PD-AAS-070

UNCLASSIFIED

UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY AGENCY FOR INTERNATIONAL DEVELOPMENT Washington, D. C. 20523 JAMAICA PROJECT PAPER CROP DIVERSIFICATION, IRRIGATION Loan Number:532-T-046 AID/LAC/P-246 Project Number:532-0123

UNCLASSIFIED

AGENCY FOR INTERNATION PROJECT DATA	AL DEVELOPME SHEET	NT	A = Add Amendment Number DOCUME A = Add Amendment Number CODE D = Delta								
2. COUNTRY/ENTITY	Section and	S	3. PROJECT NUMBER								
JAMAICA	and the second	0	532-0123								
. BUREAU/OFFICE .	1. 8 -	2	5. PR	OJECT TITLE	(maximum, 40 c	haracters)					
LAC	05		10 m	Crop Dive	rsificatio	n/Trrication	-				
6. PROJECT ASSISTANCE COMPLETION DA	TE (PACD)	7. ESTIM. (Under	B." bei	DATE OF OBLI	GAT!)N , or 4)						
MM DD YY 0 9 3 0 9 0 A. Initial FY 8 5 B. Quarter 4 C. Final FY 8 7											
	8. CC	STS (\$000	OR E	QUIVALENT	S1 =)					
A. FUNDING SOURCE	ECT										
	B. FX	C. L/C		D. Total	E FX	F. L/C	G. Total				
AID Appropriated Total	2,895	3,105	-	6,000	6,878	11,122	_18,000				
(Grant)	(1,030)	(170)	(1,200) (4,936) (8,064) (13,000)				
Other 1	(1.865)	(2,935)	(4,800) (1,942) (3,058) (5,000)				
U.S. 2											
Host Country	-	6.000	-	6.000	-	6.000	6.000				
Other Donor(s)		0/000	-	0,000							
TOTAL S	2,895 9.SCHEI	9,105 DULE OF A	ID FU	12,000	6,878	17,122	24,000				
A. APPRO- PRIMARY PRIMARY TECHL CODE D.	OBLIGATIONS T	O DATE	1	E. AMOUNT AF	PROVED	F. LIFE OF PROJECT					
CODE 1.Grant 2. Loan 1	Grant	2. Loan	- 1	1. Grant	2. Loan	1. Grant	2. Loan				
(1) FN 183 050 050	-	-		640	-	3,363	525				
(2) 030	-	-	1.20	550	-	982	-				
	-	-		10	1,940	1,532	612				
	-	-		-	3,760	7,123	13,863				
10. SECONDARY TECHNICAL CODES (marri	mum 6 codes of 1	-	1	1,200	4,500	13,000	15,000				
	1		1		1	TI. SECONDA	LRY PURPOSE CODE				
12. SPECIAL CONCERNS CODES (maximum	7 codes of 4 positi	ions each)			4						
A. Code BF	BL	1	- 1		1	1	T .				
B. Amount 982	(in direct)		1			•					
13. PROJECT PURPOSE (maximum 480 chard	acters)				- 1-	1					
To reinforce the s agricultural inves	institutiona stment in Ja	il capaci maica.	ty o	f Agro 21 :	to develop -	private					
14. SCHEDULED EVALUATIONS MM YY Interim 0 7 8 7	Final 0	9 YY 9 8 9	15. SOI	URCE/ORIGIN C	DF GOODS AN	D SERVICES	AI)				
16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a page PP Amendment)											
The Mission Contr included in this	collar appro Project Pap	ves the er.	metho	ods of impl	Lementatio	n and financi	ing				
				210							
			1	Robert A. I	leonard, C	ontroller					
17. APPROVED			2	A		IL DATE DOC IN AID/W, OR MENTS, DATE	THENT RECEIVED				
Mission Di	rector		11	Date Signed 04 - 1 0 - 91 2	15 8 15 1	MM	1 \\Y				

đ

4

.

c

.

PROJECT AUTHORIZATION

Number of Loan:

Pursuant to Section 103 of the Foreign Assistance Act of 1961, 1. as amended, I hereby authorize the Crop Diversification/Irrigation Project for Jamaica involving planned obligations of not to exceed \$5,000,000 in loan funds and \$13,000,000 in grant funds over a 5 year period from date of authorization subject to the availability of funds in accordance with the A.I.D. OYB/allotment process, to help in financing foreign exchange and local currency costs for the Project. The Planned life of the Project is 5 years from the date of initial obligation.

2. The Project ("Project") consists of assistance to diversify and privatize farms in Jamaica by strengthening the institutional capacity of Agro 21 to promote private enterprise agricultural investment and agricultural diversification. The Project will also include components which will: establish an initial infrastructure development program to rehabilitate and upgrade installations such as wells, irrigation canals, pumping stations, electrical lines, and fencing; assist Agro 21 and the Rio Cobre Irrigation Works in upgrading the Government of Jamaica's capability to operate and maintain the irrigation system; and establish a small farmer linkage program within Agro 21.

I hereby approve the reimbursement of costs incurred to carry 3. out the Project in advance of authorization of the Project in a total amount not to exceed \$2,500,000.

4. The Project Agreement which may be negotiated and executed by the officer to whom such authority is delegated in accordance with A.I.D. Regulations and Delegations of Authority shall be subject to the following essential terms and convenants major conditions, together with such other terms and conditions as A.I.D. may deem appropriate.

Α. Interest Rate and Terms of Repayment

The Government of Jamaica ("Borrower") shall repay the Loan to A.I.D. in U.S. Dollars within twenty five (25) years from the date of first disbursement of the Loan, including a grace period of not to exceed ten (10) years. The Borrower shall pay to A.I.D. in U.S. Dollars, interest from the date of first disbursement of the Loan at the rate of (a) two (2%) percent per annum during the first five (5) years, (b) three (3%) percent per annum during the remainder of the grace period, and thereafter five percent per annum on the outstanding disbursed balance of the Loan and on any due and unpaid interest accrued thereon.

B. <u>Source and Origin of Commodities</u>, Nationality of Services -<u>Grant Financed</u>

Commodities financed by A.I.D. under the Project (grant financed) shall have their source and origin in Jamaica or in the United States except as A.I.D. may otherwise agree in writing. Except for ocean shipping, the suppliers of commodities or services shall have Jamaica or the United States as their place of nationality, except as A.I.D. may otherwise agree in writing.

C. <u>Source and Origin of Commodities, Nationality of Services -</u> Loan Financed

Commodities financed by A.I.D. under the Project shall have their source and origin in Jamaica or in countries included in A.I.D. Geographic Code 941 except as A.I.D. may otherwise agree in writing. Except for ocean shipping, the suppliers of commodities or services shall have Jamaica or countries included in A.I.D. Geographic Code 941 as their place of nationality, except as A.I.D. may otherwise agree in writing.

D. Ocean Shipping

Ocean shipping financed by A.I.D. under the Project shall, except as A.I.D. may otherwise agree in writing, be financed, if the freight is grant funded, only on flag vessels of the United States and, if the freight is loan funded, only on flag vessels of the United States, other countries of A.I.D. Geographic Code 941 and Jamaica.

E. Conditions Precedent to Disbursement

1. First disbursement. Prior to the first disbursement under the Assistance, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, the Cooperating Country will, except as the Parties may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D.:

(a) An opinion of counsel acceptable to A.I.D. that this Agreement has been duly authorized and/or ratified by, and executed on behalf of, the Cooperating Country, and that it constitutes a valid and legally binding obligation of the Cooperating Country in accordance with all of its terms; and

 (b) A statement of the name of the person holding or acting in the office of the Cooperating Country specified in Section
 9.2., and of any additional representatives, together with a specimen signature of each person specified in such statement.

2. <u>Disbursement for Construction over \$3,700,000</u>. Prior to any disbursement under the Assistance, or to the issuance by A.I.D. of documentation pursuant to which disbursement shall be made for construction in a total amount exceeding \$3,700,000, the Cooperating Country shall, except as A.I.D. may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D., evidence that final engineering plans and cost estimates have been prepared.

F. Special Covenants

1. Operation and Maintenance. Except as A.I.D. may otherwise agree in writing, the Cooperating Country agrees to establish a system, including an administrative mechanism, which will authorize collection of water charges by an appropriate entity for deposit in an operations and maintenance account for use in operation and maintenance of the system.

2. Assurance of Cooperating Country Coordination. Except as A.I.D. may otherwise agree in writing, the Cooperating Country agrees to establish and execute a Memorandum of Understanding between appropriate Ministries and parastatal agencies to ensure coordination and support for the Project.

3. <u>Availability of Land for Small Farmers</u>. Except as A.I.D. may otherwise agree in writing, the Cooperating Country shall take all appropriate steps necessary to assure that land in the Project area is available to be leased by small farmers.

G. Procurement Waivers Approved

A waiver for procurement source and origin from A.I.D. Geographic Code 000 to A.I.D. Geographic Code 899 countries for the purchase of 15 motorcycles. The motorcycles are to serve as a means of official travel for canal attendants who will be operating and maintaining the rehabilitated canal. Subject equipment is essential to the O&M component of the project. Equipment of similar specifications (i.e. small trail bikes) is not available from the United States (Geographic Code 000).

Clearances: ARDO:WMcCluskey DDIR:SSkogstad (Acting) OPDS:BCypser CONT:RLeonard OEEE:CMathews **OPEP:JJones**

WILLIAM R. JOSLIN, DIRECTOR USAID JAMAICA'.

5.7 25 1985 Date /

3

Crop Diversification/Irrigation Project 532-0123

TABLE OF CONTENTS

Action Project	n Memorandum for the Director ct Authorization cesheet/Project Data sheet	
Table Acron	of Contents yms and Terms	i iii
I.	Summary	1
	A. Summary Project Description B. Summary Findings C. Project Contributors and Review Committee	1 4 4
II.	Project Background and Rationale	5
	 A. Introduction B. Background and Problem C. Rationale D. Strategy 	5 5 7 11
III.	Project Description	12
	 A. Project Goal and Purpose B. General Description C. Project Elements D. End-of-Project Status 	12 12 13 23
IV.	Cost Estimate and Financial Plan	25
	A. Overview B. Funding C. Cost Summary D. Methods of Financing	25 25 25 28
v.	Implementation Plan	30
	 A. Institutions and Agencies Involved B. Procedures C. Schedule 	30 31 33
VI.	Monitoring Plan	34

(i)

レ

VII. Pro	ject Analyses	35
А. В. С.	Administrative Analysis (Summary) Technical Analysis (Summary) 1. Climate 2. Soils 3. Irrigation Water 4. Irrigation System 5. Infrastructure Rehabilitation Process 6. Small Scale Farmers 7. Markets Social Soundness Analysis (Summary)	35 36 46
D. E.	Environmental Assessment (Summary) Economic Analysis (Summary)	47 48
VIII. Con	ditions and Covenants	52
IX. Eva	luation Plan	53
ANNEXES		
l. Legal A. B. C. D. E. F.	Exhibits PID Approval Cable Logical Framework Statutory Checklist GOJ Request for Assistance FAA, Section 611(e) Certifications DAEC Concerns	
2. Techni A. B. C. D. E. F. G.	<pre>cal Annexes Administrative Analysis Technical Analysis 1. Climate 2. Soils 3. Irrigation Water 4. Irrigation System 5. Infrastructure Rehabilitation Process 6. Small Scale Farmers 7. Markets Social Soundness Analysis Environmental Assessment Economic Analysis Other Donor Assistance Maps</pre>	

LIST OF ACRONYMS

ACB	-	Agricultural Credit Bank
AID	-	Agency for International Development
A&E	-	Architectural & Engineering
CD/I	-	Crop Diversification/Irrigation
EEC	-	European Economic Community
EOP	-	End of Project
4WD	-	Four Wheel Drive Vehicle
FX	-	Foreign Exchange
GOJ	-	Government of Jamaica
IBRD	-	World Bank
IDB	-	Interamerican Development Bank
LC	-	Local Currency
MOA	-	Ministrv of Agriculture
NIBJ	-	National Investment Bank of Jamaica
O&M	-	Operation and Maintenance
PACD	-	Project Activity Completion Date
PP	-	Project Paper
RCIW	-	Rio Cobre Irrigation Works
RCIA	-	Rio Cobre Irrigation Authority
USAID/J	-	United States AID Mission to Jamaica
UWA	-	Underground Water Authority
J\$	-	Jamaican Dollars
U.S.\$	-	United States Dollars

(i.ii)

CROP DIVERSIFICATION/IRRIGATION PROJECT

I. SUMMARY

A. Summary Project Description:

Jamaica has taken some strong measures over the last few years to stabilize its economy and begin a process of economic recovery based on private investment and production. However, the country's hopes for a strong economic recovery recently received a major setback when the weak international market for bauxite and alumina resulted in the closing of two plants, one of which then reopened under contract to the Government of Jamaica. Foreign exchange earnings from bauxite/alumina have declined dramatically, and tax revenues to the GOJ are now virtually non-existent. The new reality for Jamaica is that after years of decline, bauxite/alumina is permanently a small producer of revenue, foreign exchange and employment.

To restore living standards and permit Jamaica to become a showcase for economic development in the Caribbean, alternatives to these traditional exports must be developed quickly. Agriculture, along with manufacturing, has been identified as a key sector in the long term structural adjustment necessary to increase production and foreign exchange and to decrease dependence on imported commodities.

Jamaica's leading traditional agricultural export, sugar, has also been the subject of a protracted price decline in world markets. In spite of GOJ efforts to modernize the sugar industry, given the sensitivity of the sugar market to international price and demand changes, the GOJ has recognized that only a portion of Jamaica's sugar industry can continue to operate economically. The World Bank has indicated its willingess to rehabilitate that segment of the industry that produces for domestic consumption and for protected EEC markets. In effect, sugar has joined bauxite in permanently shrinking to a much lower level of production. In consequence, substantial amounts of unutilized and underutilized sugar lands would more optimally be used for cultivation of other crops.

The GOJ has recognized the national need for quick and bold action to create a wholly different agriculture for Jamaica. In this move to revitalize the agricultural sector, the GOJ created Agro 21 as the lead institution for achieving more intensive land utilization, crop diversification, adoption of improved technology and the attraction of new investment capital and technology into agricultual production and marketing.

The purpose of the project is to reinforce the institutional capacity of Agro 21 to promote and develop private commercial

agricultural investment in Jamaica. To accomplish this, the project will assist Agro 21 in the initial phase of its recently initiated crop diversification program, focusing on three underutilized sugar estates in the St. Catherine's Plain area on the western outskirts of Kingston. There are available some 20,000 acres of sugar cane lands, in increments of about 1,000 acres, for planting with diversified crops. However, accomplishment of 20,000 acres of production is not a specific objective of this Project. As the diversification effort is to be investment driven, it is expected that something approaching 13,400 acres will be transferred into other crops following infrastructure rehabilitation financed during the first three years of this project.

