be locally produced -- will also rise.

This strategy is based on the progressive modernization of agriculture "from the bottom up" in contrast to the past approach that encouraged large-scale, commercial capital-intensive urban production side-by-side with a poor traditional subsistence subsector containing the bulk of the population. Through a comprehensive rural development approach, involving land redistribution, rural infrastructure, research and diffusion, and local participatory institutions, agricultural development can be extended to benefit a large part of the rural population as well as supply the food needed by the urban population and products for export. This is the appropriate strategy if the government is commited to improving the living levels of the poor in a growth context.

7.3 Land Redistribution

Access to land is a fundamental constraint in achieving the country's goals in the agricultural sector. Although agrarian reform has been in progress since 1962, the country's actual latifundio-minifundio landholding structure causes "excess" labor to be compressed into a large number of small farms and a landless labor force with a consequent high degree of under-employment. As a consequence, land in the small farm subsector is used intensively while land in the large farms frequently is under-utilized. Recognition of this structural constraint, and an awareness that the prospects for additional employment in the cities are extremely limited, leads to the identification of land redistribution as a major element in the country's agricultural development strategy.

The purpose of land redistribution is to provide small farm

households and landless rural families with sufficient land to permit them to achieve "acceptable" incomes and levels of employment. An acceptable level of income needs to be defined for the Dominican context. Generally, farmers with less than 0.5 ha. are considered as too small to be "viable"; that is, other sources of household income are needed to supplement earnings in these farms. It is estimated that a farm with four hectares of average cropland could earn about RD$1000 per year by applying average production methods. In reality, the size of farm needed to provide a target level of income varies from place to place depending on soil and other characteristics. An information base needs to be developed about the potential income of different sizes of farms under varying conditions of soil quality and climate. The SIEDRA land resources inventory could be extended to provide a basis for developing estimates of the numbers and kinds of farms that could be formed in the various regions.

Agrarian reform is a long-term process requiring commitment of resources, especially finance and technical personnel. The application of agrarian reform measures can lead to disincentives to invest and produce among the larger farmers and others likely to be subjected to expropriation. In the Dominican Republic, there is widespread uncertainty about which lands can or should be used for land redistribution. This uncertainty partly stems from a lack of knowledge concerning the location and tenure status of arable land. It is not clear how much land in large farms is arable. Increasing the pace of the rural cadastre would help to clarify this situation. Action to complete this cadastre as rapidly as possible for the most important agricultural zones is recommended.

The progress to date in land reform is perhaps less in the amount of

land that has been redistributed than in the experimental techniques that have been used to implement land redistribution. Examination of the various methods tested leads some to the tentative conclusion that the solution to the people/land situation is more in through group farming systems rather than distribution of small parcels to numerous individuals. This may be especially true in the areas suitable for pasture and estate crops. The two main reasons why groupings of small farmers is desirable are:

1) increased efficiency in the delivery of production and social services and assistance, and
2) as a means of eliciting participation of farmers in the design and management of development action.

On the other hand, social and political factors and motivation often keep groups, especially non-indigenous organizations, from working in the way intended.

The potential scope for land redistribution appears to be substantial. If the amount of land in the small farm subsector were increased to 902,600 hectares (double the amount in small farms in 1975), output and employment in small farms would be approximately doubled. The average small farm size would be 3.6 hectares, and the amount of land in the large farm subsector would be reduced by 451,300 hectares, which is equivalent to about one-third of the land in large farms in 1975. Such a program would reduce the need for the members of small farm households to work off the farm, but would not assist landless agricultural households. Indeed, as land was transferred out of the large farms, small farm landless households probably would experience increasing difficulties in finding work. Any tendency

for the large farms to adopt labor-saving production methods would add to the problems of off-farm employment. The program could be extended to include landless households. If all of the projected landless agricultural households in 1990 (58,800 households) were included, an additional transfer of 211,600 hectares would be required to provide an average of 3.6 hectares to these households. In total, a transfer of about 662,800 hectares would be needed, equivalent to half the land in the large farm subsector in 1975. If all these small farms achieved the same average productivity per hectare as small farms in 1975, they would provide an average gross output of about RD$1,630 per farm unit.

7.3.1 Production Impacts

Utilized land in the large farms provided an estimated gross output per hectare of RD$372 in 1975. Small farmers use their land more intensively than the large farm operators. They produced an average of RD$452 per hectare in 1975. Taking agricultural land as homogeneous, the transfer of farm land out of the large farm subsector into the small farm subsector would result in an RD$80 per hectare increase in the annual gross output of agricultural products. Based on 1975 production patterns and prices, transferring half the land in the large farm subsector to the small farm subsector would increase the gross annual output of agricultural products by about RD$53,200,000, which is equivalent to 6.3 percent of the total gross agricultural output in 1975 (Table 7.1). If such a program were implemented during 1980-1990, the agricultural growth rate would rise by about one-half of a percentage point per year, other things equal.

The program would raise the amount of utilized land in the small farm subsector from 389,900 hectares to 1,052,800 hectares, an increase of 170

Table 7.1 Accelerated Land Redistribution, 1980-1990: Estimated Impacts on Output, Employment, and Income

Farm Size	1975		1990		
	Value of Output (RD$1,000)				
	Value	Percent	Value	Percent	Impact
Small Farms	176,554.2	20.9	476,185.0	53.0	+299,620.8
Medium and Large Farms	668,047.6	79.1	421,630.4	47.0	-246,417.2
Total	844,601.8	100.1	897,815.4	100.0	+ 53,213.6
	Total Income (RD$1,000)				
	Value	Percent	Value	Percent	Impact
Small Farms	289,342.9	37.5	499,729.8	61.1	+210,386.9
Medium and Large Farms	481,415.1	62.5	317,778.2	38.9	-163,415.1
Total	770,758.0	100.0	817,508.0	100.0	+ 46,971.8
	Labor Utilization (1,000 work-days)				
	Labor	Percent	Labor	Percent	Impact
Small Farms	32,400.7	34.2	87,487.7	66.4	+ 55,087.0
Medium and Large Farms	62,267.4	65.8	44,361.9	33.6	- 17,905.5
Total	94,668.1	100.0	131,849.6	100.0	+ 37,181.5

Source: Estimates by authors. See text.

percent. Similarly, value of output of small farms would increase from an estimated RD$176,554,000 to RD$476,185,000 (at constant 1975 prices). Total income of the small farms was estimated at RD$289,342,900 in 1975. With the accelerated land redistribution program, total income in the small farm subsector could amount to RD$499,729,800 since off-farm earnings would fall as land was transferred out of large farms by 1990. Small-farm household income, therefore, would increase at 6 to 7 percent annually. (It would appear that land redistribution programs during 1962-75 raised income in the small farm subsector at an average rate of about 1.5 percent annually.)

7.3.2 Employment Impacts

In 1975, small farms employed 83.1 man-days per utilized hectare and large farms employed only 27.0 man-days per hectare, on the average. Provided that production patterns within the small and large farm subsectors did not change, transferring 662,900 hectares out of the large farm subsector into the small farms would raise total agricultural employment from 94,668,100 work-days to 131,849,600 work-days, an increase in the sector of 39.3 percent. This increase would be equivalent to an average annual rate of growth in labor utilization somewhat less than 4 percent per year if an accelerated program were implemented during 1980-1990.

Because the distribution program would have a somewhat greater impact on output than on employment in small farms, average productivity per work-day utilized by small farmers would rise from RD$1.90 to RD$3.61, an increase of 90 percent. For the sector, however, total output per work-day would decline. In 1975, value of output per work-day was estimated at RD$8.92. In the absence of productivity-increasing programs, and using

constant 1975 prices, an accelerated 1980-1990 program would lower the average output per worker to an estimated RD$6.81 per work-day. This decrease reflects a shift from land extensive and relatively capital intensive agriculture to more labor intensive farming. It also reflects a shift from cattle production and crop production for export to the production of food for domestic consumption. Productivity in the large farms would have to be raised to maintain or increase the level of traditional agricultural exports. More critically, the need to raise yields and land productivity in the expanded small-farm subsector would be intensified so that average productivity levels could rise rather than decline.