In order to enhance the productivity of these lands and to encourage investor participation in the program, the GOJ, through Agro 21, plans to perform a series of off-site rehabilitation projects. Although the first few off-site infrastructure projects have already been identified by Agro 21, the sequencing of additional projects will depend largelv on investor interest in the various sections of crop land. All necessary engineering studies and economic feasibility evaluations of these infrastructure projects will be carried out by Agro 21 either in-house or through contracts. Following contracting of the construction under AID L/C financing contract procedures, actual contruction monitoring will be carried out directly by Agro 21 or by the Rio Cobre Irrigation Works, with supervision provided by Agro 21 engineering staff.

Concurrent with the rehabilitation process, the GOJ will be reviewing proposals, each containing a farm plan, solicited from investors. Based on criteria developed by Agro 21, the qualifying proposals will be selected and lease agreements negotiated. Following completion of any agreed upon on-site infrastructure, Agro 21 will turn the land over to the investor to start production.

In order to enhance Agro 21's capabilities to promote this private enterprise agricultural investment in Jamaica by local and/or foreign investors, the Project focuses on four principal activities, namelv: (1) strengthening the capacity of Agro 21 through the provision of staff and associated equipment; (2) assisting Agro 21 to implement a small infrastructure development program to rehabilitate and construct installations such as wells, irrigation canals, pumping stations, fencing and storage facilities; and (3) providing Agro 21 and the Rio Cobre Irrigation Works with the resources necessary to upgrade the GOJ's ability to make the rehabilitated irrigation system work effectively, with its operations and maintenance costs paid for directly by user fees; and (4) developing a small farmer linkage program within Agro 21 to facilitate small farmer access to technology, markets, land, and supplemental employment. The project is expected to increase agricultural productivity, increase exports, and generate additional permanent jobs and a large demand for seasonal employment. Production activities will be carried out in the St. Catherine's plain area near Kingston, an area which has a particularly high rate of unemployment.

Project financing will be as follows:

AID Grant	\$13,000,000
AID Loan	\$5,000,000
GOJ Contribution	\$5,000,000
Total	\$24,000,000

Major project inputs include:

43,550,000
\$464,000
\$475,000
\$583,000
\$5,000,000
\$10,167,000
\$425,000
\$331,000
\$156,000

The majority of this project will be implemented by Agro 21. Long and short term local and expatriate technical assistance for Agro 21 will be hired directly by Agro 21 using host country contracting. In addition, Jamaican firms will be contracted to conduct feasibility studies, technical consultancies, and training services. The major share of overseas commodities and equipment required by Agro 21 will be procured by a Procurement Services Agent (PSA); the balance will be procured directly by Agro 21. Construction will be undertaken by local private firms who will be monitored and supervised by RCIW and Agro 21 staff. Those aspects of the Operations & Maintenance component which will upgrade RCIW

- 3 -

will be implemented directly by RCIW which will contract for the necessary technical assistance and procure their commodities using a PSA. The environmental monitoring identified under this component will be carried out by the UWA. The Small Farmer Linkage Program will be implemented by Agro 21 through various combinations of grower contracts, producer organizations, and coordination with the Ministry of Agriculture.

B. Summary Findings:

Based on the analyses contained in Parts IV (Cost Estimate and Financial Plan) and VII (Project Analyses) and in Annexes 2A-E of the Project Paper, the project has been determined to be technically, economically, financially, socially, adminstratively, and environmentally sound and ready for implementation. Project feasibility was thoroughly assessed by an eight-person team of U.S. consultants and by two independent consultants in August 1985. In addition, project development draws on the findings of a three-person team of Israeli water and agricultural specialists.

The Project meets all statutory criteria (see Statutory Checklists, Annex 1-C, and Mission Director's 611(e) Certification, Annex 1-E).

C. <u>Project Contributors</u>:

A program to assist with the diversification of croos and the promotion of private enterprise agricultural investment has been under discussion with the GOJ since 1980. The Project Paper reflects close AID/GOJ collaboration and mutual understanding of the project's objectives and planned implementation.

II. PROJECT BACKGROUND AND RATIONALE

A. Introduction:

Jamaica, the third largest of the Caribbean islands, with a land area of 4,243 square miles, is relatively well-endowed with natural resources, appropriate conditions for both agriculture and tourism, a plentiful, relatively well-educated and skilled labor force, and proximity to North American markets. Although the climate is tropical at sea level, numerous micro climates exist, making the country well suited to the production of an extensive array of crops. Rainfall is seasonal, with striking regional variations: some northern regions receive up to 500 cm per year while the southern and southwestern plains receive only 70 cm.

Per capita GDP (in 1094 dollars) was J\$4079, however the annual per capita real GDP growth rate declined by 0.4 percent in 1984. The All Jamaica Consumer Price Index increased by 27.8 percent over that of 1983 and by 69.6 percent over that or 1980, measured on an average basis. 1/ About fifty percent of the population lives at or below the poverty level.

Historically, the pattern of production and trade has been based on exports of agricultural produce and raw materials and imports of manufactured goods and food. Principal exports have been bauxite alumina, sugar, and bananas. In recent years, the small manufacturing sector has supplied increasingly more of the domestic market, although exports of such proudets have been largely limited to CARICOM markets. In spite of the favorable aspects of location, endowment, and climate however, the economy is highly sensitive to international price and demand changes and is entirely dependent on imported oil for commercial energy consumption. The 1984 trade balance was a negative US\$450 million.

B. Background and Problem

The Jamaican economy has been battered by concurrent declines in all of its traditional exports. In spite of strong measures taken since 1982 to stabilize and revitalize the economy, the process of economic recovery based on private investment and production received a major setback recently as continuing weak international markets for bauxite and alumina resulted in the closing of two plants. Although one of these has reopened under contract to the GOJ, foreign earnings and tax revenues from bauxite/alumina have

^{1/} Source: Economic and Social Survey 1984. 1984 figures are provisional.)

declined drastically and tax revenues are virtually non-existent. The contribution of the bauxite/alumina sector to the Jamaican economy is expected to decline by about 3 percent of GDP or 11 percent of central Government revenues. Because of the decline in export revenue, the World bank estimates that the fiscal deficit will rise from 7.8% of GDP in JFY1984/1985 to about 12% in JFY1985/86 unless some compensatory measures are taken.

In line with this, the GOJ deficit target of 6-8% of GDP will require further reductions in expenditures and an increase in revenues, measures which will produce a further drag upon an already depressed local economy. Assuming good management of government resources and rescheduling of external debt, there is still a need to mobilize about US\$102 million in financing for JFY1985/86 from presently unidentified sources if a significant decline in non-bauxite GDP is to be avoided. Even under this scenario, non-bauxite sector imports would have to decline by close to 10%. Without a significant increase in net capital inflow, non-bauxite sector imports would have to decline by about US\$160 million or 16% of GDP.

With sharp declines in earnings from bauxite and alumina, the principal foreign exchange earner, the Government of Jamaica has targetted the agricultural sector as an essential source of employment, foreign exchange earnings and savings and the key element in achieving increased food self reliance. Along with manufacturing, this sector is seen as critical to the success of the World Bank's structual adjustment program.

Agriculture for the past number of years has been stagnant, characterized by a negative balance of trade in agricultural products. This was the result of neglect to such critical needs as the use of updated technology, new export crops and markets, agro-industrial linkages, commercialization and the socio-demographic integration required to achieve comprehensive development. Consequently, the sector has remained traditional in outlook and scope, dominated by subsistence food farming, inefficient practices and techniques, over-reliance on subsidies, and plantation sugar production. It has accounted for about 70% of employment in the productive sectors and about 35% of employment in the economy as a whole simply by virtue of the large subsidized plantation workforce and the large number of subsistence farmers.

The protracted decline of world sugar markets has affected Jamaica directly through lower prices and indirectly through the decline in efficiency in the sugar industry because of low capital investment and maintenance. As a result of a recent study, the World Bank recommended that Jamaica's sugar industry should be reduced to a level which will be adequate only to satisfy the EEC quota and local consumption, discounting any further U.S. guota. This leaves a production requirement of approximately 225,000 tons of sugar which can be satisfied by private estates and the production from two of the large publicly owned estates, Monvmusk and Frome. The World Bank will support rehabilitation of these two large government owned mills, but will not fund rehabilitation of four other publicly owned mills which they judge to be uneconomical units.

With global sugar prices permanently depressed, high costs of production and accumulated losses of J\$259 million (US\$ 47 million) by the National Sugar Company, the GOJ, in line with its Crop Diversification program, has taken the significant decision to lease 20,000 acres of three less viable estates to private sector entities for diversified crop production. The redeployment process will generate considerable improvements in land utilization, foreign exchange savings and earnings, and add significantly to employment opportunities for permanent and seasonal jobs. It is with this background that the Crop Diversification/Irrigation Project is proposed.

C. Rationale

The GOJ created Agro 21 as the key element in the medium term plan for revitalizing the agricultural sector. Established with AID assistance in 1983, Agro 21 is the lead institution for achieving more intensive land utilization, crop diversification, adoption of improved technology and the attraction of new investment capital and know-how into agricultural production and marketing. Significant progress has been achieved over the past year but with the continued decline in earnings from bauxite and alumina, the pace of agricultural development must be sharply accelerated.

Unfortunately, the amount of good agricultural land is very limited and the best lands are predominantely devoted to sugar cane and The need to get better returns from its available land and bananas. water resources has prompted the GOJ to stress both an increase in export crops as well as an increase in crop substitution programs. In order to do this, the decision was taken by GOJ to make available land and water resources now being used in a relatively inefficient government operated sugar based export production mode to a more profitable higher value private sector cropping program. This has resulted in the GOJ's Crop Diversification Program, a country-wide program to restructure the agricultural sector by rehabilitating abandoned lands, diversifying the crop base, and putting more of the government lands into the hands of the private sector. An estimated 100,000 acres are available for this purpose of which approximately 60,000 acres have been identified for small free-hold lands and 40,000 acres are identified for commercial production under long term lease agreements.

In this context, the GOJ has conceptualized a privatization and diversification program for the three underutilized sugar estates in the St. Catherine Plain area, beginning in 1985 and running through 1988. The GOJ is seeking investment funds from the World Bank, the EEC, the Inter-American Development Bank, the Caribbean Development Bank, local banks, supplier credit, and investor equity, as well as from USAID. USAID wishes to respond to the GOJ request by providing assistance for the initial phases of the program which focuses on some 13,400 acres of state farm lands in the St. Catherine Plain area.

Cultivation of the currently idle lands and more intensive production of the other lands in the three sugar estates will result in an increased demand for labor. The approximatelly 3,500 workers now involved in sugar are by and large an older group, mostly in the fifty years and above category. Their skill levels range from cane cutting to equipment operation, mechanics and adminstration. The skilled and semi-skilled should .ave no problem being absorbed into similar jobs in the new program since multi-cropping, as compared to sugar cane, requires more irrigation and tillage and consequently more maintenance and repairs.

The analysis of the labor demand for the entire project area indicates that the 20,000 acres will represent 39,400 effective crop acres as the result of double cropping (two crops per vear except for ornamentals) and an estimate of approximatelrlv 1.36 million person days of work. The figure will be musch higher if any hand labor is used in harvesting grain crops and if the fruit and aquaculture components are added.

Since the project also involves rehabilitation of a canal system that services an estimated 2,000 small farmers, another significant increase in employment, for which no estimates have been made, will occur. Additionally, there will be a significant increase in ancillary services (transportation, grading and packing, maintenance of the irrigation system, and support sales from secondary and tertiary businesses) that will offer increased employment. Rehabilitation of the iirrigation system will also provide several thousand days of employment.

The project will offer employment opportunities for women. This is highly desirable since one-third of Jamaican households are headed by women and female unemployment is much greater than that of males. (For more details on employment, see Annex 2.B.C.)

In addition, the program is expected to provide substitutes for a significant portion of current imports and to result in a substantial increase in shipping to the export market, all of which will generate increased demand for shipping, processing and ancillary services.

(i) GOJ Priorities:

This Project is a major new priority initiative of the GOJ's program. Agro 21 is a key element for revitalizing the agricultural sector. The Agro 21 program involves the identification of crops and agricultural activities with significant development potential; the organization of the requisite resources and infrastructure for their development; the marshalling of land, capital, manpower, and technology to pursue market opportunities; and the removal of the existing and potential bottlenecks in the way of development of these markets. As such, Agro 21 is an integral part of the GOJ strategy to:

- 1. Improve the investment climate in Jamaica and develop the country's investment capability to achieve the fastest possible expansion of the country's ability to produce goods and services for export and for domestic consumption;
- Deregulate the economy to encourage and induce more private sector participation in the production and distribution of goods and services;
- Enhance the country's ability to earn and save foreign exchange through the expansion of export enterprises and the reorganization and rehabilitation of the production infrastructure;
- Promote food self-sufficiency in order to reduce reliance on imported agricultural products with resulting foreign exchange saving; and
- 5. Develop and implement manpower policies and programs in order to increase the number of skilled workers, managers, and entrepreneurs in the country.

Within this framework, Agro 21's role is one of a catalytic instrument to transform the agricultural sector into a commercially viable economic state. In particular, Agro 21 promotes the application of technological innovations and private investment to expand agricultural production for export and food self-sufficiency on Jamaica's idle resources of unutilized and under utilized land.

(ii) USAID Strategy:

The Project responds to AID's policy objectives of increasing rural income, foreign exchange earnings, and food security. It supports AID's policy objectives of encouraging increased participation of the private sector, both U.S. and Jamaican, in agricultural production, marketing, and the transfer of technical, managerial and marketing expertise. The Project will have major institutional development benefits and will contribute to the policy dialogue by supporting practical demonstrations of the effectiveness of private enterprise in development.

The proposed Project is consistent with the Mission's objectives of:

- 1. strengthening the private sector
- 2. increasing reliance on market forces
- 3. increasing food self-reliance
- 4. technology transfer
- 5. institutional development.

More specifically, the Project represents one of the principal interventions identified in the Mission's FY 1986-87 Action Plan to support stable long term growth in the context of changed short to medium term economic conditions. In view of the drastic reduction in export earnings from bauxite and alumina, Jamaica has a critical, and immediate, need for expansion of foreign exchange earnings from non-traditional exports. The proposed Crop Diversification Project will address this need, as well as increase employment and production in the agricultural sector.

This Project is an integral part of the Mission's overall shift of available resources towards intensified support for the GOJ's program of accelerated export growth over the next five vears. It is an example of the kind of interventions which both addresses short term economic exigencies and supports structural adjustments aimed at increasing reliance on private market mechanisms. It is consistent also with Mission policy dialogue objectives, particularly those relating to removal of restrictions on the importation of agricultural inputs, relaxation of constraints imposed on agricultural marketing by the External Marketing Organizations, elimination of price controls on imported foods, and liberalization of the foreign exchange and trade regime.

The project supplements the on-going Mission efforts to expand the role of agriculture in the nation's economy by encouraging the development and expansion of agribusiness activity through the Agro-Industrial Development Project (AIDP). AJDP is providing foreign exchange, pre-investment funds, and training and is funding the strategic planning program within Agro 21. A number of the staff positions funded under AIDP directly impact on the implementation of the current project.