7.4 Technological Change on Small Farms and Research

Increasing productivity and output on small farms through technological change is the second major element in the proposed strategy. Technological change in agriculture refers to the introduction of new biochemical technology -- better seed varieties, fertilizer and plant protection chemicals, and new farming practices. Technologies, which meet the technical needs and physical, social, and economic requirements of rural people, usually will have to be developed and tested locally. This requires an effective research and extension system. Also, for the biochemical technology to work well for the small farmer, water, chemical inputs, output markets, and credit need to be accessible.

Limited access by most small farmers to needed inputs and services remains a serious constraint on the improvement of their incomes and well-being. This conclusion does not ignore the advances that have been made in research, extension, credit and input supply in recent years, but simply recognizes the scale of the job yet to be done. And that scale will itself

be compounded if a vigorous program to create additional small-farm units is implemented.

To generate technology appropriate for small farmers, a methodology is needed that integrates agronomic with economic and social factors. An interesting approach has been developed in Guatemala.[1/] This methodology reflects the need for rapid results from low-budget, area-specific research. Farmers are involved in all phases. It is designed to minimize the recommendation of technology packages that are high-risk, high-cost, or inappropriate to actual conditions, which farmers resist and ultimately do not adapt.

This methodology, as sketched in Figure 7.2, has four characteristics relevant to the Dominican Republic:

1) It can generate recommendations that are appropriate and immediatel available to a target group.
2) It is continuous; results in one phase lead directly to more detailed research to follow.
3) Farmers participate to provide actual on-farm testing and feedback to guide further research.
4) It integrates the social and agronomic disciplines required to generate high-return, low-risk, appropriate technology.

The methodology has four basic and interrelated components:

1) Diagnostic - Description and analysis of the target group to understand what factors constrain their use of improved technology.

[1/] Hildebrand, P. Generando Technologia para Agricultores Tradicionales: Una Metodologia Multidisciplinaria. Instituto de Ciencia y Technologia Agricola, Guatemala, 1976.

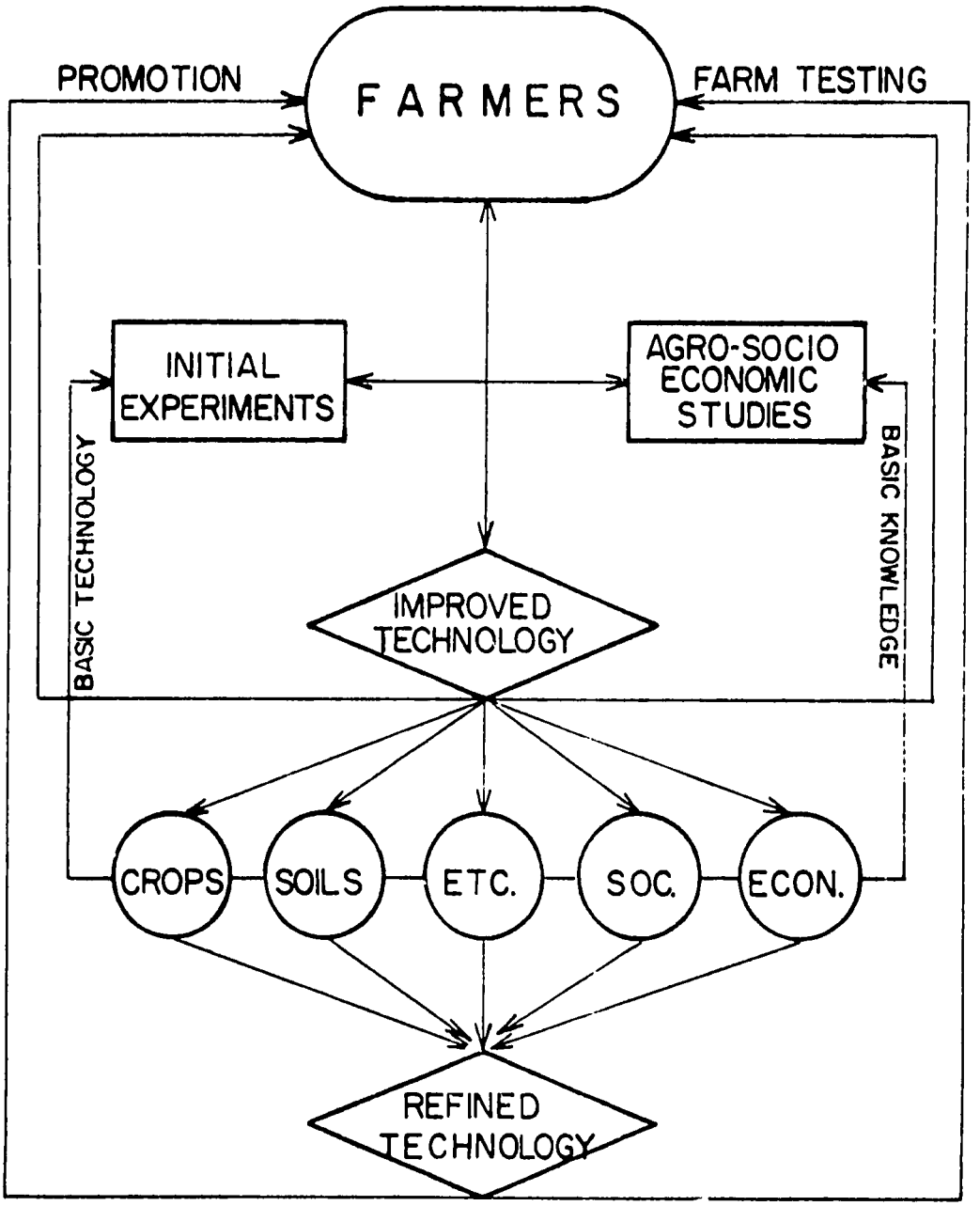

Figure 7.2

METHODOLOGY FOR GENERATING TECHNOLOGY FOR SMALL TRADITIONAL FARMERS

2) Adaptive research - Generating new technology and packages of practices appropriate for the target groups.

3) On-farm testing - To establish early in the process how the technology works under actual farm conditions.

4) Evaluation - To determine what recommended practices are being used on what proportion of the land and to monitor the effects of its use on the adopters.

Development of a small-farmer technology focus, along the lines described above, could help to establish a coordinated framework for research, extension, credit, input-supply and marketing programs. The goal is to generate technology better suited to the mass of small farmers, based on more local diagnosis of conditions and need, more contact with small farmers, and more attention to known and achievable improvements. A considerable revision of the content, staffing and methods of research units, and their integration with field extension workers, is implied.

The extreme diverse ecological composition of natural resources and broad range of farming systems require a research system of considerable more capacity than presently exists. Also, research to date has often focused on medium and large farm crops and farming systems at the neglect of activities directed toward the small farm units which comprise the majority of the farmers. Activities financed under USAID Agricultural Sector Loan II have started to reverse this trend, although continued assistance will be required to institutionalize the shifting emphasis.

The major remaining research problems fall into several major categories. First, the linkage between the major international research centers and the national research system are limited and need to be

strengthened. Second, to the extent adequate research does exist in-country, the diffusion linkages between the national research system and the small-farm subsector is insufficient to rapidly transfer known improvements in technology. Third, the scope of present research has been limited to a few traditional crops at the neglect of developing techniques useful for increasing production on hillside farms, of tree crops in the forested areas, and in arid conditions. And these areas represent conditions under which the majority of the rural poor live and farm.