By focusing on the problems faced by small farmers, particularly access to markets and technology, the project also reflects Mission interest in these areas reflected in the Agricultural Marketing Project and the Small Farmer Production/Marketing Project.

D. <u>Strategy</u>

The GOJ has already identified those lands which are appropriate for diversified agriculture. In order to enhance the productivity of these lands and to encourage investor participation in the program, the GOJ, through Agro 21, plans to perform a series of rehabilitation projects. This infrastructure rehabilitation is necessary before potential investors will be willing to commit because the lands in question are dependent on the water, power, and road access which they will provide. Although the first few infrastructure projects have already been identified by Agro 21, the sequencing of additional projects will depend largely on investor interest in the various sections of crop land. All necessary engineering studies and economic feasibility evaluations of these infrastructure projects will be carried out by Agro 21 either in-house or through contracts. Following contracting of the construction under AID local cost financing contract procedures, actual construction monitoring and supervision will be jointly carried out by the Rio Cobre Irrigation Works and Agro 21 engineering staff.

Concurrently, the GOJ will be soliciting proposals from investors. The proposals should contain both a farm plan as well as any requests for on-site infrastructure. Based on criteria developed by Agro 21, the qualifying proposals will be selected and lease agreements negotiated. Following completion of any agreed upon on-site infrastructure, Agro 21 turns the land over to the investor to start production.

The proposed AID financed Project will assist in developing Agro 21's capacity to promote this private enterprise agricultural investment and agricultural diversification through both staff support and by assisting with the initial small infrastructure development program to rehabilitate and construct installations such as wells, irrigation, canals, pumping stations, and fencing. A third element will examine the current system of operation and maintenance of the irrigation system and follow through with reforms and upgrading required to improve the system. A fourth element of the Project is a small farmer linkage program designed to facilitate access to technology, market outlets, land and supplementary employment through private commercial agriculture activities, primarily through linkages with the larger investors. BV concentrating U.S. assistance in these areas of activity, it is expected that significant contributions to employment, and production can be realized during the life of the project.

AID is in a postion to move more rapidly than other donors with whom the GOJ and we have discussed funding possibilities. As such, it is proposed that AID finance an \$18 million (\$13 million grant and \$5 million loan) initial aspects of the program, with other donors (most likely the EEC, IDB and IBRD) subsequently contributing in the order of \$60 million.

III. PROJECT DESCRIPTION

A. Project Goal and Purpose

The <u>qoal</u> of the project is to develop the agricultural sector to increase productivity, increase employment and enhance Jamaica's capability to earn and save foreign exchange.

The <u>purpose</u> of the project is to reinforce the institutional capacity of Agro 21 to develop private agricultural investment in Jamaica.

B. General Description

Agro 21 was created in October 1983 by the Government of Jamaica to spearhead the private investment in agriculture which is considered crucial for economic recovery. Investment in agriculture will enhance Jamaica's capacity to earn and/or save foreign exchange while easing the constraints on growth brought on by declining world markets for the traditional exports of alumina/bauxite and sugar.

The centerpiece of investment in agriculture is abandoned sugar land or land otherwise underutilized. These lands are to be made available to investors through a crop diversification program administered by Agro 21. It is anticipated that crops planted will include winter vegetables, ornamental horticulture, food and feed grains, tree crops and oil seed crops. Phased development of the lands is anticipated with some 13,400 acres of the St. Catherine Plain being the focus of initial efforts.

To accomplish the previously stated purpose, the project will assist Agro 21 in undertaking this urgently needed program. The project focuses on four principal activities, namely: (1) strengthening the capacity of Agro 21 to promote private enterprise agricultural investment by local and/or foreign investors; (2) assisting Agro 21 to rehabilitate the existing system, upgrade it and add facilities required to ensure full effectiveness (3) providing Agro 21 and RCIW with the resources necessary to upgrade the GOJ's ability to efficiently operate and maintain the rehabilitated system, and (4) establishing a small farmer linkage program at Agro 21 to help small producers gain access to technology, market outlets, land and employment through formal and informal relationships to be developed with larger producers and markets. Accomplishment of 20,000 acres of production is not a specific objective of the project.

C. Project Elements

1. Strengthening Agro 21

Agro 21 is the key agency in the G.O.J. strategy to increase agricultural production for export and import substitution. It has been identified as the implementing agency for the GOJ program to diversify crop production by both large and small investors and farmers. To strengthen Agro 21's capability to accomplish these objectives, the project will finance a variety of staff and technical assistance.

Long-Term Technical Assistance Ten long term Agro 21 technical staff will be funded under the project. These will comprise a variety of expatriates, Third Country Nationals and Jamaicans, although special efforts will be made to find and recruit Jamaicans either in Jamaica or overseas, provided that their skills and qualifications are commensurate. Three of these individuals relate directly to the Small Farmer and Operations & Maintenance components and will be discussed in those sections. The remainder are discussed below:

Expatriate: (\$1,890,000)

- -- Consulting Irrigation Engineer, Operations & Maintenance (36 pm) - will determine and set in place correct procedures at the administrative and field levels to operate and maintain the rehabilitated facilities.
 - Irrigation Engineer (36 pm) (same as the consulting engineer).
 - Procurement Specialist (36 pm) will draft materials and equipment documentation and manage the procurement process for both local and offshore procurment of goods and services required by Agro 21 for the implementation of the project.

TCN: (\$480,000)

-- Hydrogeologist (36 pm)

-- Irrigation Engineer (36 pm)

Local Staff: (\$200,000)

-- Site Engineer (36 pm)

-- Site Engineer (24 pm)

The second Site Engineer is currently funded under an AJD special grant (TCTG) and will be picked up in the project's second and third vears.

Short Term Technical Assistance: (\$304,000) Nineteen person months of short term technical consulting will be furnished to Agro 21 to supplement the skills and resources available through the long term staff. These specialists will contribute to special studies and implementation inputs responsive to problems of environment, soil and water relationship, and commodity profiles information. The project will finance the following categories of specialists:

Agricultural Engineer Systems Analyst Environmentalist Agronomist Soil Scientist Pest Management Social Scientist Irrigation Design

<u>Commodities and Operating Costs</u>: (\$505,000) The project will finance commodities required in support of Agro 21 along with operations funds. Commodities will include five vehicles, computer hard and soft ware, short wave radio equipment, internal communications equipment, video equipment, and U.S. books and publications. Operating costs include vehicle fuel and maintenance, supplies and printing, and legal and audit fees.

Total AID funds budgeted for this component, including inflation, are \$3,705,000.

Small Infrastructure Rehabilitation:

Of some 47 parcels of GOJ land now available for lease by Agro 21, some 20,000 acres of land located near Kingston in St. Catherine and St. Dorothy Plains area are of highest priority for development. They are mostly idle or underutilized cane plantation land which has been poorly managed and maintained. The irrigation works necessary for crop production in this area have been allowed to deteriorate and to be broken down by water thieves to the extent that the system delivers a very small percent of the designed potential established over a hundred years ago. The basic engineering is sound; however, in the last 10 to 15 years, little has been done to maintain the system.

The project will assist Agrp 21 in the rehabilitation of the system. This will ultimately affect some 20,000 acres of GOJ-owned sugar estate lands located within three sugar estates west of Kingston. It is not anticipated that this project will finance all off-site land and water infrastructure projects in the area, although subprojects covering 13,400 acres have been identified for financing. However, it is expected that Agro 21 will obtain additional funding from other sources to develop a major part of the remainder of the area. Funds from this project will be used to initiate the process of improving the area's water delivery system.

The Agro 21 rehabilitation activity will eventually provide sufficient water for 24,000 acres in average years and 19,000 to 20,000 acres in drought years. Availability of rehabilitated, on-farm wells (operated by the lessees under this project) will supplement the lower-cost gravity flow system to ensure availability even in drought years. Improved on-farm water application and eventual wide spread use of drip irrigation could improve the irrigation efficiency by 40% to 50%.

Infrastructure Rehabilitation: (\$9,311,000)

Investors will lease farm land on these estates under the Agro 21 lease. In order to make the leased land suitable for commercial agricultural production, varying amounts of off-site infrastructure improvement will be necessary or desirable depending on which land is selected by investors for what crops.

The infrastructure activities of this Project are conceived to be investor driven rather than planning driven. As the need for development of specific tracts arises, construction will take place. The alternative approach of massive development for 20,000 acres of land was considered but rejected. High capital inputs are justifiable only where high value or critically needed croos will be grown. The volume of high value crops grown depends on whether or not investors are available and ready to invest. The cost of security and possible vandalism on land not under active management by private interests would be high. Finally, smaller increments of works will be easier to manage and to contract to Jamaican private enterprise. Although the approach taken here may result in slightly higher costs for specific improvements, the overall savings are expected to be significant.

Although the timing and actual composition of the various rehabilitation activites will be determined by investor interest, it is expected that the project will finance the following in the first year, for which engineering plans and cost estimates have been prepared by Agro 21 and approved by AID:

- Rehabilitation of 7 wells, construction of 12 new wells including electrical service
- Construction of new pumping station on Ric Cobre (capacity 45 cfs)

- Construction of 2 small pump stations on canal

- -- Reshaping and lining of branch canals
- -- Underground piping and hydrants
- -- Roads and drainage rehabilitation
- -- Canal cleaning, bridge repair & gates
- -- Removal of obstruction in canal
- -- Fencing

Additional infrastructure work in the subsequent two years of the project, for which preliminary engineering planning has been completed, is contemplated to include:

- 16 -

- Rehabilitation or replacement of sluice gates of Rio Cobre dam, including clearing of upstream approaches;
- -- Drilling and equipping of some 31 new wells;
- -- Rehabilitation of conveyance canals and dams;
- Rehabilitation of service roads;
- -- Installation of piping and water control structures;
- -- Fencing.

Agro 21 will be responsible for carrying out off-site infrastructure projects for the account of the GOJ. This will involve

- -- engineering and planning studies;
- -- engaging engineering services; and
- contracting directly for private sector construction services under Agro 21 oversight.

Generally speaking, it is expected that Agro 21 will provide for off-site improvements and that investors will finance on-site improvements such as land leveling, drip and sprinkler irrigation, shade houses and the like. However, engineering studies and, in some cases, certain types of on-site construction work and land leveling may be done by Agro 21 in support of Agro 21's overall effort to attract investors. The amount of land leveling required will depend on the type of crops being planted and the type of irrigation selected.

Total AID funds budgeted for this component, including inflation, are \$10,130,000.

3. Operation and Maintenance

Operation, maintenance and security are as essential as rebuilding the irrigation works. While the Rio Cobre Irrigation Works (RCIW), now under the Ministry of Agriculture, has this responsibility, it has neither the funds nor the authority to adequately accomplish these tasks. Financing provided under this component will be channelled to Agro 21, the RCIW, and the Underground Water Authority in order to upgrade the overall GOJ capability to properly operate, maintain, and monitor the rehabilitated system.

Agro 21

Agro 21 will be responsible for working with the RCIW to enhance its expertise to interface with the water users and to properly manage the multiplicity of water problems. The project will finance:

Long Term Technical Assistance: (\$120,000)

Director, Administration/Liaison Rio Cobre Water System: (36 pm) - will provide inter agency coordination with respect to the project area's O&M needs. By means of a contracting mechanism, will ensure that RCIW and MOA maintain sufficient people on site and proper timing of activities.

This individual will also be involved in negotiations with the RCIW, Ministry of Agriculture and the Ministry of Finance for revenue generation to provide the maintenance and security services needed. Water user fees at a reasonable level, will be collected and turned over to RCIW, to support O&M for the system. At present only a small fee (J\$300/year for a flow of 1 cubic vard/hour) is collected and this accrues to the Ministry of Finance.

Interim Measures: (\$100,000) The project will provide the funding to enable Agro 21 to contract with RCIW to provide maintenance and security for the system on an interim basis as it is rehabilitated pending establishment of a satisfactory revenue generating procedure. This will include strengthening the RCIW by the addition of staff specifically for the rehabilitation area.

RCIW

The RCIW is currently a department within the Water Resources Authority under the Ministry of Agriculture. RCIW staff, consists of approximately twenty two people, including a works manager, four works overseers, two secretaries, three accountants, and the remainder being canal attendants. At present the Underground Water Authority, a statutory body responsible for monitoring water use, water levels, and water quality, through coordination with the Israelis, is executing an Assessment Study of both the St. Catherine and St. Dorothy irrigation systems (administered by the RCIW and the St. Dorothy Irrigation Authority respectively). The study, funded by AID, is being carried out by a team consisting of a water engineer, an agronomist and an economist/sociologist. The Study will:

(i) assess the current institutional arrangement for the management operation and maintenance of the two systems. Included within this assessment will be a survey of water users (farmers) to determine the level of water availability, water costs, and on-farm water management practices for current cropping patterns.

(ii) provide recommendations for an acceptable reorganization of these irrigation systems, that will provide for accountability of management performance and sustainability of the systems based on equitable user fees. The recommendations will include (a) a plan and schedule for organizing water user associations for the two irrigation systems. This plan will provide for the direct participation of representatives of water users in the management of the systems, and to the extent possible, for the participation of water users in carrying out improvements to and maintenance of the systems; and (b) a training plan for the water users in on-farm water management techniques.

This project will finance implementation of the recommendations out forth by the Assessment Study following acceptance by the relevant Jamaican entities.

Long Term Technical Assistance: (\$760,000)

General Manager - (24 pm) will work as a counterpart to the current Works Manager of the Rio Cobre Irrigation Works. With a background in irrigation engineering, this individual would also provide the expertise necessary to upgrade the general technical competency of the RCIW. He would also be responsible for identifying needs for additional short term technical assistance in specialty areas.

The project will finance the temporary addition to the RCIW staff of three local On-Farm Water Management Specialists (48 pm each). These individuals would work with the farmers to build up confidence in the system. They would provide technical advice on the amount of water required given a farmer's soil, crop combination and acreage.

Short Term Technical Assistance: (\$160,000)

It is anticipated that 10 pm in the following categories of specialists will be needed to provide the necessary short term technical assistance:

- -- irrigation engineer
- on-farm water managment specialist
- -- economist/sociologist
- -- management/organizational specialist
- -- financial/institutional development specialist

Operations Support: (\$175,000) The project will provide supplemental operations support to the RCIW pending institution of a satifactorily self-sufficient revenue generating arrangement for the irrigation system's operation and maintenance. This will include funding for necessary additional personnel, supplies, and vehicle fuel and maintenance.

Training: (\$90,000) The project will also finance training of RCIW staff to upgrade their capabilities to adequately monitor and coordinate the use of the water in the system. The instruction will be provided in part by the short-term specialists and in part by knowledgeable individuals currently in the GOJ or the Jamaican private sector. Training will also be provided for the water users via workshops in order to upgrade on-farm water management techniques.