7.5 Managing Land and Water Resources

Success in the two strategy elements discussed previously will require concomitant improvements in land water use. A program for improving the management of these two critical resources should encompass four stages: (1) an assessment stage, (2) an analysis-formulation stage, (3) a demonstration stage, and (4) an implementation-diffusion stage. Each will be discussed in turn.

7.5.1 The Assessment Stage

In spite of the significant contributions of the CRIES/SIEDRA project, there is still a great deal about land and water use which is not known, e.g., the exact location of land of high agricultural potential. Only within broad outlines is it possible to know now where within a given zone specific crops are grown. Only vaguely is it possible to know whether or not there is land of high (or even moderately high) potential that is not now being cultivated. Only in the crudest sense is it possible to be sure which lands receive irrigation on a "regular" basis. One hears that "too much land is in pasture", or "too little land is in annual crops", but such conclusions -- while crucial for policy analysis of Dominican

agriculture -- cannot stand without a more careful assessment of the full array of the economics of alternative land uses. Indeed, it is not possible to make such assertions without a complete understnading of the full array of social benefits and costs of alternative land-use practices. Such an understanding cannot be attained without much more data and analysis than are now available. Hence, a necessary first step is one of assessing current use of land and irrigation water.

7.5.2 The Analysis-Formulation Stage

The second logical phase in the development of a land and water program is the analysis of information obtained in the assessment stage, and the formulation of strategies. This aspect would consist of carefully evaluating the evidence compiled both from the assessment, as well as from the ongoing CRIES/SIEDRA project. Then analysts could begin to answer such questions as: (1) what distribution of land among annuals, perennials, fallow, and pasture will best achieve development objectives? (2) what should the regional distribution of land in these various uses be? (3) where is drainage and soil salinity a serious problem and what might be done about? (4) where are groundwater resources most promising? (5) what are the optimal cropping calendars to take advantage of agroclimatic factors? (6) where are the best lands not now cultivated? (7) in what areas would social benefits arise from conversion of land from sugarcane or pasture? (8) in what places does it make the most sense to attempt to resettle those currently cultivating slopes too steep for long-term viable agriculture? (9) where, and to what extent, is current water use (by crop) excessive? (10) where are the greatest opportunities for improvements in leveling of rice fields? (11) what are the water-saving

implications of improved cropping practices?

The process of analyzing these questions must, however, be combined with formulating policies and programs to utilize the information obtained.

7.5.3 The Demonstration Stage

Upon completion of the first two stages, it will be necessary to establish programs with farmers to help them to improve their land and water use. For example, better leveling of rice fields will require considerable effort on the part of technicians to both illustrate the advantages of improved leveling as well as the process of leveling. Along with improved leveling will come the opportunity to use less water. Also, it may become necessary to use other means of weed control. In each instance, it will be important to show farmers the full complement of "new" inputs. In a sense, the program here would resemble the "input package" approach taken with the new high-yielding varieties. It is at this stage that a strong regional focus of the program will likely have the greatest payoff.

7.5.4 The Implementation/Diffusion Stage

When some progress has been made in the first three stages of the land and water program it will be time to establish a mechanism for the spread of new methods to other areas. The enlistment of selected farmers into a paraprofessional corps to help spread the technology is a possibility. Regional demonstration plos where leveling, ditch (both distribution and drainage) construction, other input usage, and the like are illustrated for small groups of farmers could be established. The agrarian reform settlements provide one natural institutional focus for the phases of the recommended program -- but especially for the diffusion stage. This is reinforced by the fact that many of the agrarian reform units are concerned

with irrigated rice production. Also, farmer organization are already in place on these settlements with an existing leadership structure and a history of communal action.

Pilot projects for using groundwater could be established. There should be efforts to monitor groundwater levels and pumping rates to establish the parameters for policy about aquifer utilization. Finally, pilot water users' associations could be established to illustrate the benefits of cooperative action around the shared input, water.

These four stages, then would form the basis for a program aimed at improving land and water use in Dominican agriculture. A possible implementation strategy for this program is discussed in the next section.

7.5.5 Implementation of a Land and Water Management Improvement Program

The most important need in bringing about the improvement of land and water resource use in the Dominican agriculture is an agency to exercise an "organizing and coordinating" function among INDRHI, the Secretariat of State for Agriculture, and the Dominican Agrarian Institute. In spite of official interaction at the highest government levels, there seems to have been little cooperation in the past at the more substantive level where real coordination is necessary. With the bulk of irrigated rice in the country grown on land-reform projects, the need for close coordination with IAD is evident. Similarly, the important role of INDRHI in constructing and managing water projects implies that its involvement in improved water management is necessary.

But these two agencies are not the only ones that pay little attention to improving water management within irrigation systems and on farms. The

SEA has traditionally not been overly concerned with water use. To assist in the development of interest on the part of SEA, the creation of a Subsecretariat of Natural Resources (SRN) within SEA should be considered and given a sector-wide mandate.[1/]

It is suggested that the SRN contain four technical units and three support units. The technical units would consist of the offices of: (1) Land and Water Resources, (2) Forestry and Range Land, (3) Fisheries, and (4) Meteorology.

(1) Land and Water Resources. This unit would have the responsibility for developing a better understanding of the current use of land and water resources in Dominican agriculture. The current CRIES work provides an excellent starting point, but there is much more to be done. Little is known about actual water use at the farm level; little is known about opportunities to manage water better so that farmers not now receiving water might have access; little is known about groundwater supplies in areas where good agricultural land is available but not irrigated because of lack of surface water; little is known about cropping patterns by land class; little is known about the erosion impacts of hillside farming and of forestry and grazing. This unit could be the focus of those types of studies and assessments, building on the basis of the SIEDRA project.

(2) Forestry and Range Lands. Much of the agricultural land is classified as pasture, but a large proportion of this is probably foothill land that is grazed, and may even have some forest potential. This unit

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[1/] As of 1979, this unit has been created but INDRHI continues to function as a decentralized agency since its responsibilties include hydroelectric power generation as well as irrigation. Also, as explained in Chapter 6, IAD is likely to continue as an independent agency outside the control of SEA.

would be responsible for helping the inventory of these lands, and for developing options to improve their use.

(3) Fisheries. The development of near-shore commercial fisheries and small-pond aquaculture can hold considerable promise for improving the quality of protein in rural diets. This unit would have the responsibility for the assessment of that potential, and for the development of options for consideration in overall agricultural planning.

(4) Meteorology. This unit would continue and expand the current functions.

The three support units would be: 1) Management, 2) Planning and Program Development, and 3) Environmental Monitoring.

(1) Management. The technical advisor, administrative functions, education and training functions and the public information function would be located in this unit.

(2) Planning and Program Development. This unit would work with the technical units in developing both short-run and long-run programs for natural resource assessment and use.

(3) Environmental Monitoring. This unit could be concerned with monitoring water supplies for salinity, nutrient loads, herbicide and pesticide residuals, toxic compounds, sedimentation, and the like. It is important to begin the environmental monitoring efforts by focusing upon the various ways in which agricultural production (and producers) is effected by the actions of others. This applies to erosion as well as to salinity. If the Tavera Dam silts up quickly, it is farmers who will suffer. The environmental monitoring unit would be concerned with these issues.

There is little basis for drawing a diagram of the ideal SRN organization. However, it may be important to have the four technical units report to a technical coordinator who then reports to the Subsecretariat for Natural Resources. It is also suggested that the three support units report directly to the subsecretary. However, organizational charts depict only nominal structure; the real structure of any organization is a function of the people who occupy the various positions.

In order to carry out the four-part program of improved land and water management discussed in Chapter 2 -- as well as to assist the Dominican Republic in general resource problems -- a five-year program of technical assistance in natural resource management is suggested. The major emphasis of the program would be to help staff the Subsecretariat of Natural Resources in SEA with qualified individuals, and to help coordinate natural resource management and development with other agencies involved.

It is suggested that AID -- through grant funds -- pay for the establishment of 8 new positions in the Subsecretariat, four in the Land and Water Office, two in the Forestry and Grazing Office, and one each in the Fisheries and Wildlife Office and Meteorology Office. While it is hoped that most of these positions could be filled by in-country personnel, it must be recognized that there may be very few Dominicans at present with the capability to fill these jobs. Hence, in the early period some of the positions may be filled by foreign technical advisors.

Purchase of equipment of several types will be needed. Two vehicles, and small portable equipment for measuring water flow through an irrigation system, are examples. There is also a need for the purchase of rain gauges for the Meteorology Office. This would permit the establishment of rain

stations at several new locations. Precipitation records will prove valuable in coordinating cropping patterns with rainfall. Given the great variability of rainfall in the country, this is a very important aspect of improving irrigation water management.

Training for SRN staff is important and would require approximately $50,000 per year. This amount would cover in-country training as well as courses in other countries. Finally, there would be a need for short-term visits by agricultural engineers, foresters, fisheries experts, agricultural economists, range livestock experts, resource economists, groundwater hydrologists, and other natural resource specialists. A budget for short-term consultants would be needed. The tentative cost of a program is given below:

Annual Budget Requirements for SRN

Personnel (local and foreign)	8 @ $50,000.[1/]	$400,000
Equipment (vehicles, water measuring devices, etc.)		55,000
Participant Training		50,000
Short-term Consultants		25,000
TOTAL		$530,000

7.6 Food Marketing

The marketing studies summarized in Chapter 5 explain what the marketing system is for various products and suggest a few changes. They do not do a very good job of answering why the system has developed as it has, or of analyzing the problems involved in improving the marketing system.

[1/] Estimate of average total budget obligations per position, not salary costs.

The "National Marketing Plan" describes some general objectives and outlines a general strategy but provides very little in the way of specific marketing programs or projects. The Plan's general objectives are certainly consistent with sector development goals. The general strategy of working with producers' associations appears to be appropriate.

There is need for continued support for gradually building a strong marketing group within SEA. The CENSERI idea is promising and could be linked to the input supply centers reviewed in Chapter 5. Work could begin with a few existing farmers' associations to help them do one or two things first; e.g., (a) purchase chemical inputs for members, (b) set up rural packing centers that sell directly to wholesalers or exporters, or (c) provide members with storage facilities. Some of the groups started will fail due to bad management or be forced out of business by competition from truckers or wholesalers. Nevertheless, more can be learned more cheaply by trying and failing occasionally than by simply studying the possibilities further.

A marketing program with the following components could be developed:

1) Improve market information and outlook.
2) Promote standards of weights, measure, and product grades.
3) Support small farmers associations' marketing activities through a "rural marketing centers" program.
4) Encourage better food handling and improved food storage.
5) Promote improvements in the management and infrastructure of public markets.

SEA has a good start on improving its market price and outlook information but this information is of presently limited value to small farmers.

For this reason, it is worth investing more resources. A program to determine small farmers' sources of market information (radio, truckers, newspapers, etc.) for different crops and a program to provide better information via the most frequently used information sources is recommended. Estimated cost of a three-year market information program is $300,000.

Promoting standard weights and measures and establishing widely used product grades is a slow task. The government could begin by standardizing its own statistical reports. Some U.S. technical assistance would be useful here, particularly on the grades and classification. Roughly $200,000 for a three-year technical assistance program should be adequate.

The effectiveness of "rural marketing centers" for small farmers' associations can be tested with relatively little money. (The SEA/IICA group expected to have part of the "testing" done by 1979). If the "tests" suggest that a reasonably high percentage of the centers are likely to work, funding such activities at a level of roughly $1,000,000 per year is suggested. Of this, roughly $100,000 would be used for technical assistance, $100,00 for training, $300,00 for marketing facilities (packing equipment, cold storage, etc.), and the remaining $500,000 for short-term operating expenses (marketing credit). This totals $3,000,000 for a three-year program.

Promoting better food handling is a particularly difficult job. In many cases, the marketing "losses" are hidden and can be passed on to the next buyer or the final consumer in higher food costs. Better packaging may save food but usually involves an added cost. In many countries, the cost-price structures are such that it is cheaper to lose food than to package it adequately. Nevertheless, an on-going program to promote

better food handling and to improve (or increase) food storage facilities would be worthwhile undertaking. Such a program could be primarily technical assistance plus some funds for private wholesalers or farmers' associations interested in constructing new storage facilities. Estimated total cost of a three-year program would be roughly $1,500,000, of which at least $300,000 would be for technical assistance.

Promoting improvements in public markets will require close cooperation with the municipalities. As a nationwide program, however, SEA leadership is approximate. Such a program would involve (1) some training programs on food handling in public markets, (2) changes in or better enforcement of municipal rules on market conditions, (3) installing better water systems and cold storage facilities in public markets, (4) enforcement of standards for accurately weighing or measuring sales, (5) building repairs, and (6) some market expansion.

In total, marketing programs are likely to require a budget of up to $8,000,000 over a three-year period, broken down as follows:

Marketing Program Component	Credit for Infrastructure ($1000)	Training and Technical Assistance ($1000)
1) Market News	--	300
2) Grades and Standards	--	200
3) Marketing Centers	2,400	600
4) Food Handling	1,200	300
5) Public Markets	2,700	300
TOTAL	$ 6,300	$ 1,700

7.7 Professional Agricultural Personnel

U.S. assistance for human resource development has a long and effective record in the Dominican Republic. During the late 1960s and 1970s, more than 200 Dominicans were trained in U.S. universities. These professionals

now constitute the core staff of the major rural development agencies. Support has also been provided to the three universities offering agricultural education, which has considerably increased the in-country training capacity.

The analysis in the appendix to Chapter 6 shows that personnel needs, both in terms of numbers and specialties, for training university-level professionals is much greater than has generally been realized. That analysis views professional manpower as a derived demand, reflecting policy objectives and strategy choices. Without these professional workers, progress in planning and policy, research, extension, credit, and marketing and other areas will be severely constrained.

Additional efforts to enlarge existing programs and add new fields of training are needed. Moreover, a program to initiate M.S.-level training in a few areas appears to be warranted. Given the time lags involved in establishing new programs, steps to accelerate progress in training of spcialized professional technicians deserves high priority.

For the period 1976-80, the demand for university-level agriculturalists was estimated to be 891 graudates, as compared to an annual supply of 505 graduates; i.e., a deficit of 43 percent (Table 7.2). The demand projections reflect the 1974-5 level of activities in the agricultural institutions.[1/] If the expanded programs outlined in this section are to be realized, the deficits for trained manpower will be even greater in the 1980s unless expanded training programs are soon initiated in the universities and other training institutions. Similarly, unless the agricultural high schools

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[1/] Asmon, I. "Preparing Professional and Middle-Level Manpower for Agricultural Development of the Dominican Republic." USAID, August 1975.

Table 7.2 Comparison of Demand and Supply of University-level Agriculturalists and Veterinarians 1976-1985

Specialization	1976-80 Demand	1976-80 Supply	1976-80 Surplus (+) or déficit (-)	1981-1985 Demand a/	1981-1985 Supply	1981-1985 Surplus (+) or déficit (-)
Agronomy (including plant production, plant parasitology, norticulture and forestry) b/	247	201	-46 c/	315	137	178 d/
Agricultural engineering (including irrigation and drainage, soils and agricultural mechanization)	60	31	-29	77	108	+31
Farm management	221	70	-151	282	122	-160 e/
Agricultural extension	148	36	-112	189	92	- 97
Agricultural economics	59	11	- 48	75	80	+ 5
Veterinary medicine and animal proudction	156	156	0	199	121	- 78
TOTAL	891	505	-386	1137	660	-477

a/ Projected demand for the period 1981-85 has been estimated on the base of demand calculated for 1976-80, assuming a comulative annual increase of 5%.

b/ Demand in forestry has not been estimated, but is considered to be minor.

c/ This deficit may reduced by about 30 general agronomy graduates of UCE (Universidad Central del Este), leaving a deficit of about 16 agronomists.

d/ This deficit may be reduced by about 75 general agronomy graduates of UCE (15 annually), leaving a deficit of about 103 agronomists.

e/ This deficit may be reduced by about 75 farm managers (15 annually) of the farm administration school planned by UCE, leaving a deficit of about 85 farm managers.