<u>Commodities</u>: (\$198,000) In line with the recommendations developed as part of the Assessment, the project will finance commodities and equipment necessary to upgrade the capabilities of the RCIW to a level of efficient operation of the system. It is expected that these will include vehicles, tools, surveying equipment, water measurment devices, communications equipment, and office equipment. It will also include funds to set up a revolving loan fund within RCIW to allow canal attendants to finance their own work-related transportation (a motorcycle).

Small Infrastructure: (\$856,000) Funds will be provided to assist RCIW in carrying out the rehabilitation of small infrastructure works outside of the initial investor-oriented rehabilitation already identified by Agro 21. These would focus on, but not be limited to, rehabilitation activities which would improve the operation of the system as a whole and directly benefit the farmers currently in the area. Prior to initiation of these works, short term technical assistance would draw up adequate economic feasibility and engineering plans to enable implementation by the RCIW.

Underground Water Authority

<u>Commodities</u>: (\$90,000) Environmental monitoring of the project activities will be the responsibility of the Underground Water Authority. This will include monitoring of (a) water quality with respect to both salinity and contamination by pesticides and other pollutants, (b) groundwater extraction, and (c) soil salinity. However, the UWA currently does not have the vehicles, instruments and spare parts necessary to allow it to take on this additional task. The project will provide funding to finance two small 4WD vehicles, lab fees, spare parts for the drilling equipment, instruments and other equipment necessary to carrying out the monitoring activities.

Total AID funds budgeted for this component, including inflation, are \$3,000,000.

4. Small Scale Farmer Linkage

In order to be eligible to access the lands made available under the GOJ diversification program, all producers are expected to demonstrate that they have the technology, management, markets and funds to operate their enterprises. The larger producers are expected to demonstrate these skills quite readily. However, the many small producers for which land is available and those smaller producers near the project area, who will be receiving water from the rehabilitated irrigation system, may lack one or more of these required skills. The Small Scale Farmer Linkage component of this project is to assist these smaller producers by facilitating access to technology, market outlets, land and supplementary employment.

The project will assist Agro 21 in testing a combination of intervention or linkage models in order to determine a way or ways of developing complementary arrangements between larger commercial farms, agribusinesses, and smaller producers. The replicability of the various development models that evolve from this project will subsequently be tested by investors and farmer groups in other parts of Jamaica.

Some of the possible approaches to such linkages which may be developed are described in Annex 2.B(6). Although other linkages will be investigated, the primary method under consideration follows the "Mother Farm" model. It is expected to be the most common and most important linkage mechanism under the Project.

The intent of the "Mother Farm" model is to give small farmers access to large commercial farms' marketing channels, technology, and management "know-how." The large farm has a strong incentive to make such arrangements because it gives the large farm access to much greater production than its own on-farm investment generates. This greater flow of production can be handled through the same or modestly expanded facilities, thus "leveraging" the large farm's basic investment at relatively low cost.

Under the "Mother Farm" model, the scheme of relationships between the large farm and satellite farmers is incorporated in some detail in the Farm Plan. The Farm Plan is negotiated as part of the Agro 21 lease. The Farm Plan specifies the services to be provided by the large farm for crops and investors for which this is appropriate. Thus for those large farmers who so opt, the small farmer linkage becomes a part of the large farm's obligations in consideration of which the lease is granted.

In order to encourage large farm outreach, the Project makes it possible for the large farm to eliminate risks of providing such services to small farmers. Small farmers will pay a user charge for the services which will limit or eliminate the "technical assistance subsidy." In some cases, the large farm may be unwilling or unable to manage the outreach functions. In such cases, the Project provides funds to enable Agro 21 to contract with the Ministry of Agriculture or with other sources of technical assistance to provide technical assistance and training to small farmers meeting specifications defined by the large farm or marketing entity.

Long Term Technical Assistance: (\$240,000)

-- Director, Small Farmer Programs (36 pm) -

-- Resource Economist (36 pm) -

The Director of Small Farmer Programs will be responsible for all aspects of Agro 21's activities relating to small farmers under the Project. The primary responsibility of the Small Farm Programs Director and staff will be to develop mutually beneficial relationships between small and large farmers and to coordinate these activities with the Ministry of Agriculture (MOA) which is primarily responsible for small farmers' programs. The major objective of the activity is to facilitate technology transfer and market opportunities to the small farmer.

Among the functions involved are explaining how both large and small farmers can benefit from the cooperative relationships, helping to resolve disputes either directly or through coordination with the Ministry of Agriculture, advising on credit, and otherwise providing counsel and assistance to both the large and small farm operations to facilitate their linkage.

The Director and staff may work directly with small farmers in some cases, but more often they will work through the Ministry of Agriculture, other GOJ agencies or private contractors to explain to

small farmers the rature of the opportunities open to them, how they may take advantage of them, how the Agro 21 lease helps to protect small farmers, and why it is in the small farmers' interest to comply with their contracts.

The Director would also be responsible for planning for Technical Assistance and training, and for coordinating arrangements to provide support for small farmers from the existing banking, input supply, marketing, and technical assistance/extension system.

The Resource Economist will provide in-depth economic and financila anlaysis of land development and utilization projects, as well as other relevant investigations as directed by the Director of Small Farmer Programs.

Other Long-Term Technical Assistance: Additional specialists financed under this project or under AID's Agro-Industrial Development Project will play crucial roles in the implementation of this component. They are:

- -- the Director of Export Marketing and the Export Marketing Coordinator,
- -- the Director of New Project Development and the New Product Development Coordinator,
- -- the Irrigation Engineer, and
- -- the Consulting Irrigation Engineer.

Under the project, the combined efforts of these specialists will enable Agro 21 to provide the following assistance to small scale farmers:

- -- market development activities;
- -- information of products required in the local and export markets;
- -- effective and efficient on-farm water management;
- -- fair and equitable irrigation water delivery system

These same specialist staff will be equally effective with large scale commercial operations in which development of the "Mother Farm" model and its many variations and linkages may be the most efficient.

Training: (\$335,000) The small farm coordinator must be aware of and able to coordinate GOJ services to assist the small-scale farmers. Training, study tours, conferences and workshops will be the kinds of activities used to educate the individuals involved and to coordinate the actual services. In addition, provision will be made to fund specific crop culture demonstrations and field trials. Under associate grower programs, the "mother farm" may be compensated for special training or development programs for small farmers. To satisfy the requirements of the Environmental Assessment, funds have been included under this item specifically for training small farmers in proper pesticide handling and use. It is recommended that the training for this aspect be contracted out to the Caribbean Agricultural Research and Development Institute.

Special Projects Fund: (\$326,000) A Special Projects Fund will address unforeseen requirements and experimental projects. An example of an unforeseen or "emergency" requirement" would be funds to handle technical assistance, equipment, and chemical controls for an outbreak of pests or plant disease. An example of an "experimental project" would be the testing of new varieties and techniques on a small farm which had only been tried previously in a large farm environment.

The Special Projects Fund is designed to deal with "problem-solving" and "trouble-shooting". This is a fast-response mechanism to deal with problems affecting the interests of small farmers directly or indirectly, thus helping to maintain the commercial reliability of small farmers in the face of inevitable problems which small farmers are unable to deal with. Although larger farmers will be expected to pay user charges, they will also benefit, as the Special Projects Fund buttresses their investment.

Funds will also be used to finance special studies and research, including studies to monitor the small scale farmers' use of pesticides both on and off the commercial farm.

Total AID funds budgeted for this component, including inflation, are \$982,000.

D. End of Project Status:

At the end of five years, the project described above is expected to result in the following conditions:

- 1. An enhanced institutional capability will exist in Agro 21 to attract foreign and Jamaican private investment to diversified commercial agriculture, principally export crops, thereby increasing foreign exchange earnings and savings.
- 2. Substantial tracts of idle and underutilezed traditional sugar growing land in St. Catherine's Plain will be under production by large and small private agricultural enterprises.

- 3. Practices and institutional arrangements will have been established through which small farmers will have access to production resources and markets, both local and export. This will include linkages to larger agricultural enterprises for the purpose of exploiting marketing channels, technology transfer opportunities, and other economic benefits.
- A greater degree of self-sufficiency in foods now being imported will have been generated thereby saving vital foreign exchange resources.
- 5. Employment of permanent and seasonal workers will have increased by approximately 2,000 new full time equivalent employment opportunities during development of the first 2,000 acres in St. Catherine's Plain area.
- 6. The significance of private agricultural enterprise as an instrument of development and employment generation will recieve broader recognition and incorporation in Jamaican domestic policy dialogue.
- 7. O&M of the rehabilitated system will have been upgraded. RCIW will finance these activities on a self-sustaining basis from its collections of water user charges established at a level which adequately covers costs.

.

IV. FINANCIAL PLAN AND ANALYSIS

A. Overview

The total cost of the CD/I project is estimated at \$24.0 million. The AID contribution will consist of a US\$13.0 million grant and a US\$5 million loan which will be obligated over a five year period; \$6.0 million in Fiscal Year 1985 and the remainder in the following four years. The GOJ contribution will total US\$6.0 million in kind.

B. Funding

A.I.D. is to provide funds for the project by means of a grant of \$13.0 million and a loan of \$5.0 million. The grant funds will be used for long term technical assistance of approximately 516 person months, short term technical assistance of 29 person months, evaluations and audits, training including in-house and on-the-job training plus workshop and conference attendance, small farmer linkage, commodities, operations and maintenance, approximately half of the off-site and on-site infrastructure rehabilitation, and inflation. The loan funds will be used for approximately half of the off-site and on-site infrastructure rehabilitation, some technical assistance and inflation.

The GOJ will provide \$6.0 million. These counterpart resources will principally consist of land.

C. Cost Summary

Table 4.1 is a summary cost estimate and financial blan by component. This information is further broken down between foreign exchange and local currency costs.

Table 4.2 is a projection of expenditures by fiscal year. The expenditures in years 4 and 5 are extremely low and reflect a phasing out of A.I.D. funding, with the focus being on the Operations and Maintenance component. After project completion, approximately J\$500,000 a year will be necessary to continue project related Agro-21 operations.

,

Table 4.1: Summary Cost Estimate and Financial Plan (USS000)

	-CEAI	613 20415 TH		AID						
(F000)	11	LC	71	20	-203 /A /1	LC	72	tortal 20	Total	
LAGAD 31 STRENGTHENING										-
Long Term TA Experiments (3 for 3 years at \$2001/yr) Eucal (Tri-1,fr-3,Tr)-2 at \$40k/yr) TCM (2 for) years at \$40k/yr)	1.10	13 1 0 20	0 0 44	0 0	I		1,80	0 1 3 20	0 1.870 0 :00	
<pre>ihort Term TA (Tri-Lipm,Tr2-6pm,Tr3-lpm et %l6k/pm)</pre>	30		•				:0	•	 	
Commodities Survey Equipment Internal Communications								•		
Video Equipment										
Photocopy										
Computer Airdware (6 PCa) Computer Software										
Venicles (5 smail 4wDe) Furniture/Office Equipment										
Miscellaneous Commodities Subtotal	26	7 10								
Operations	•••						261	, н И	303	
Level/Audit/Personnel Cffice Space/Utilities										
Jucpiles/Printing Jenicis Hainterance										
Cretations Subtote:	50	150					13	110	200	
Subtotal	2. 42	L 478	180		,	9	2.301	478	3.279	
Contingency and Inflation	220	r 13	• •	9	9	0	:71	11	127	
TOTAL - AGRO 21 STRENGTHENING	2.545	531	125	đ	0	0	3.174	531	3.735	
SHALL INFRASTRUCTURE REHABILITATION				******			•••••			
Land (GOJ Contribution of 16.300.000)						6.000)	,	16.000	1 (4. 390)	
A. Pernard Luige 1,000 acres vegetables	172	:27	126	140				14.7		
 Atton Grove/Cecar Grove 1.300 acres vege Grossental Hortsculture 430 acres 	141	111	17	101					743	
7. Bernard Lodge 1.030 scree grains Pumbing Station	:11	598	3	344				146	154	
Canal Heed Cleaning Canal Sridge & Gaze Pepair		201		125			111	328	310	
Hein Canel Sloceage Pepgyel Cam Fluening Gate Secare	ž		3	11			3	52	12 #6	
Wain River Gewending 6 Clearing	3	171	1	105			;	:75	17	
F. Caymonas 1.330 acres vegetables	128	219	194	175			121	442	101	
Semiting fiver	3	115	; ;	145			3		171	
R. Caymanas 1,300 scree vegetables I. Surnard Lodge 1,500 scree vegetables	73	549		162					1.065	
Jubtocal	1.210	1.330	745		•			1.522	1.310	
Contingency and Inflation	78	40.9					1.155	7.356	9.311	
TOTAL - SMALL INFRASTRUCTURE REMARILITATION	1.108	4.159		134	,		110	461	£19	
OPERATION AND WAINTENANCE								8,317	10.130	
Long Term TA - Aaro 11										
Local (1 for 3 years at \$40k/yr)	3	120					9	: 20	120	
Interim GAM Measures - Agro '1 '	3	130					đ	:20	100	
Long Term TA - 4CIN :1 for 2 years at \$100k/yr) 13 for 4 years at \$10k/yr)	3	160	400	٥			+00	3	493	
Short Term TA + KCIV (Trl-2pm,fr)-6pm,fr]+2pm ecfl6k/pm)			160	,						
Training - HCIW	30	60	-	-						
Commodities - SCIW								••	10	
Survey and Other Equipment Padios										
Veniciem (] small (WDe) 15 Motorcyclem										
Miscellaneous Tremodities Subtotal										
Sperations -RCIW							152	14	100	
Small Infrastructure Assessitions		120					55	120	175	
Camposities - 174	229	416					229	436	156	
Environmental Monitorine										
Commodities dubtites	10	1					10	,	10	
Subtotal	347	1.412	160	,	,	3	1.107			
Contingency and Inflation	50	139	52	1	,	,	107			
TOTAL - OPERATION AND HAINTENANCE	177	:. 771	\$12	3	,	,			•••	
SHALL FARMER LINKAGE										
Lana Term TA										
Local '2 for 2 years at Higk/yrl	3	240					1	:+0	:40	
Training (Pesticide Jae)	,	:10					,	:+0	:+0	
Training & Horkenona -Others	. 2	51					; 0	.,		
Joecial Protects Fund	::1	. : 5					:11	.15	· : 6	
Juntatal	:41	• 6 0	1	3	;	;			101	
functingency and inflation	:4	••	•	•	,	,	:4	-		
TOTAL - IMALL PRAMER LINEAGE	14.5	•••	,	,		,	265	•		
SALUATIONS/AUDITS			********							
fveruations (Trl-Jos/fr4-jos at Sign(rs)	۱.,	,						,	14	
Innual Audit		10							•1	
Jubtocal	14	50	1	,	,	,			• •	
Contingency and Cofferion	::	•	, 1	1	,			1.1	.31	
TTAL - TVALUATIONS/AUDITS	117		,	,			•	•	.7	
AAND TOTAL I.	116							4	.33	
									100	