Source: Asmon, I. "Preparing Professional and Middle-level Manpower for Agricultural Development of the Dominican Republic," USAID, August, 1975.

are expanded, their output will stabilize at the 1978 level of some 140 graduates annually, while the demand in the 1980s will probably exceed 250-260 technicians annually, including both those who would enter the universities for advanced training and those who could begin work.

The assessment makes no pretense to establish total training needs for agricultural and rural development. A coherent program would involve primary and secondary education and adult farmer training as well as university-level programs. A coordinated approach between the agriculture and education ministries is needed and should be encouraged.

7.8 Credit

It is now generally conceded that credit to small farmers for intermediate inputs can be an important policy instrument with favorable output and equity consequences. It is becoming more widely recognized that well-intentioned interest ceilings can be counterproductive if they dry up both the flow of credit to small farmers and the flow of savings from small farmers to local credit institutions. High default rates, unfavorable market conditions (both price and access), and questionable prohibitions against use of credit for consumption are also on the policy agenda in the Dominican Republic.

Agricultural credit activities have absorbed a major percentage of USAID assistance in the Dominican Republic in the past decade. A review of this record points out several factors which should be taken into consideration before undertaking future credit projects. First, the case for major intervention into credit system has been founded on weak evidence. While it is true that only a small proportion of small farmers receive institutional credit, less attention has been given to their

demand for credit and the complementary technical packages that are needed for credit to be productive. Too often it has been insufficiently understood that loaning to small poor farmers is a high cost operation and higher interest rates are essential to cover costs of lending and maintenance of lending capacity. Low interest rate problems have resulted in shifting funds toward larger farms and away from the small, high-risk, high-cost borrowers. Where repayment has been low, small farmer credit programs have in reality become welfare programs.

Certainly, many farmers in the Dominican Republic desire more credit than is available at "official" interest rates. It is less clear that given their access to land, quality of resources, level of technology, and access to inputs and markets, that to provide them with credit will greatly increase their output and incomes. To a large degree those farmers who can put credit to productive use are getting it from public or private sources, although the rates of interest paid may not always be considered "reasonable".

The solutions to this dilemna are clear, although difficult. First, as argued earlier, more small farmers will have to be provided with sufficient land to achieve minimum levels of employment and income. Second, small farmers will have to have access to profitable technology suitable to their conditions. Third, small farmers will need adequate low-cost input supplies and effective output markets. These three requirements are basically outside the scope of credit programs, but complementary to them. Then, interest changes should reflect the productivity and cost of providing credit, or subsidies on small-farmer lending will be required continually. Finally, a coordinated approach to small-farmer credit

delivery involving SEA, the Agricultural Bank, IAD, private banks and agencies, and local farmers' associations should be evolved to avoid duplication and extend the coverage of the system.

7.9 Farmer Service Centers

The generally favorable experience with input supply centers was reviewed in Chapter 5. The possibility of linking marketing centers with the input supply units was identified in Section 7.6 on marketing programs. The extent to which public agencies should become directly involved in the commercial functions surrounding agriculture is a difficult and controversial question.

The goal is to provide a nearby point at which farmers can readily find access to inputs, credit, technical advice, equipment, market outlets, and basic consumption goods. This is the range of services that "market towns" provide all over the world. In a prosperous countryside, with rising purchasing power among farmers and other rural residents, private trade provides these services through retail and service units. However, not all rural areas in the Dominican Republic have well-developed market towns, with the necessary roads and transport and commercial facilities. This is the justification for the provision of service centers, and in the early stages of rural development the operation of such centers is clearly desirable. At a later stage, these centers could be transferred to cooperatives or other farmers' associations. Also, when basic production and marketing systems are better organized, farmers tend to be more closely linked to processing and marketing agencies. At that time, public-sector operations may be more narrowly directed to research-diffusion-regulation functions.

7.10 Rural Infrastructure

Large rural infrastructure projects have received considerable funding by the GODR and multi-lateral international lending institutions in recent years. Assuming this trend continues, large-scale projects should remain a low priority for bilateral U.S. assistance. The situation with small-scale public-works projects is less encouraging. There is considerable need for rural infrastructure projects appropriate to the location and requirements of the rural poor. These projects include rural roads construction and maintenance, small-scale irrigation systems, hillside terracing, wells, marketing facilities, and community buildings. Agricultural Sector Loan II contained a major element directed to the labor-intensive construction of rural infrastructure. That program should be monitored closely as a basis for designing future programs. Presently, it appears a major obstacle is the development of an institutional framework in which this type of approach can be implemented and a management philosophy that allows and encourages local participation and administration of funds.

A major benefit of rural public works projects is that they are one of the few development tools that can directly address rural underemployment. A difficulty will be to orient the projects to the appropriate labor-intensive, income-generating technology. This difficulty will continue given the fact that national policies often create signals that encourage project managers to use more capital-intensive techniques. The solution to this problem involves national policies that both reflect factor endowments and simultaneously encourage as much local implementation as possible. If these institutional conditions can be developed, considerable domestic and foreign funds could be allocated to small-scale rural infrastructure projects.

It would be an error, however, to view expanded public works as a substitute for the major land redistribution and small farmer productivity programs proposed earlier. Still, the idea of undertaking labor-intensive public construction activity as a means of alleviating low-end poverty and of adding to the stocks of socially-productive infrastructure of poor rural communities is appealing. The question is whether the political conditions and commitment are such that a program of a significant scale is feasible, in constrast to the existing program which is almost trivial compared to the needs of the country.

The bottom 50 to 75 percent of the rural population is clearly economically disadvantaged. The only feasible way of increasing the incomes of this large group is to increase their output via the recommended redistribution and productivity strategy. Otherwise, and until this strategy can be implemented, opportunities for additional employment are limited. Hence, the possibility of mobilizing underemployed labor for publicly-organized work opportunities.

Such programs need not be short-term palliatives, partly because the needs are so great relative to past budgetary allocations and partly because rural progress itself will keep generating new needs. Furthermore, the technology can be successfully biased toward labor intensity without sacrificing much in the usefulness and durability of the assets produced.

The extent to which the underemployed rural labor force can be mobilized is somewhat uncertain. Certainly, unutilized labor is highly seasonal (see Chapter 3). But it is equally clear that a labor supply <u>is</u> available, especially if the works program can be adjusted to seasonal agricultural employment peaks. (It is also the case that any upward pressure on wages

created by rural public works would result in distributing income more equally in the rural economy.)

A substantial public works program would necessitate fiscal offsets to reduce the inflationary impact of the increased consumption by the employed rural poor. Finding adequate offsets will likely not be easy in the Dominican Republic, but they must be found unless a higher rate of inflation is acceptable.

Food is critical to this question of fiscal adjustments and inflation. Food will claim the largest share of increased consumption expenditures by the program participants. Since neither food aid nor food imports are feasible or desirable at the required scale, then an expanded public works program is dependent on increased food production. Success in raising domestic food output is, therefore, a prerequisite for expansion of rural public works.

7.11 Farmer Organizations

The results of AID/DR assistance to local farmer participatory institutions has been mixed, with generally less than satisfactory results. Considerable efforts to strengthen agricultural cooperatives and other farmers' organizations, and community development activities have failed to become self-sustaining and have been restricted or abandoned in recent years. On the other hand, considerable success has been obtained in group lending activities, especially through the Dominican Development Foundation. An evaluation of these experiences leads to several observations which may offer guidance for future activities. First, it appears that there is nothing from a sociological standpoint that inherently constrains effective group action. The Dominican rural population has demonstrated a willingness

to join together for collective action if there is a reasonable chance for mutual gain. On the other hand, activities developed from the top down will likely fail as soon as external support is withdrawn. There appears to be some political reluctance to foster local institutions if there is a chance they may evolve into a base for group action other than for their limited initial purpose. Thus, groups specifically organized to obtain credit may survive, but a group that develops the capability to exert market power may very well be discouraged. This suggests that, to the extent that broad-based local participatory institutions are essential for rural progress, their effective development in the Dominican Republic is highly dependent on a more enlightened political environment.

In this situation, priority should continue to be placed on small, facility-oriented or single-purpose groups, such as credit or marketing. Success in this first stage may well result in the consolidation of small groups into larger, multi-purpose organizations at a later time. In the first stage, the most important contribution will probably be the spread of effective joint action. As larger organizations emerge, criteria of financial success, efficiency and improved service over commercial competitors will increase in importance.

7.12 Rural Nonfarm Production

It is generally accepted that potential exists for rural nonfarm production to play an increased role in rural development although progress from past attempts have been limited. The first problem is that past efforts were based on the assumption that the major constraint was lack of capital availability. Several investment funds have been created and, for the most part, have moved slowly. It is becoming apparent that progress in enlarging

rural nonfarm employment will require assistance in project identification, project implementation, and management, as well as credit assistance.

The level, composition, and growth of nonfarm production in rural areas reflects demands for:

1) nonfood goods and services, which rise as rural income increase and its distribution improves, and
2) inputs and services for agricultural production and output marketing.

The Household Income and Consumption Survey showed that nonfood items represent a rising share of rural families consumption budget as income rises. Similarly, demand for purchased inputs and marketing services increases when agricultural output increases. These "market" linkages are the basis for the formation and growth of market towns.

The extent, however, to which employment is generated in rural areas as output and incomes increase depends on many factors. Among others, the nature and distributive impact of agricultural growth is clearly important. It is reasonable to infer that small farmers consume more of the simple, labor-intensive, locally-produced goods (including those produced at home) than do large farmers, the latter relying more on capital-intensive goods imported from urban areas or abroad. The tendency for "imported" industrial goods to supplant local handicraft production often reduces nonfarm production and employment.

Few data and little analysis exists to evaluate the role that nonfarm employment in rural areas can play in poverty alleviation in the Dominican Republic. It deserves more attention as a basis for choosing the kinds of programs that will enhance the growth of complementary nonfarm employment

and income for the rural population.

7.13 Summary

The salient fact of the existential situation is the under-utilization of land and labor resources in the agricultural sector. While precise measurement of their undesirability awaits further development of the CRIES/SIEDRA project and information on the landless rural poor, there is little doubt that it is considerable. That is why the need to provide access by more people to more land (either in small farms or through group farms) has been identified as the most important constraint on the sector. Assuming the access problem is resolved, then priority next must go to complementary programs to provide the technology, water, other inputs, and technical assistance required for increased output and employment of small farmers.

Effective demand will rise if the production structure transfers the benefits of the increased production back to the population at large. But export markets are also required once production rises past the absorption capacity of the domestic market.

In spite of large public expenditures sector since the mid-1960s, and in spite of numerous programs that are individually highly successful, the measurable impact of the high rate of economic growth during 1965-77 on the rural poor has been negligible. Their productivity remains low. Under-employment remains high. There are still thousands of farm families trapped in a struggle for subsistence for which they are inadequately prepared in terms of resources and capabilities. There are still thousands of individuals dependent upon the earnings of landless, unskilled laborers. Rising output, increased employment, greater productivity of human and natural resources, and a more widespread enjoyment of improved standards of living, are the

stated objectives of the government. Public expenditures on improvements in infrastructure, public services, and inputs are certainly necessary in observing a higher standard of rural living, but they are by no means sufficient. It is necessary to fundamentally reassess rural development as it has been sought in the Dominican Republic to date. It is time to reconsider the basic resource constraints and supporting economic and social services that limit the participation of the majority of rural population in the growth process.

BIBLIOGRAPHY

Adams, D. and J. Ladman. Assisting Poor Farmers by Means of Rural Financial Markets in the Dominican Republic. USAID Report, 1975.

Anderson, Kent P. Economic Development in the Dominican Republic: The Record of the Past and a Projection of the Future. Report WN-7219-AID. Santa Monica, California: The Rand Corporation, 1970.

Andrews, Margaret. An Analysis of Small Holder Objectives in the Dominican Republic. AREIS No. A-6. College Park, Maryland: Department of Agricultural and Resource Economics, University of Maryland, Nov. 1975.

Andrews, Margaret S. and Moore, John R. An Integrated Production-Consumption Farm Model for the Dominican Republic. MP899. College Park, Maryland: Agricultural Experiment Station, Aug., 1976.

Angeles, M. and Perez, M. Amiro. Población y Salud: Efectos de la Fecundidad, Mortalidad y Migración. Report prepared for the seminar on population problems at the Autonomous University of Santo Domingo, January 13-19, 1975.

Antonini, Gustavo A., ed. Public Policy and Urbanization in the Dominican Republic and Costa Rica. Proceedings of the 22nd Annual Latin American Conference. Gainesville, Florida: Center for Latin American Studies, University of Florida, 1972.

Antonini, Gustavo A.; Ewel, Katherine C.; and Tupper, Howard M. Population and Energy: A Systems Analysis of Resource Utilization in the Dominican Republic. Gainesville, Florida: The University Presses of Florida, 1975.

Applegate, M. J. A Macroeconomic Analysis of the Economy of the Dominican Republic. USAID/Dominican Republic Report, 1976.

Applegate, M. J. Macroeconomic Structure, Policies, and Performance. USAID/Dominican Republic Report, 1977.

Aquino G., Carlos. Fundamentos para una Estrategia de Desarrollo Agrícola. Centro de Investigaciónes Económicas y Alimenticias, Instituto Superior de Agricultura, Octubre, 1978.

Asmón, I. Preparing Professional and Middle-Level Manpower for Agricultural Development of the Dominican Republic. USAID/Dominican Republic Mission Report, August, 1977.

Banco Central de la República Dominicana. Boletín Mensual. Various volumes 1975-1977, Santo Domingo, R.D.: Author.

Banco Central de la República Dominicana. National Family Income and Expenditure Survey, May 1976-April 1977. Preliminary unpublished data.

Banco Central de la República Dominicana. Estudio Sobre Presupuestos Familiares. Five vols. Santo Domingo, R.D.: Author, 1971.

Banco Central de la República Dominicana, Departamento de Estudios Económicos, División de Cuentas Nacionales. Cuentas Nacionales 1950-1975. Various volumes, 1966, 1973, 1975, 1976.

Banco Central de la República Dominicana, Departamento de Estudios Económicos, División de Estadística. Indice General de Precios al Consumidor por Grupos de Artículos, Ciudad de Santo Domingo 1960-76. Unpublished data. Santo Domingo, R.D.: Author, 1977.

Barnes, A. C. The Sugar Cane. 2nd Edition. New York: Wiley, 1974.

Bretón T., Pedro A. Hacia un Nuevo Enfoque del Proceso de Desarrollo del Sector Agropecuario. Speech before the American Chamber of Commerce, November 24, 1977, Santo Domingo, R.D.

Bromley, Daniel W.; and Crosson, Pierre. Land and Water Resources in Dominican Agriculture: A Preliminary Report. USAID/Dominican Republic Mission report, November, 1977.

Cabral, M. J. Design and Application of a Macroeconomic Planning Model for the Dominican Republic. The Hague, Netherlands: Institute of Social Studies, 1962.