(SOOD) Agan J1 Starwithening		L	Total		f • (TJLAJ			er) 2 Tace	1	/ A	C Tota		3 L	er 5		7074	L Totel
Long Term TA Larastias (3 for) veers at \$300A/yr) Lucal (tri)Ltri),trj-2 at S4CA/yr) TTM (2 for 3 years at S4DA/yr)	63	0) 2 6	3 430 3 43 0 140	63	0) 0 1	10 110 10 17	6C	9	17 43 10 9	0						1.10	, ,	*0 :,••0
Short Term TA (TF1-10pm,fr2-4rm,fr3-1pm at 516s.cm)	14		1 : 40					•		u						48	ġ .	3 (30
Correndicies jurver Lauisment Internal Communications tadjos Video Cauisment Liorary Photocopy	4	0 3 5 5	3 40 3 10 3 10 3 10 5 10 5 10 5 10 5 10 5 10	:0		10 2 2 2 2 3 10 3 10 3 10	1	0 0 3 3		• 1 5 5						, , ,	•	2 324
Computer Saroware (6 PCs) Computer Satoware Venicles (5 iseal) (+0g) Purniture/Office Equipment Hiscellaneous Computies Subtotal	31		30 30 4 34 5 3 194	3 24 3 1 41		0 3 2 1 7 24 3 3 1 2 9 70	1											
Deratione Leasi/Audit/Personnel Ifice Sace/Utilities Supplies/Printing Contenicle maintenance	0 3 15 5	•0	1 40 15	0 3 13	•0		0 3 13	•	1 1								•	•
Subtotal	20	42	42	15	ii	••		ŝ	i i							. 59	::	a ::a
Contingency and Inflation				112	170	1,102	137	17	3 1.030		3	, 0		•	9 D	2. 971	•7	1 3,379
COTAL - AGRO 21 STRENGTMENING Small intrastructure renabilitation	1.111	: 34	1.244	1.025	197	1.212	1.337	210	1.247	•	3 3	3 0 3 C	• ••••	9 (9 (o o	273 3.174	1) 177 1 1.105
Land (GOJ Contribution of 16,000,030)																,	16,301	J) (4.979)
A. Method Loade 1,300 acres vegetables - stress Grows/Cadar Grow 1,303 acres ve C. Jrassmital vorticulture 430 acres (Jupoing Margina) Jupoing Station Group Station Canal acred Cleaning Canal acred Cleaning Canal acres the State Margin Was filmed Blockse teroval	277 7= 229 134 7 181 0 0 0	167 134 450 466 127 328 53	645 743 544 766 310 328 52 46													114	363 536 850 860 221 228 52	5 445 742 5 544 5 544 5 210 1 228 5 2
nein statta Gate Appair Mein Steve Severing (1 Stering C. Sernard Lodge 1.600 Acres vegatables C. Gavens J.000 Acres vegatables Stater Lodge 2.600 Acres vegatables Sestimate J. Announce vegatables			, , , , , , , , , , , , , , , , , , ,	521 207 20	17 276 462 483 379 853	17 2°6 383 690 173 833										3 3 121 201 3	36 17 276 462 483 173	276 941 640 319
1. Bernard Lodge 1,000 ecres vegetables			0			3	118	991 1.322	1.069							114	452	
Subtotal	#21	2.912	1.733	728	2.471	3,118	406	1.173	2.379	1	• •	, ,	0	0	,	1.115	7.356	9.232
Contingency and inflation TOTAL - SMALL INFRASTRUCTURE REPARTMENT	•	5 • • • •	, ,,,	11	247	120	15	414	500	(• .•) 0	0	0	c	150	\$ 4 1	419
SPERATION AND MAINTENANCE						1.51		2,300	2.179				••••••		;	2,113	1.:17	10.110
Long Term TA - Ngro 21 Local (1 for) years at \$40k/yr) Interim OlM Measures - Agro 21	0	**	40	3	40	40	3	40	10	d		a	з	0	э	3	120	1:5
Long ferm TA - 1(1) 11 for 2 years at \$120%/yr) 13 for 4 years at \$33%/yr)	100	;	100	:00	30 30	220	100	25	25 ::2	3		0	3 0	•	0 3	د 101	123	100
Short Term TA - First (Yrl-Jom, Yrl-Apm, Fri-Tom at \$166.cm)	.,					,,		10	10	a	10	10	3	43	(5	ì	363	240
Training - PCIW	31	: 3	14	96 10	3 20	16	12	,	:2	0	0	•	3	0	9	160	3	163
Commodities - ACIW Lirvey and Other Equipment Radios	:5	10	25 15	10 5	:5	15	:5 :5	10	25	,	10	13	5	10	11	:0	40	10
15 wotryclus Miscelisnegus Commodities Subtotal	38 33 39 86	10 10	35 30 31 104	2 1 1 14	2 3 1	2 2 2 3 2 5 2	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 2 0 10	2 2 30									
Cperations -RC1W	15	30	+5	25	50	#5	15	10	(5								120	198
Swall Infrastructure Renabilitation Commodities - OwA Desironmental Homitoring	50	: 16	: 86	25	1-2	370	"	:25	300	3	:	a	3	٥	3	220	636	154
Venicles (2 Lugi) (#De) Commodities Sustorei	24	3	10															
Suptotel	388	296	584	+ 6 2	551 I	. 11 1	247	430	\$77	1	1 20	1 25	,	55	60	,,, 1.:07 (T 5132	**
- STAIL - OPERATION AND WAINTENANCE	2 190	7 296	2 184	26 300	13 404 1	101 4	52 299	99 120	142	2	:33 :22	: 15 : 40	2	41 136	43 : 43	:92 :.231 :	399 . 791	+61 2,200
Lang Term TA											-							
-ocal 2 for 3 years at \$40%/vr)	,	10	•0	,	10	10	t	10	90							;	. 40	240
Training & Markenope (Uther)	2 10	120	120	• •	:20	: 20	•	ر 	,							۱	:10	:40
oecial Projects Fund	•:	.,	101		, ,	: 10	10	29 34	15 54							;3	- 5	**
Jubtotel ·	11	247	126	20	:75	:45		143	2.0	ι	t	:				414 	::5	1:4
Instangency and Inflation	3	,	,	,		·•	15	:•	+4	- 1	,	;	1	"	2	**1 7.4	••0	***
TOTAL - "MALL FARMER LINSAGE	11	: 13	326		: 11	432		147		3	·····	,	·	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,			- 12
rväliaktione ffl- om,frevion at 516k/pm) kannal tuda	,	3	1	••	;	4	,	,	t	18	,		,	:	,	••	;	14
infues AUGST	1	:0	: "	,	:1	10	1	:0	: 9							3	•3	•0
Lintingency and inflation	. ,	:0 ,	:0		;0 ,	14 1	1	10	: 9	••	7	(4	ł	ł	,	16	43	:56
TOTAL - TVALUATIONS, AUDITS	,	:0	.0	• 1	:1	•,)	4 7.4	•	•	, -	14	•	1	:	.1	٠	:•
AAND 70734	. 402 ;,	507 5.	P99			111	, 23, 2 , 3,	11		·····		34	, ,) . 14	. 4 3	.17 1.378 .11	••	13 1 2 2 3

Table 4.2:	Projection	oī	Expenditures	by	Fiscal	Year	(US\$000)

-27-

D. Methods of Implementation and Financing

It is envisioned that both local and expatriate staff under the long term technical assistance will be funded under host country contracts. The expatriate staff is currently funded under this mechanism and it has proven to be an efficient and effective method.

All local commodity procurements for this project will be the responsibility of Agro-21 and will be handled on an advance/reimbursement basis. The overseas procurement will involve a Direct Letter of Commitment issued by A.I.D. to the supplier/PSA abroad. The use of an A.I.D. Direct Letter of Commitment is necessitated as U.S. currency is not readily available in Jamaica.

Additional A&E services required to complete the planned rehabilitation will be obtained locally by means of host country contracts. Construction services will also be obtained by host country contracts. Evaluations will be obtained by means of an AID direct contract while audits will be under host country contracts.

The overseas training under this project will be accomplished by means of direct contract enabling key personnel to attend short term courses or conferences overseas. The local training will include in-house and on-the-job training.

In summary, it is felt that there is adequate capacity and capability in Agro-21 to carry out these activities. A review of their accounting practices will be conducted by A.I.D. Mission staff in October of 1985.
Component	Method of Implementation	Method of Financing	Approx. Amount (US\$000)
Long Term TA Expatriate Staff Local Staff TCN	HC Contract HC Contract HC Contract	HC Advance/Reimbursement HC Advance/Reimbursement HC Advance/Reimbursement	2,290 920 480 3,690
Short Term TA	HC Contract	HC Advance/Reimbursement	464
Commodities Overseas Procurement Local Procurement	t HC Procurement HC Procurement	Direct L/Comm HC Advance/Reimbursement	509 74 583
Operations/Interim O&M	HC Contract	HC Advance/Reimbursement	475
A&E/Construction Serv:	ices HC Contract	HC Advance/Reimbursement	10,167
<u>Training</u> Overseas Training Local Training	Direct Contract HC Contract	Direct Payment (Advance) HC Advance/Reimbursement	60 <u>365</u> 425
<u>Special Projects Fund</u> Foreign Exchange Local Currency	HC Contract HC Contract	Direct Payment (Advance) HC Advance/Reimbursement	21.6 <u>11.5</u> 331
Evaluations	Direct Contract	Direct Payment	96
Audits	HC Contract	HC Advance/Reimbursement	60
		TOTAL INFLATION GRAND TOTAL	16,290 <u>1,710</u> <u>18,000</u>

..

Table 4.3: methods of Implementation and Financing

V. IMPLEMENTATION PLAN

A. Institutions and Agencies Involved

Agro 21 was created in October, 1983 to "make agriculture Jamaica's business". The performance of the organization was evaluated by USAID in December 1984, and Agro 21 was judged to have "performed in an outstanding manner". USAID believes that Agro 21 is fully capable of implementing this Project.

Agro 21 will implement the Project directly; no authority beyond the existing broad mandate of Agro 21 is required to carry out the Project. Agro 21 operations under this Project will be financed partly by AID, and partly by GOJ budget allocations.

It is expected that ten additional professional staff members will ultimately be hired to carry out the functions required under the Project. However, it is the intention of Agro 21 to retain within the organization only those functions which are essential to being handled "in-house" with the preferred mode of acquisition of services to be by contract. The rate of staff build up will depend on such factors as the overall workload of Agro 21, the ability of current staff to carry part of the workload of this Project, the availability of contracting alternatives to staff hiring, and the page of Project implementation.

The majority of this project will be implemented by Agro 21. Long and short term local and expatriate technical assistance for Agro 21 will be hired directly by Agro 21 using host country contracting. In addition, Jamaican firms will be contracted to conduct feasibility studies, technical consultancies, and training services. The major share of overseas commodities and equipment required by Agro 21 will be procured by a Procurement Services Agent (PSA); the balance will be procured directly by Agro 21. Construction will be undertaken by local private firms who will be supervised by Agro 21's staff. Those aspects of the Operations & Maintenance component which will upgrade RCIW will be implemented directly by RCIW which will contract for the necessary technical assistance and procure their commodities using a PSA. The environmental monitoring identified under this component will be carried out by the UWA. The Small Farmer Linkage Program will be implemented by Agro 21 through various combinations of grower contracts, producer organizations, and coordination with the Ministry of Agriculture.

B. Procedures:

Agro 21 will implement the project. Day-to-day management (planning, coordinating, monitoring and accounting) will be the responsibility of the Managing Director of Agro 21, assisted by Unit Directors and supported by Agro 21 administrative and support staff.

The Project contemplates a complex set of acquisitions of services and commodities including:

- -- long term technical assistance
- -- a wide variety of short term consulting services
- -- A&E construction services
- -- management of local and international procurement of commodities

The project thus will require a multiplicity of individual procurement actions. It would be undesirable for Agro 21 and USAID staff to handle this administrative burden internally. Limitations on staff resources, the need for rapid, flexible response on Project acquisition decisions, and the need as a policy matter not to allow implementation complications to cloud a GOJ perception of USG responsiveness to urgent operational needs all argue for creation of a separate capability under contract to handle procurement administration. The following procurement strategy is designed to respond to these problems.

A PSA will be contracted to procure the majority of the overseas commodities.

The project will finance a Procurement/Contracts Specialist to augment the staff currently employed by Agro 21. This individual will be responsible for procuring all construction services and for procuring locally available commodities. Purely local currency cost services would be procured under Handbook 1, Supplement B Chapter 18. Construction services involving local and foreign exchange costs would be handled under Handbook 1, Supplement B Chapter 12. He would also be responsible for recruiting long and short term technical assistance personnel, both overseas and local.

Service		Conducting (Year 1)	Conducting (Subsequent)
LONG TERM TECHNICAL ASSIS Expatriate Local	TANCE HC HC	x x	
SHORT TERM TECHNICAL ASSIS Institution Strength Operation & Maintena	STANCE Dening HC Ance HC	X X	x
A&E/CONSTRUCTION SERVICES	НС	X	x

HC means Handbook 1, Supplement B, Chapter 18 referring to solicitations for service contracts solely within the cooperating country.

Procurement of goods and services under the Project will be governed by the AID Handbook 1, Supplement B, Procurement Policies. Because of the nature of the project wherein the initial inputs have an unusual urgency critical to meeting certain Project objectives, i.e. irrigation infrastructure sufficient to accommodate the 1985-86 winter vegetable crop, and subsequent inputs requiring rapid implementation response, e.g. accommodating investor infrastructure needs once identified, discretionary AID Handbook 11 procedures could constitute a constraint on project implementation effectiveness if applied in all cases. In view of the fact that HB11 procedures derive from HB18, the HB18 principles and statutory requirements will be the basis for the procurement procedures to be detailed in Project Implementation Letters.

Much of the procurement under this project will be for Local Cost Financing (LCF). Under Ch. 18 of HB1B, LCF, only the competitive principles in award of contracts and the contract approval requirements of HB1B Ch. 12 apply. Where US dollar procurement is involved, HB1B Ch.12 will be the basis for procurement procedures to be detailed in PILs.