Carvajal, M. J.; and Geithman, D. T. "Migration Flows and Economic Conditions in the Dominican Republic." Land Economics 52 (May, 1976), 207-220.

Centro de Investigación y Acción Social (CIAS). Estudios Sociales. Various volumes, 1972-1977. Santo Domingo, R.D.

Consejo Estatal del Azúcar (CEA). La Industria Azúcarera Dominicana. Santo Domingo, R.D., 1976.

Consejo Estatal del Azúcar; and Bookers Agricultural and Technical Services Ltd. Estudio de Rehabilitación y Expansión de la Industria Azúcarera. Santo Domingo, R. D., ca. 1975.

Corten, A.; and Corten A. Cambio Social en Santo Domingo. Instituto de Estudios del Caribe. San Juan, Puerto Rico, 1968.

Corten, A.; Vilas, C.; Acosta, M.; and Duarte, I. Azúcar y Política en la República Dominicana. Taller. Santo Domingo, R. D., 1976.

Davis, Russell G. Los Recursos Humanos y el Empleo en la República Dominicana. Education Development Center, Inc., Newton, Massachusetts; and Fundación de Crédito Educativo, Santo Domingo, R. D., ca. 1977.

de la Fuente Garcia, Santiago. Geografía Dominicana. Colegio Loyola, Santo Domingo, R. D., 1976.

Delouche, James C. Improved Seed and Plant Materials Program for the Dominican Republic. USAID/Dominican Republic Mission report, 1976.

Díaz, Joaquin A. Estudio de Pesos y Medidas de Productos Agropecuarios en el Valle del Cibao. Centro de Desarrollo Agropecuario (CENDA), La Herradura, Santiago, R.D., 1975.

Dore y Cabral, C. Problemas de la Estructura Agraria Dominicana. Toller, Santo Domingo, 1979.

Ferran, Fernando I. Tabaco y Sociedad: La Organización del Poder en el Ecomercado de Tabaco Dominicano. Fondo Para el Avance de las Ciencias Sociales y Centro de Investigación y Acción Social, Santo Domingo, R. D., 1976.

Fondo para el Avance de las Ciencias Sociales. Economía Dominicana. Various volumes, 1975, 1976, 1977. Santo Domingo, R. D.

Fondo para el Avance de las Ciencias Sociales y Consejo Nacional de Población y Familia. La desnutrición y sus implicaciónes sociales en la República Dominicana. Santo Domingo, R.D.: Author, 1976.

Food and Agriculture Organization of the United Nations. Diversificación y Aumento de la Produccien Agrícola en el Valle del Cibao, República Dominicana; Estudio de Perspectivas de Desarrollo Agropecuario del Valle del Cibao, by Císar Fuentes and J.A. Díaz, Santiago 1974; Informe Tecnico 22.

Food and Agriculture Organization of the United Nations. Inventario y Fomento de los Recursos Forestales en la República Dominicana. Rome: United Nations, 1974.

Food and Agriculture Organization of the United Nations. Yearbook of Fisheries Statistics. Washington, D.C.: United Nations, 1971 and 1975.

Free, J.; and Kresge, C. Dominican Republic Fertilizer Situation: A Description, Analysis and Recommendation. Muscle Shoals, Alabama: International Fertilizer Development Center, 1976.

Garner, J.; and Ruiz, R. Marketing in the Dominican Republic. U.S. Department of Commerce, OBR 75-28, 1975.

Graber, Eric S. Strategy, Policies, and Programs for Economic Growth and Social Progress in the Dominican Republic: With reference to rural development. Unpublished doctoral dissertation, Iowa State University, 1978.

Graber, Eric S.; and Warren, John. Agricultural Sector Assessment Update Report. USAID/Dominican Republic report, October, 1975.

Hatch, J.; Flores, A.; and Scofield, R. Group Farming in the Dominican Republic. USAID/Dominican Republic Report, 1977.

Hatch, L. U. Production and Marketing of Peanut Oil in the Dominican Republic. M.S. thesis, University of Georgia, Athens, 1977.

Instituto Agrario Dominicano, Oficina de Programación. Documentación Sobre Algunos Aspectos Generales de la Reforma Agraria en la República Dominicana. Santo Domingo, R.D.: Author, May, 1977.

Instituto Azúcarero Dominicano. Estadísticas Azúcareras. Santo Domingo, R.D.: Author, ca. 1976.

Instituto Nacional de Recursos Hidraulicos, Subprograma de Riego de PIDAGRO. Plan Nacional de Aprovechamiento de Recursos Hidraulicos Superficiales. Four volumes. Santo Domingo, R.D., April, 1976.

Kennard, William C. Crops Research and its Administration in the Dominican Republic. USAID/Dominican Republic Report, September 1975.

Kohout, Jose C. Informe Preliminar: Sector Agropecuario de la República Dominicana. Banco Interamericano de Desarrollo, Departamento de Desarrollo Económico y Social. Results of field trip, August, 1975.

Kutish, Francis A. Evaluation of Extension Activity and Recommendations. USAID/Dominican Republic Report, August 1975.

Lashman, Karen E.; and Daly, John A. SYNCRISES The Dynamics of Health: An Analytic Series on the Interactions of Health and Socioeconomic Development. IX (June, 1974). Washington, D.C.: Dominican Republic, U.S. Department of Health, Education and Welfare, Office of International Health.

Listín, Diario. Santo Domingo, R.D., May 31, 1976.

May, Jacques M.; and McLellan, Donna L. The Ecology of Malnutrition in the Caribbean. New York: Hafner Press, 1973.

Munguia, George A. A Transitional Stage in the Agricultural Sector: The Case of the Dominican Republic. Unpublished doctoral dissertation, Fordham University, 1975.

Oficina Nacional de Estadística. Estadística Industrial de la República Dominicana-1974. Oficina Nacional de Estadística, Boletín 22, Santo Domingo, R.D., 1977.

Oficina Nacional de Estadística. República Dominicana en Cifras 1975. Vol. VII. Santo Domingo, R.D.: Author, 1976.

Oficina Nacional de Estadística, Departamento de Censos y Encuestas. V Censo Nacional Agropecuario-1960. Santo Domingo, R.D.: Author, 1966.

Oficina Nacional de Estadística, Departamento de Censos y Encuestas. 4to. Censo Nacional de Población-1960. Santo Domingo, R.D.: Author, ca. 1967.

Oficina Nacional de Estadística, Departamento de Censos y Encuestas. V Censo Nacional de Población-1970, Vol. I Características generales de la población. Santo Domingo, R.D.: Author, 1975.

Oficina Nacional de Estadística, Departamento de Censos y Encuestas. V. Censo Nacional de Población-1970, Vol. III Características económicas. Unpublished data. Santo Domingo, R.D.: Author, ca. 1975.

Oficina Nacional de Estadística, Departamento de Censos y Encuestas. 6to. Censo Nacional Agropecuario-1971. 2nd edition, Vols. I, II, and III. Santo Domingo, R.D.: Author, 1976.

Oficina Nacional de Planificación, Unidad de Estudios Regionales. Regionalización de la República Dominicana. Santo Domingo, R.D.: Author, 1966.

Oficina Nacional de Planificación, Unidad de Programación Global. Construcción Cuadro de Insumo-Producto Para 1962. Santo Domingo, R.D.: Author, 1970.

Oficina Nacional de Planificación. Bases Para Formular Una Política de Empleo en la República Dominicana. Plandes 19. Santo Domingo, R.D.: Author, 1974.

Oficina Nacional de Planificación. Aspectos Globales de la Evolución de la Economía Dominicana en el Año 1976. Santo Domingo, R.D.: Author, 1976.

Oficina Nacional de Planificación. Posibilidades del Desarrollo Económico-Social de la República Dominicana: 1976-1986. Plandes 26. Santo Domingo, R.D.: Author, 1976.

Oficina Nacional del Presupuesto. Ejecución del Presupuesto 1966-75. Santo Domingo, R.D.: Author, various volumes.

OIT. Technología, Empleo y Distribución de Ingresos en la Industria Azucarera de la República Dominicana. PRELAC, Septiembre 1978.

Organization of American States, General Secretariat. Sistemas Tributarios de América: República Dominicana. Washington, D.C.: Programa de Finanzas Públicas de la OEA, 1973.

Organization of American States, General Secretariat. Survey of the Natural Resources of the Dominican Republic. Washington, D.C.: Author, 1969.

Paulet, Manuel. La Erosión y la Conservación de los Suelos en la República Dominicana. Instituto Interamericano de Ciencias Agrícolas. A/D-14/78, Santo Domingo, R.D., March, 1978.

Paulet, Manuel. Lineamientos Para el Establecimiento de un Programa de Conservación de Suelos y Agua en la República Dominicana. Instituto Interamericano de Ciencias Agrícolas. A/D-12/77, Santo Domingo, R.D., Nov., 1977.

Ramirez, Nelson, Proyeccioneo de la Población de la República Dominicana por Sexo y Edad, 1970-1990, Asociación Dominicana Pro Bienestar de la Familia, Inc., Santo Domingo, 1975.

Ramirez, N.; Tactuk, P.; and Bretón, M. La Migración Interna en la República Dominicana. Fondo Para el Avance de las Ciencias Sociales y Consejo Nacional de Población y Familia, Santo Domingo, R.D., 1977.

Rowland, Sandra K. Descriptive Analysis of Income: Dominican Republic Cost of Production Survey. Report, U.S. Department of Agriculture (USDA/IDS/SAIG), Washington, D.C., 1977.

Secretaría de Estado de Agricultura. Plan de Mediano Plazo: Documento Preliminar de Discusión Metodologica Preparado para Reuniones con FAO-ILPES-CEPAL en Santiago, Chile. Santo Domingo, R.D., 1977.

Secretaría de Estado de Agricultura, Consultoría Jurídica. Compendio de Leyes Agrarias de la Republica Dominicana: Tenencia de Tierras. Santo Domingo, R.D.: Author, 1976.

Secretaría de Estado de Agricultura, Departamento de Economía Agropecuaria. Boletín Estadístico No. 1: Resultado Encuestas, Arroz, Maíz y Habichuelas. Santo Domingo, R.D., 1976.

Secretaría de Estado de Agricultura, Departamento de Economía Agropecuaria. Plan Nacional de Comercialización. Review draft. Santo Domingo, R.D.: Author, 1977.

Secretaría de Estado de Agricultura, Departamento de Economía Agropecuaria y Departamento de Extensión y Capacitación. Inventario Organizaciones Rurales. San Cristobal, R.D., April, 1977.

Secretaría de Estado de Agricultura, Departamento de Planificación, Aspectos del Empleo Rural en la República Dominicana. Santo Domingo, R.D., 1977.

Secretaría de Estado de Agricultura, Subsecretaría de Investigación, Extensión y Capacitación. Intensidades Máximas y Erosivdad de las Lluvias en la República Dominicana. Technical report DT-50, PIDAGRO, San Cristobal, R.D., 1978.

Secretaría de Estado de Agricultura, Subsecretaría de Investigación, Extensión y Capacitación Agropecuaria and Instituto Interamericano de Ciencias Agrícolas, Programa Integrado de Desarrollo Agropecuario. Plan Nacional de Investigación y Extensión. San Cristobal, R.D.: Author, 1977.

Secretaría de Estado de Agricultura, Subsecretaría Técnica de Planificación Sectorial Agropecuaria. Diagnóstico y Estrategia del Desarrollo Agropecuaria 1976-1986. Santo Domingo, R.D.: Author, 1976.

Secretaría de Estado de Educación Bellas Artes y Cultos. Diagnóstico del Sector Educativo en la República Dominicana. Santo Domingo, R.D.: Author, 1977.

Secretaría de Estado de Finanzas, Dirección General del Catastro Nacional, Subprograma de Catastro Rural (PIDAGRO). Boletines No. 1 y No. 2. Santo Domingo, R.D.: Author, 1977.

Secretaría de Estado de Salud Pública y Asistencia Social, Consejo Nacional de Población y Familia. Encuesta Nacional de Fecundidad: Informe General. Santo Domingo, R.D.: Author, 1976.

Secretaría de Estado de Salud Pública y Asistencia Social. Estudio de Población y Salud: Encuestas "DIAGNOS" - Manual de Instrucciones. Santo Domingo, R.D., June, 1974.

Strasma, J. Assessment of the Status and Problems of Cadastral Survey, Land Titling, Property Registration, and Land Taxation in the Dominican Republic, 1979. USAID Report (draft), March 1979.

Timmons, John F.; Arscott, Trevor G.; Hardy, Ernest E.; Olson, Gerald W. Comprehensive Resource Inventory and Evaluation System (CRIES): An Evaluation. Office of Agriculture, Development Support Bureau, U.S. Agency for International Development. March, 1978.

U.S. Agency for International Development, Bureau for Latin America. Agricultural Sector Farm Survey for the Dominican Republic-1975. Statistical Working Document Series, vol. 1-6. Washington, D.C.: Author, 1977.

U.S. Agency for International Development/Dominican Republic Mission. Agricultural Sector Assessment for the Dominican Republic. Santo Domingo, R.D.: Author, 1974.

U.S. Agency for International Development/Dominican Republic Mission. Health Sector Assessment for the Dominican Republic. Santo Domingo, R.D.: Author, 1975.

U.S. Agency for International Development/Dominican Republic Mission. Agricultural Sector Loan II Project Paper. Santo Domingo, R.D.: Author, 1976.

U.S. Agency for International Development/Dominican Republic Mission. Statistical Data Book. Santo Domingo, R.D.: Author, June 1977.

U.S. Department of Agriculture, U.S. Agency for International Development, and Michigan State University. Land Resource Base Report. Report (for Dominican Republic). Review draft. Comprehensive Resource Inventory and Evaluation System (CRIES), 1977.

U.S. Department of Agriculture, U.S. Agency for International Development, and Michigan State University. Visual Interpretation of LANDSAT Imagery for Land Cover and Land Use of Selected Test Sites in the Dominican Republic Report. Comprehensive Resource Inventory and Evaluation System (CRIES), 1977.

Universidad Católica Madre y Maestra. Revista EME-EME Estudios Dominicanos. Various volumes. Santiago, R.D.

Vega, Bernardo. Evaluación de la Política de Industrialización de la República Dominicana. Santo Domingo, R.D.: Promociones Industriales, C. por A., July 1973.

Vega, Bernardo. La Problematica Económica Dominicana. Book, Universidad Católica Madre y Maestra, Santiago, R.D., 1974.

Weil, Thomas E.; Black, J. K.; Blutstein, H. I.; Johnston, K. T.; McMorris, D. S.; and Munson, F. P. Area Handbook for the Dominican Republic. 2nd Edition. Washington, D.C.: U.S. Government Printing Office, 1973.

Welhouse, Henry. The Consolidated Budget of the Dominican Public Sector. USAID/Dominican Republic Mission report, August, 1975.

Werge, Robert W. Agricultural Development in Clear Creek: Adaptive Strategies and Economic Roles in a Dominican Settlement. Unpublished doctoral dissertation. Gainesville, Florida: University of Florida, 1975.

World Bank. Main Problems in the Economic Development of the Dominican Republic. Report no. 1705-DO. Washington, D.C.: Author, 1977.

World Bank. Updating Report on the Economy of the Dominican Republic. Report no. 611-DO. Washington, D.C.: Author, 1975.

World Bank, Population Projects Department. Appraisal of a Population and Family Health Project: Dominican Republic. Report no. 752b-DO. Washington, D.C.: Author, 1976.