C. <u>Implementation Schedule</u>:

	Year 1 FY 1986	Year 2 FY 1987	Year 3 FY 1988	Year 4 Fy 1989	Year 5 FX 1990
Activity	ONDJFMAMJJAS	ONDJFMAMJJAS	ONDJFMAMJJAS	ONDJEMAMJJAS	ONDJEMAMJJAS
AGRO 21 STRENGTHENING					
Long Term TA Irrigation Engineer/Co Irrigation Engineer Procurement/Contracts Spec Hydrogeologist Irrigation Engineer Site Engineer Site Engineer	XXXXXXXXXX XXXXXXXXXX XXXXXXXXXXX XXXXXX	XXXXXXXXXXXXX XXXXXXXXXXXX XXXXXXXXXXX	XXXXXXXXXXXXX XXXXXXXXXXXXX XXXXXXXXXX	xxx xxx xxx xxx xxxx	
Short Term TA	xxx	XXX			
Commodities	xxxxxxxxx	*****	XXX		
Operations Support	*****	*****	****	xxx	
SMALL INFRASTRUCTURE REHABILIT	ATION				
Phase l Construction Phase 2 Detailed Planning Phase 2 Construction	xxxxxxxxx xxxxxxxxx xxx	*****	****		
OPERATION AND MAINTENANCE					
Long Term TA - Agro 21 Director, Admin/Liaison RCIW	*****	****	****	xxx	
Interim O&M Measures	*****	*****	*****		
Long Term TA - RCIW General Manager On-Farm Water Mgmt Spec On-Farm Water Mgmt Spec On-Farm Water Mgmt Spec	×××××××××× ××××××× ××××××× ×××××××	XXXXXXXXXXXX XXXXXXXXXXXX XXXXXXXXXXXX	xx xxxxxxxxxxxxxx xxxxxxxxxxxxx xxxxxxx	xxxxxxxxxxxx xxxxxxxxxxxx xxxxxxxxxxxx	xxxxx xxxxx xxxxx
Short Term TA - RCIW	xx	x xx x x x	x x		
Training - RCIW	*****	*****	*****	*****	xxxx
Commodities - RCIW	******	XXXXXXXXXXXX	xxx		
Small Infrastructure Rehab	*****	*****	*****		
Commodities - UWA	******				
SMALL FARMER LINKAGE					
Long Term TA Director, Sm Farmer Programs Resource Economist	xxxxxxxxx xxxxxxxxx	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	xxxxxxxxxxxx xxxxxxxxxxx	xxx xxx	
Training and Workshops	xxxxxx	******	*****	xxx	
Special Projects Fund	xxxxxx	XXXXXXXXXXXXXX	******	xxx	
EVALUATIONS/AUDITS	x	x xx	x	x	x

VI. MONITORING PLAN

USAID implementation responsibility will be shared by two offices. The Office of Engineering, Energy and Environment will be responsible for the small infrastructure development program to rehabilitate and construct installations such as wells, irrigation canals, pumping stations, and fencing, and monitoring of environmental concerns. The Office of Agriculture and Rural Development will be responsile for the strengthening of Agro 21's institutional capacity to promote private enterprise agricultural investment in Jamaica, small farmer linkage program, and the upgrading of the system's O&M.

Additional mission support will be provided by other USAID offices as appropriate (e.g., Office of Project Development and Support, Office of Contract Management and Office of the Controller).

Representatives from the Office of Engineering, Energy and Environmental and the Office of Agriculture and Rural Development will be members of the Project Coordinating Committee (for composition see Implementation Plan). It is expected this committee will meet each month to review project progress and problems. Other monitoring mechanisms include site visits by the Project Officer, Engineer and other USAID staff; review of semi-annual USAID implementation status reports; regular Mission portfolio review meetings; GOJ reports; the 1986 and 1989 evaluations; and audit reports.

Project reviews are planned for on a semiannual basis. The reviews will assess progress in implementing the project (focusing on inputs), identify and resolve constraints to the extent possible to provide the bases for budget preparation for the following year. Participants in the annual review will include both Agro 21 personnel and USAID staff.

Early in project implementation the USAID Project Committee will identify areas particularly important to project success for special monitoring, e.g. progress in the "Mother Farm" and other approaches to small farmer participation, policy reform necessary for the implementation of an efficient O&M system, GOJ incentives and disincentives to commercial farm exports and importation of production inputs.

A. Institutional Analysis (Summary)

Agro 21 was organized to stimulate agricultural development by attracting local and foreign investors to agricultural production and processing enterprises. The emphasis is on medium to large scale commercial projects whose production is exported to earn foreign exchange, meet domestic food needs, or substitute for imports. Agro 21 now has 70 to 80 projects for which it has monitoring or developmental responsibility.

Agro 21 functions as a catalyst to bring together the separate parts of an investment enterprise (capital, production technology, processing and marketing). Short term underwriting of equity by a government agency may be needed on occasion. Agro 21 designs, administers, and monitors projects but does not have the staff or mandate to directly execute projects. Implementation is provided by other GOJ agencies or by contract with private sector companies.

The Corporation is organized as an innovative, highly flexible, quick response group that understands private sector needs and interacts with other government agencies to speed government response to private sector for service and approval to requests.

Agro 21 is deeply involved in the GOJ's program of divestment of government owned lands for diversified agriculture. Forty-seven parcels of government land have been advertised for long term (49 years) lease and Agro 21 is charged with lease preparation, negotiation, and renting.

Organized first as a secretariate under the Prime Minister, Agro 21 was changed to a public sector corporation (wholly owned by the National Investment Bank of Jamaica) in April of 1985. The new charter of the corporation is guite broad allowing all business and corporate functions under Jamaican corporate law. Specific objectives remain essentially the same as they were under the secretariate, i.e. increase exports, provide import substitutes, increase land productivity, create new employment opportunities, find new investors for the commercial sector, enhance technology transfer, and improve both foreign and domestic market availability to agricultural producers.

The evaluation of Agro 21 by a USAID sponsored contract was completed in December 1984; the report was highly favorable. The response by Agro 21 to recommended changes was positive and many have been made or are being planned.

The Agro 21 Board of Directors, with the Managing Director as Chairman provides company policy and top level guidance. The Managing Director has regular contact with the Prime Minister through a small steering committee for Agricultural Development that meets once per week with the Prime Minister. Weekly senior staff meetings at Agro 21 are held to keep managers informed of company activities and tasks which are conducted by multi-disciplinary teams. Directors administer their respective divisions but task and activity authority is retained at the Managing and Deputy Director level. It may be necessary to delegate more authority as the work of Agro 21 expands. The use of sub-director project leaders would ease this problem and the capable staff of the corporation would respond positively to greater responsibility.

All employees are on short contracts (one to two years) which reduces the tendancy for empire building. The corporation is able to pay higher salaries and attract highly competent people who are not afraid to make decisions. The top level administrators, including the Managing Director and his Deputy, are U.S. citizens funded under the USAID Agro-Industrialization Project. Additional staff members necessary for the successful implementation of Agro 21's mandate will be financed under this project. They include three Irrigation Engineers, a Procurement/Contracts Officer, a Hydrogeologist, two Site Engineers, a Director for Administration/Liaison with the Rio Cobre Water System, a Director for the Small Farmers Program and a Resource Fconomist.

In conclusion, given Agro's 21 assigned role as a catalyst in stimulating production and investment in agriculture and given its role to date in the GOJ's land divestment and crop diversification program, Agro 21 is the logical implementing agency for this project. Analysis of current staff has resulted in the identification of the additional positions (outlined above) that are supportive of the successful outcome of this project and which will be funded by the project. As a result, Agro 21 can be viewed as having both the orientation and the capacity necessary to administer the project.

B. Technical Analysis:

The Technical Analyses Section Annex is divided into seven sections dealing with those aspects which will impact most strongly on the outcome of the Project: Climate, Soils, Irrigation Water, Irrigation System, Infrastructure Rehabilitation Process, Small Farmers, and Market.

1. Climate

The South Coastal Plains has the lowest rainfall in Jamaica; it is warm and tropical but very drv. The 30 year average rainfall is 28 inches but can vary from as low as 9 inches (1976) to as high as 62 inches (1979).

The average annual temperature is 80° F with a mean annual variation of 10° F ranging from 64° to 88° F in January and February to 70° F to 90° in July and August. Day/night temperatures fluctuate about 20° F.

Relative humidity is 77% to 86% in the early morning, dropping to 65% to 70% about mid-day. Sunshine hours range from 7.2 to 8.9 hours/dav during the year.

Daily evaporation (free water surface) is 76 inches/year or 6.3 inches/month. Evaporation ranges are 0.26 inches/day in July and 0.15 inches/day in January.

On the St. Catherine coastal plain, the low rainfall, high temperature and drying winds result in evaporation exceeding rainfall in every month expect November. To grow crops successfully in this area, irrigation is a vital necessity.

2. Soils

Two major kinds of soils occur in the project area: the very high pH to calcareous, well drained, permeable Caymanas clay loam (Mollisol) soils on "young" nearly level alluvium that do not flood; and, the high pH, imperfectly drained, slowly permeable, Sydenham and Churchpen clay (Vertisol) soils on "old" nearly level alluvium that does not flood, but which have varying degrees of salinity that is increasing down slope.

Caymanas soils are well suited for vegetable croos, papaya, mango, corn, soybean, red beans and lime tolerant ornamentals, if adequate irrigation is supplied. Caymanas soils are not suited to crops requiring acid soil such as pineapple.

Sydenham and Churchpen soils are well suited to irrigated wetland culture of saline tolerant varieties of rice, and, if artificial drainage is adequate, to irrigated culture of saline tolerant varieties of sugar cane, soybeans, corn and sorghum, and perhaps tomatoes.

Both the Caymanas and the Sydenham, Churchpen soils are low in available nitrogen. Soil test research results show "high" levels of pH, very high available phosphorus and moderate levels of potassium. Because of high pH, acidic forms of nitrogen fertilizers should be used; for example, ammonium sulfate which also would furnish needed amounts of sulfur in readily soluble form.

The high pH of all soils continually being slowly increased by the addition of high pH irrigation water containing appreciable amounts of calcium, magnesium and sodium has made essential secondary and trace elements chemically unavailable for crop production. Zinc, sulfur, iron and manganese, and, perhaps boron, are the principal minor elements that are deficient; verv likely critically deficient. A deficiency of one or more essential secondary and/or trace elements reduces crop yields but all of these are readily and inexpensively available.

Wetland irrigated rice, in addition to nitrogen, phophorus and potassium requires adequate amounts of available zinc, sulfur, iron, manganese and silica. No results of research with these elements on rice grown on "old" alluvia, high pH Sydenham or Churchpen soils was found.

Other Possible Soil Related Problems: No information was found concerning possible harmful nematode populations in the Caymanas soils or of possible introduction of nematodes from moist climate hillside farms via the Rio Cobre River water used for irrigation. Nematodes are tiny worms, 1/25 mm in length, that live on root juices of many crops, especially on well drained soils. They are especially abundant in the Tropics. Control is complex; usually controlled by crop rotation, chemicals and resistant varieties. This potential problem deserves monitoring.

There may be a possibility of <u>harmful pollution</u> from the Rio Cobre River waters used for irrigation. In this regard a 1983 paper by the National Resources Conservation Department of Jamaica states on page 2 ... "It is a well established fact that upstream, the Rio Cobre is subjected to organic affluent from the Condensary, Citrus, Coffee and Milo factories at Bog Walk. It has also received overflow from the ALCAN operation during periods of heavy rains but this has declined in recent years.

Another pollution hazard area exists south of Spanish Town that is reported to be due to occasional discharges of alkali from a manufacturing plant (from June 1985 Water Salinity Status Map of Rural Physical Planning Division of the Ministry of Agriculture).

Observations - Surrounding Areas: Preliminary field observation of small-scale farms west of the current project area and the site of the St. Catherine Vegetable Marketing Association indicates that the lands are mostly well drained, high pH, high phosohorus, high potassium Whim clay loam soil in the "voung" alluvial valley of Coleburns Gully. The Whim soil is similar to the Caymanas soil surable Provisional St. Catherine Soil Map and 1958 Vernon Soil

•

The soils in the vicinity of Amity Hall are moderately drained Lodge clav with saline subsoil and moderately drained Salt Island clay, strongly saline and alkali throughout (1984 Provisional St. Catherine Soil Map). It may be necessary to use rice varieties with adequate salt tolerance in this area.

Conclusions: In summary, the recent alluvia located on the Caymanas tract, a major portion of Bernard Lodge and in the Colesburn Gully area are well drained naturally fertile soils. With proper irrigation these soils are capable of producing a variety of high yielding crops, including most vegetables and ornamentals. The old alluvia soils, due to poor natural drainage and some variable levels of salinity, are more limited in the number of suitable crops that can be grown. Attention must be given to improving the drainage on these soils so that leaching will prevent additional accumulation of salts. However, this constraint was recognized by the project planners as reflected by their selections of the old alluvia as the site for producing the shallow rooted cereals (rice, sorghum and corn). With adequate leaching and/or the selection of more salt tolerant varieties, the number of potential crops could be expanded. Monitoring for salinity, nematodes and potential pollutants is recommended.

On the basis of the data examined, the crops selected to be produced on the identified soil types of the project area appear feasible with the application of commonly available technology.

3. Irrigation Water Resources

Sources: Sources of water for the St. Catherine plain and surrounding areas include seasonal rainfall, groundwater stored in the aquiter, and the Rio Cobre. The Rio Cobre is supplied by groundwater and runoff in the Rio Cobre Basin which has a watershed area of about 1283 km² (495 square miles), and an annual rainfall rate of about 193 cm. (67 inches per year). Groundwater, contributes greatly to the river flow, as much as 60% in some periods.

The Rio Cobre produces some 343 million metres³/vear of water during a mean year(12,000 million cubic feet) and some 226 million metres³/year in a dry year (8,000 million cubic feet) of which 172 million metres³/year (6,000 million cubic feet) is diverted to the irrigation canal, to meet only in part an irrigation water demand of 202 million metres³/year (mean year) (7,000 million cubic feet) or 259 million metres³/year (dry year) (9,000 million cubic feet).

The remainder of the water required for irrigation not supplied by the Rio Cobre is to be supplied by wells. With full refurbishing of the canal, the canal can then provide 23,000 cubic metres/hour (230 cfs) leaving only a deficit of water required for irrigation for January through April and from June through July (mean year) that must be made up from the wells. In a dry year there is a deficit for irrigation water supplied by the irrigation canal for January through September. The length of the above periods may change depending upon the type of irrigation practiced and the demand for irrigation water.

Theoretically from 23,226 acres to 24,235 acres can be irrigated from revitilized canals and wells in an average year (28 in. of rain); and in a dry year (12 to 15 in. of rain) 19,045 to 19,972 acres. This includes anticipated losses plus a leaching factor of 10%. Increasing the irrigation efficiencies and minimizing losses would enhance these figures considerably, perhaps as much as 40% to 50%. Use of sprinkler or drip irrigation would also add to more total acreage.

Conclusion: There is sufficient low saline water of good quality to irrigate some 20,000 acres, with the present irrigation system refurbished and updated, with water from the Rio Cobre conveyed by the renewed irrigation canal and water from local wells, plus the new Rio Cobre pumping station.

4. Irrigation System

Because of inadequate attention for many years, the Rio Cobre Irrigation System has been steadily deteriorating, causing a serious reduction in the supply of irrigation water in the canal system. The irrigation canals are in very poor condition primarily because of bank erosion and vegetative growth. The main Rio Cobre Reservoir has a high siltation problem. The reservoir desilting gate and the main canal headgate are not functioning properly; these must be replaced. To attain levels of service that were available in 1964, the main canal requires major updating, revamping and removal of the weir at Spanish Town.

Providing lower cost gravity flow irrigation water by restoring the canal system to 1964 levels should be given the highest priority. Data concerning soil and water resources in the St. Catherine Plain supports the potential for irrigation development to reduce farming risks and increase productivity. Shortage of water is the major reason given by well over 1,000 growers in the area as to why they are not now producing food crops. A reliable source of irrigation water needs to be established and maintained to bring these growers back into production.

The infrastructure component of the proposed project involves the rehalibitation and upgrading of an old existing system to restore

it to its original design capacity and operation potential in addition to augmenting such system with some new wells and a pump station downstream of the Rio Cobre diversion dam. The rehabilitation and upgrading work proposed includes four subprojects and some common infrastructure listed below in summary form in order of their priority for accomplishment under the first obligation of funds. Detailed engineering planning for these subprojects has been completed and cost estimates prepared.

Summary of Subprojects for which Planning is Completed

		J\$	<u>US\$ (000)</u>
1.	Rehabilitation of 7 wells, construction of 12 new wells including electrical service	4,015,420	0.692
2.	Construction of new pumping station on Rio Cobre (capacity 45 cfs)	1,800,000	0.310
3.	Construct 2 small pump stations on canal	336,000	0.058
4.	Reshaping and lining branch canals Cumberland Pen Lawrencefield Turners Pen Port Henderson La Caridad-Hill Run	6,900,000	1.190
5.	Underground piping and hydrants	2,900,000	0.500
6.	Roads and drainage rehabilitation	2,300,000	0.397
7.	Canal cleaning, bridge repair & gates	2,200,000	0.379
8.	Remove obstruction in canal	500,000	0.086
9.	Fencing	700,000	0.121
1		21,651,420	3.733

Additional infrastructure work, for which pleminary engineering planning has been completed, is contemplated to include:

 Rehabilitation or replacement of sluice dates of Rio Cobre dam including clearing of upstream approaches;

b. Drilling and equipping of some 31 new wells;

Rehabilitation of conveyance canals and dams;

Rehabilitation of roads;

e. Installation of piping and water control structures;

f. Fencing;

g. Possibly some dredging upstream of the Rio Cobre dam.

Detailed engineering plans and cost estimates will be completed prior to initiation of construction. The additional infrastructure is not expected to cost in excess of US\$6,434,000.

<u>Wells</u>: Many irrigation wells in the project area, originally drilled over 20 years ago to replace the reductions occurring in canal water supplies, are either not producing any water or producing very poorly. These wells, seventeen in number, must be restored to a satisfactory operating condition, because the canal water, the pumped water and other water sources are all urgently needed to meet irrigation demands.

<u>Pumping Station</u>: Another source of irrigation water will be provided by a proposed 6,000 cu. yd./hour (45 cfs) pumping station located on the Rio Cobre river adjacent to Spanish Town. Because it is located directly below Spanish Town, the irrigation water pumped at this location may be at hazard due to sewage and industrial waste. This water is destined to be used on fresh vegetables.

Type of Irrigation: The type of irrigation to be utilized for each farm will be the independent decision of each farmer leasing the land. However, the project will plan and aim for a certain type of irrigation in each general area. The amount of land leveling required varies with the type of irrigation being utilized. Sprinkler and drip irrigation requires little or no land leveling; furrow and level basin requires exact and high amounts of land leveling and earth movement.

Because of a possible salinity problem, a leaching factor of 10% is recommended to prevent a salinity build-up and lowered crop yields in the project area.

<u>Spanish Town Weir</u>: The domestic water diversion at Spanish Town (200 yds³./hr.) has caused a major change in the main irrigation canal capacity. The accompanying reduction in the canal flow velocity has resulted in a severe canal siltation problem. For Spanish Town, the diversion should be removed to provide a more efficient separation of irrigation and domestic water supplies. The capacity of the canal has been reduced almost in half by this diversion.

<u>Management</u>: Restoring the canal system to 1964 levels by itself is not sufficient to meet the needs of the farmers involved. There is an urgent requirement for a proper management program for the irrigation system and the provision for policing and providing security for the system. The Rio Cobre Irrigation Works under the Ministry of Agriculture which holds the responsibility for managing the Rio Cobre Irrigation System requires technical assistance to enhance their expertise to interface with organized water users and to increase their ability to properly manage the multiplicity of water problems confronting them daily. Technical assistance is also needed to monitor the irrigation system and individual plots by providing a management plan to more efficiently use irrigation in a water short area. This will need to be supplemented by activities such as installing wiers, flumes and/or flow meters to measure the volume of irrigation water supplied at turnouts as a basis for more equitable payments for water. Efficiency in water supply and application will make more water available throughout the irrigation system, a vital necessity during critical periods.

5. Infrastructure Rehabilitation Process

Small infrastructure projects are designed to provide incentives to investors to begin production on the St. Catherine Plains. This is considered necessary as the existing irrigation system has deteriorated over the last few years, and investors are uncertain if sufficient water or its delivery will be available to support their activities.

Infrastructure project activity involves both off-site and on-site work. Off-site work involves rehabilitating the existing canal system and improving roads and electric services. The rehabilitation of the canal system is needed throughout the entire parish and should be part of the larger water plan. Costs for off-site work will be financed through project funds and will be recovered either through water charges which will fall within the jurisdiction of the local water commission, or through service charges or additional rent charged relevant investors.

On-site development is site specific and refers to refurbishing existing or drilling new wells, repairing existing irrigation facilities (pipes and sub-canals) and land leveling. These improvements are tailored specifically as incentives to prospective investors in the St. Catherine area and such activity is not projected to be offered by Agro 21 in other areas or other phases of their program.

Small ScaleFarmers

It is difficult to specifically define small farmers as the term is used in Jamaica. For example, a farmer is defined by the Farmer Register as an individual or entity, private or public, that has an operation containing one square chain of cultivation (0.1 acre), twelve economic trees, a cow, two pigs, twelve poultry, twelve rabbits or six beehives. Thus a farmer may be a 10,000 acre government owned sugar estate or a backyard hobbyist with twelve chickens. Obviously, the definition is near meaningless in terms of agricultural development. More commonly, size of holding is used to differentiate between large and small farmers, although in Jamaica, approximately 33 percent of all "farmers" contain one acre or less with an average size of 0.47 acre. Development efforts aimed at helping farmers enter into commercially oriented production are generally focused on those tilling three acres or more. The guidelines in the LAC Agricultural Strategy suggest that efforts be aimed at assisting those tilling 5 to 25 acres.

The dispersal of farming operations can be generalized with producers farming less than 10 acres tending to be located in the hills, and the lowlands being the site for plantations and larger operations. In St. Catherine this delineation appears accurate, as the Plains are the location of the three large GOJ owned sugar estates which are the focus of the project.

The only location in the project area which contains any significant number of small holders occurs in Bushy Park where there are an estimated 2,000 small holders, although several of them operate 25 acres or more. This group is presently receiving substantial AID assistance in two ways. Technical assistance is provided through a grant to Partners for Productivity who have two technicians on the ground assisting in the formation of a Producer Marketing Association. The same group is receiving assistance from the Agricultural Marketing Project, an AID funded project with the MOA. Construction of an assembly and grading station in the community is underway. However, despite the assistance given the constraints of inadeguate water and markets remain as well as problems associated with labor and praedial larceny.

The project design provides for rehabilitation of infrastructure which should ameliorate the water problem. It also provides for developing the capacity of the Rio Cobre Irrigation Works to operate and maintain the system, a shortcoming that has been a serious problem in the past.

Relative to the market constraint, the project provides two long term technicians working through Agro 21 who will develop a combination of linkages or interventions to develop complementary arrangements between larger commerical farmers, marketing and credit entities and agricultural supplies and the smaller operators. This will provide those small farmers that are responsive an opportunity for technology transfer and export marketing.

The project also provides funding to support small farmer training programs and a special projects fund designed to deal with problem solving such as an unexpected pest outbreak or conducting applied field trials on small farms to demonstrate performance of improved varieties or practices.

The flexible approach proposed appears to be highly appropriate and supportive of the on-going work with these small farmers.

7. The Market for Export Crops

The core concept of this project is the promotion of commercial export agriculture. The project provides for various support services to assist in promoting commercial export agriculture and additional support to help small farmers exploit the benefits of larger scale commercial agriculture. Thus, the feasibility of promoting investment in commercial agriculture for export in Jamaica is a matter of interest in project design.

The nature of export markets in the United States has been studied by various authorities. The Mission has consulted a recent report, "Some Factors Affecting Fresh Fruit and Vegetable Exports from Central America and the Western Caribbean" (June 1985, prepared by Don Braden), the applicability of which to local circumstances has been confirmed by highly experienced marketing experts in country.

Among the relevent indications of the Braden Report are the following:

- 1. Total U.S. consumption of fresh fruit and vegetables is increasing.
- 2. Per capita consumption is increasing.
- 3. U.S. imports of fresh fruits and vegetables are increasing.
- The volume of U.S. imports from Mexico is very large relative to all other sources, some 55% of total imports by volume in 1983.
- 5. During the period December to May when supply from U.S. sources is reduced, lucrative markets exist for imports of produce.
- 6. Mexican production, while large, faces a range of problems.
- The commodities with the largest volumes of imports to the U.S. include varieties planned for cultivation under this project.
- 8. Costs of transportation and entry to Nogales in the case of Mexican produce and east coast ports in the case of selected Caribbean countries are substantially similar and small relative to average prices less cost of production. Inland transportation costs from ports of entry to a number of major markets favors Caribbean over Mexican produce.
- 9. Selected estimated costs of production of produce under this project plus cost of transportation to selected major

markets compared with average prices in winter months suggests considerable potential for profitable production of various crops for export to the U.S.

Thus the Mission concludes that winter vegetable production for export is feasible in general. The problem, of course, is that exporters do not sell into a nationwide market with average prices and average competition. They sell on specific days in specific places with specific market conditions applicable. It is precisely for this reason that Agro 21 has sought investment by firms with existing market channels, knowledge of produce importation and marketing in the U.S., and the technology and management to optimize the chances for success in what is, inevitably, a risky business.

C. Social Analysis

It is concluded that this project will directly benefit the following groups:

- -- local and foreign investors;
- -- agricultural workers of both sexes;
- -- unskilled workers of both sexes; and
- -- small and medium size farmers.

Indirect benefits will accrue to skilled workers and service workers in ancillary activities such as grading, packing, transportation, production supplies and other services in support of the larger production units.

The project area will benefit from increased employment and, providing wage rates are above current levels, increases in the living standards will result to families of the labor force. The small farmers in the area will benefit from improved infrastructure and the accompanying access to water which will stimulate increased production. Over the longer period, the development of small farmer linkage programs, which will result from the technical assistance provided by the project, will provide technology transfer and incorporate small farmers into more efficient and commerically oriented agriculture.

The project design has addressed the socio-cultural issues involved by focussing on development of several methods to involve small farmers before attempting to adopt a single approach to the issue.

The question of displaced sugar workers was not raised in this analysis since it is not an immediate result of the project. The initial activities are focused on sugar lands that have been idle three to five years and presently offering no employment. The GOJ has, however, decided to allocate 2,000 acres of land on the Innswood and Bernard Lodge estates for future distribution among full time employees of the Bernard Lodge, Caymanas, and Innswood estates who may eventually lose their jobs a consequence of subsequent diversification projects. As mentioned previously, since Agro 21 will initially concentrate on putting 13,400 acres of unutilized and underutilized sugar lands into production, interaction with these displaced workers will not take place in the short term. It should be noted that Agro 21 will not have responsibility for the program of settling the displaced workers and that the strategy for distribution of the land has not yet been determined.

Currently there are no figures available to indicate how many displaced workers will wish to take advantage of the GOJ's offer of plots of land. A strong demand could mean that actual plots would be too small to support viable commercial farming enterprises, and would only be adequate to sustain subsistence farming activities.

The expansion of diversified cropping into lands yet in sugar will be gradual, and will logically occur as there is an increased awareness that sugar cultivation is no longer economically viable. There will therefore be no direct displacement of sugar workers as a result of this project.

D. Environmental Analysis (Summary and Recommendations):

The Crop Diversification and Irrigation Project proposes to restore to profitable agricultural use lands that have been unproductive, underutilized or idle by conversion to higher value crops and by rehabilitating the existing Rio Cobre irrigation system, installing a pumping station on the Rio Cobre and rehabilitation or drilling of wells.

The Rio Cobre water quality at the diversion point is characterized by low salt content and by pollution from effluent discharges upstream. Rio Cobre water at the proposed pumping plant intake is more severely polluted due to effluent discharge from the Spanish Town oxidation ponds.

Well water will be drawn from two aquifers, one limestone the other alluvial. Overdrafts from the limestone aquifer have the potential of exacerbating salt water intruion. Groundwater quality is characterized by varying degrees of salinity. Increased pesticide use carries a potential increased public health hazard. - 48 -

Potential environmental effects from the proposed project include:

- decreased water quality due to salt water intrusion
- decreased soil fertility due to increased salinization
- increased public health hazards due to pesticide use and potential irrigation with polluted water on vegetable crops and pasture.

It has been determined that the proposed project will not introduce any short term significant environmental impacts with proper water management. The limiting of long term impacts depends upon Agro 21's ability to plan further development taking the natural resource constraints into account.

To deal with the environmental concerns, it is recommended that:

1. The Mission Director focus attention on crop diversifivation development as it relates to problems of increasing soil salinity and water pollution.

2. a. The Caribbean Agricultural Research and Development Institute (CARDI) of Jamaica be contracted to carry out a training program for farmers and farm workers on the use and storage of pesticides.

b. The commercial farm lease should include stipulations relative to exclusive use of the U. S. registered pesticides; training and equipping farm workers for safe use of pesticides; proper transporation, storage and disposal thereof; and monitoring of pesticide use.

3. Funds be made availabe for:

- a. Maintenance of the irrigation system
- b. Testing water for contaminants
- c. Monitoring groundwater extraction
- d. Testing soil salinity

4. Results of soil and water testing be reported to USAID.

E. Economic Analysis (Summary):

Agricultural development is of high priority in Jamaica. Agriculture is a potential major earner and saver of foreign exchange, possesses the technology and resources to contribute to aggregate income and employment, and has access to domestic and foreign markets. The development effort, is to be investor driven as opposed to public sector led. A major strategy of the Jamaican Government for agricultural development, and one that is supported by the U.S. Agency for International Development (USAID) is the Crop Diversification Program as carried out by Agro 21. The essence of this program is to stimulate private investment in areas where land and water resources are underutilized and in areas where traditional crops showing low or negative returns to resources are replaced by crops with higher current and projected returns to resources.

The purpose of this USAID project is to support the Government's strategy of crop diversification. Strengthening the institutional capacity of Agro 21 to undergird this process is a key element of the purpose. The specific project objectives are to:

- Provide technical assistance and training through Agro 21 to aid in stimulating private sector investment in crop diversification projects;
- Finance small capital infrastructure projects in the St. Catherine Plains region needed to rehabilitate government lands and to increase the supply of water;
- Upgrade the GOJ's capability to operate and maintain the rehabilitated system, largely supported by water use charges; and
- 4. Develop a small-scale farmer program in the St. Catherine Plains region linked to the Crop Diversification Program.

Assessment of the Strategy:

The ingredients available to make the crop diversification strategy successful are numerous: government policy to use the private sector in carrying-out the strategy; available abandoned and underutilized lands; available markets for domestic food crops and non-traditional export crops; price policy emphasizing free market transactions; adequate credit to agriculture; income tax and other fiscal policies benefiting agricultural producers; and non-discrimination with respect to size and ownership.

There are several obstacles to making the strategy successful, most of which are being addressed by the current USAID project.

 Institutional land use constraint: The Crop Diversification Program has potential impact on all abandoned and underutilized lands. Through strengthening Agro 21, the agency will be able to demonstrate how productivity of these lands can be increased.

- <u>Government policies and investor confidence</u>: Past government policies have been viewed with skepticism by private investors. Agro 21 will be able to help clarify current government policies and build investor confidence.
- 3. <u>Technical constraints</u>: Costs of rehabilitating abandoned and underutilized lands is uncertain and leads to uncertainty in estimating rates of returns to private investment. Agro 21 will be able to complete the needed engineering and technical analyses to assist the private investor in determining costs of production.
- 4. <u>Social Stability</u>: Structural changes cause temporary imbalance in social and economic systems. Agro 21 will be able to evaluate the various alternatives to reduce the amount of social instability during the period of structural change. An important component of the evaluation criteria is the non-discrimination by size and ownership in program implementation.

Assessment of Project Components:

An important purpose of the project is institution building through strengthening Agro 21 to implement the Government's strategy of crop diversification. Specific application of the strengthening process is made in the St. Catherine region by providing assistance with small infrastructure projects, O&M, and developing a small-scale farmer program.

Agro 21 is the most logical institution to implement the Government's strategy. It is an institution created to assist the private sector in identifying investments with high pay-off. No other institution is in such a position to assist the private sector and yet have access to government agencies in providing technical services such as technology transfer, and credit and market analysis. Agro 21 is action oriented and not currently encumbered with a bloated bureaucracy.

The impact Agro 21 can have on the Crop Diversification Program is shown through the economic analyses of the other project components.

This project brings total USAID support to Agro 21 to approximately \$8 million. This sum is exceptionally small in comparison with the annual incremental net foreign exchange earnings it is expected to foster.

Small Infrastructure Projects:

Agro 21 has planned a phased development of the land and water resources in the St. Catherine region. The specific off-site and on-site small infrastructure projects are investor led. This means that as investors show a demand for land and water resources in the region, Agro 21 will evaluate the benefits and costs of off-site and on-site infrastructure needs.

The technical economic analysis shows a high financial and economic rate of return to the development of the land and water resource base for the first proposal of 1,600 acres of winter vegetables. The economic analysis also uses the Israeli report to show the high profitability of Agro 21's approach to linking the water resource to the available land resource. A minimum of 15,000 acres of land can be brought back into production with a proposed water supply increment of 51 mcm/yr. The expected annual value of the increased supply of water is about J\$50,000,000 at a cost of about J\$5,000,000 annually.

Small-Scale Farmer Program:

The technical analysis emphasizes a varied approach to the small farmer program. The economic analysis shows that working with 2,500 existing farmers in the region and bringing at least two acres of land back into production per farmer by giving access to the proposed water supply increment, the small-scale farmer program will add a minimum of J\$7,700,000 to small-scale farmer benefits. These benefits are included in the benefits shown above in the small infrastructure analysis.

A. Conditions Precedent to Disbursement

1. First disbursement. Prior to the first disbursement under the Assistance, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, the Cooperating Country will, except as the Parties may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D.:

(a) An opinion of counsel acceptable to A.I.D. that this Agreement has been duly authorized and/or ratified by, and executed on behalf of, the Cooperating Country, and that it constitutes a valid and legally binding obligation of the Cooperating Country in accordance with all of its terms; and

(b) A statement of the name of the person holding or acting in the office of the Cooperating Country and of any additional representatives, together with a specimen signature of each person specified in such statement.

2. <u>Disbursement for Construction over \$3,700,000</u>. Prior to any disbursement under the Assistance, or to the issuance by A.I.D. of documentation pursuant to which disbursement shall be made for construction in a total amount exceeding \$3,700,000, the Cooperating Country shall, except as A.I.D. may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D., evidence that final engineering plans and cost estimates have been prepared.

B. Special Covenants

1. <u>Operation and Maintenance</u>. Except as A.I.D. may otherwise agree in writing, the Cooperating Country agrees to establish a system, including an administrative mechanism, which will authorize collection of water charges by an appropriate entity for deposit in an operations and maintenance account for use in operation and maintenance of the system.

2. Assurance of Cooperating Country Coordination. Except as A.I.D. may otherwise agree in writing, the Cooperating Country agrees to establish and execute a Memorandum of Understanding between appropriate Ministries and parastatal agencies to ensure coordination and support for the Project.

3. <u>Availability of Land for Small Farmers</u>. Except as A.I.D. may otherwise agree in writing, the Cooperating Country shall take all appropriate steps necessary to assure that land in the Project area is available to be leased by small farmers.

IX. EVALUATION PLAN

Two formal external evaluations are planned over the life of the five year project: July/August 1987 and September/October 1989. The first evaluation will require about three weeks of effort by a team of experts in agricultural crops, irrigation, fiscal management and accounting, and rural sociology. The second (impact) evaluation will entail about three weeks (September/October 1989) of effort by a team with a composition similar to the first evaluation. All evaluations will involve, as resource personnel, representatives of Agro 21 and appropriate representatives from participating agencies, as well as USAID, the project-financed technical assistance teams and possible representatives of the World Bank, the EEC, the Inter American Development Bank or others with whom GOJ will seek further investment funding for further rehabilitation schemes. ሞክթ participation of AID/Washington personnel may also be required.

In support of the evaluation process, the Agro 21 will undertake yearly, an audit of the project at the close of the GOJ fiscal year (April) so that it is available to the evaluation team. The audits will be carried out each April in the years of 1986, 1987, and 1988.

In addition to the audits and project evaluations, project reviews will be carried out at six-month intervals through the life of the project. These reviews will be held within the period of the first month following the end of a six-month implementation period. The project review committee will be comprised of representation from Agro 21, participating technical agencies and USAID (ARDO and OEEE project managers, FM, and others as may be required on a review-by-review basis).

<u>Table I</u>

		Fisc	al Year-		
	1986	1987	1988	1989	1990
	·	····			······································
Audit Yearly	4/86	4/87	4/88		
Evaluation (2)		7-8/86		9-10/89	9
Review Committee (semiannual)	4/86	10/86 4/87	10/87 4/88	10/88 4/89	10/89 4/90

Illustrative Schedule of Review and Evaluation

ANNEX 1

.

•

54

LEGAL EXHIBITS

.)-	1/2	LASSIFIED	STATE 2	5134701	
3	ACTION: AIDS INFO: AM	B DCM ECON RF/9			
)	VZCZCKGO522 RR RUEHKG	acen —	A A	Annex 1 A. PID Approval	Cable ,
,	ZNR UUUUU ZZE R 240753Z JUL 85 FM SECSTATE WASEDC	(FI	LE]	24-JUL-85 TOR: 14:12 CN: Ø16Ø9	,
•	. TO AMEMBASSY KINGSTON	0708		CERG: AID	· · ·
	UNCLAS STATE 226104	1.1.1.1.1		DIST: AID	
)	AIDAC				1. A. A.
,	E.O. 12356: N/A SUBJECT: CROP DIVERS	IFICATION PROJECT	(532-0123)		1997 - 1997 1997 - 1997 1997 - 1997
)	1. THE PID WAS REVIE THE MISSION DIRECTOR, APPROVE THE PP AND AN	WED AND APPROVED ON USAID/JAMAICA, IS	AUTHORIZED TO	35 * · · ·	. · · •
)	SHORT TIME REMAINING APPROVES OBLIGATION O GUIDANCE FOR DEVELOPM	FOR INTENSIVE REVIS F THE PROJECT IN SE ENT OF THE PP FOLLO	W, THE BUREAU PTEMBER, DWS,	J	÷.
)	2 JAMAICA'S COMPETIT AGPICULTURAL PRODUCER	IVENISS WITH RESPEC S IN THE CARIBBEAN	T TO OTHER WAS DISCUSSED).	2
)	AS A RESULT OF INVESTI LAND, AND PROXIMITY TO PLAIN AREA WAS SEEN A	MENT REALIZED TO DA O KINGSTON, THE ST.	TE' GOOD QUAI CATEERINE'S	DATE RECEIVE	D: 7/24
ı	ARFA. POLICY REFORMS HAVE HELPED IMPROVE T	AND DEREGULATION C EE INVESTMENT CLIMA	F THE ECONOMI TE FOR BOTE	ACTION OFFIC	OPDS
	TO WEAT FUTENT IMPEDI	INVESTORS. HOWEVER	, IT WAS UNCI	EAR DIR	ARDO
1	PRODUCTIVE INPUTS AND	CAPITAL (E.G. IMPO	RT LICENSING	D/DIR	OHNP 5
	CONTROLS ON CAPITAL R	MENT TO SURRENDER S EPATRIATION). AND I	ALES PROCEEDS	, OPPD	OEHR
,	IN THE LONGER RUN, WON	ULD REDUCE THESE AN	VANTAGES. IT	OPDS	CD L
1	INPUTS AND CAPITAL WC	ULD BE TAKEN UP WIT	'E TEE GOJ IN	A/ECON	RHUDO
*	DISCUSSIONS ON THE NET DISCUSS JAMAICA'S COM	AT TRANCHE OF ESF	THE PP SHOUL	D MGT	ICR
,	AGRICULTURAL PRODUCTION ATTENTION TO THE POLI	ON AND EXPORT. PAYI CY AND REGULATORY S	NG PARTICULAR INVIRONMENT AN	ID CONT	R.F.
1	LONG-RUN LABOR SITUAT IISBURSEMENT OF THE E	ION. AS THE ARRANG SF WILL BE SNOWN BY	EMENTS FOR THE TIME THE	DUE BY	7/31
	PEMOVE CONTROLS ON IM	PORTED INPUTS AND E	ARNINGS/CAPIT	ACTION TAKE	M N N N Y
•	REPATPIATION, THE EXE EXPECTED TO FURTIER IN SHOULD BE DISCUSSED.	ECTEL RESULTS, AND MPROVE JAMAICA'S CO	EOW. THEY ARE MPETITIVENESS		, 15 t
	3' IMPLEMENTING AGEN	Y. THE ROLE OF AG	RO 21 AND ITS		1
	PRIVATE CEANNELS FOR	I GARRY DUT THE PRO IMPLIMENTATION. AND	THE ABILITY	OF	
1	TEE GOJ TO COVER THE	RECURRENT COSTS OF	AGRO 21 VERE		
	INSTITUTION TO CARRY INCERN THAT THE BOJ.	OUT THE PROJECT. H GIVEN ITS DIFFICUI	OVEVER, THERE	WAS	~

עבבניבה י בטווני

×

.

*

4.217

56

SITUATION, WOULD HAVE DIFFICULTY ADEQUATELY COVERING THE PROJECT'S RECURRENT COSTS. MISSION REPRESENTATIVES STATED THAT THE MISSION WOULD INSIST THAT THE INCOME FROM LEASES SIGNED UNDER THE PROJECT BE APPLIED TO AGRO 21'S RECURRENT COSTS. AGRO 21'S COSTS DURING PROJECT IMPLEMENTATION AND THE PROJECT'S RECURRENT COSTS SHOULD PE ANALYZED AND A PLAN FOR COVERING THOSE COSTS INCLUDED IN THE PP, THE PP SHOULD ALSO DESCRIPE THE ARRANGEMENTS FOR ENSURING THAT THE LEASE INCOME GOES TO AGRO 21.

4 THE POLITICAL ENVIRONMENT. THE DAEC REVIEWED WHAT APPEARED TO BE THE HIGH POLITICAL PROFILE OF THE PROJECT, AND THE POTENTIAL POLITICAL EFFECTS OF LEASING LARGE FLOCKS OF LAND TO PRIVATE INVESTORS, INCLUDING FOREIGNERS' OPTIONS FOR DEVELOPING BROAD POLITICAL SUPPORT FOR THE PROJECT TO ENSURE ITS CONTINUITY UNDER SUBSECUENT ADMINISTRATIONS WERE DISCUSSED. IT WAS SUGGESTED THAT THE POSSIBILITY OF BI-PARTISAN REPRESENTATION ON AGRO 21'S BOARD BE EXPLORED. THIS ISSUE SHOULD BE FULLY DISCUSSED IN THE PP'

5. TIME FRAME' THE PROPOSED THREE YEAR TIME FRAME FOR THE PROJECT WAS DISCUSSED. AID/W FULLY SHARES THE MISSION'S DESIRE TO GET THINGS MOVING AS QUICKLY AS POSSIFLE, IN THAT CONTEXT, WE HAVE NO OBJECTION TO THE MISSION AUTHORIZING REASONABLE PRE-PROJECT EXPENDITURES. THE RATIONALE AND THE SPECIFIC EXPENSES SHOULD BE EXPLAINED IN THE ACTION MEMO WHICH AUTHORIZES THE PROJECT, IT WAS NOTED, HOWEVER, THAT EXPORTING IS A IENGTHY, COMPLEX AND DIFFICULT UNDERTAKING, AND THE PROJECT WILL PROBABLY. NEED MORE THAN THREE YEARS TOBE IMPLEMENTED.THE MISSION IS REQUESTED TO FURTHER CONSIDER THE PLANNED TIME FRAME AND ALLOW SUFFICIENT TIME FOR PROJECT COMPLETION.

6' AID POLICY ON LAND REFORM AND EQUITY. AID'S DRAFT POLICY ON LAND REFORM AND EQUITY INCLUDES THE FOLLOWING STATEMENT: QUOTE A.I.D. WILL NOT SUPPORT PROGRAMS IF TEEIR LIKELY OUTCOME IS TO LEGITIMIZE A LAND TENURE SYSTEM WHICH DOES NOT PROVIDE TO SMALL FARMERS AN ECUALITY OF OPPORTUNITY TO OBTAIN AND UTILIZE LAND, UNCUOTE. THE DEGREE TO WHICH THE PROPOSED PROJECT IS CONSISTENT WITH THIS POLICY WAS DISCUSSED. IT WAS NOT CLEAR THAT A.I.D.'S MANDATE TO ASSIST SMALL FARMERS WOULD SMALL FARMER LEASING OF LAND UNDER THE PROJECT PE MET. WAS SEEN AS DOUBTFUL NOT BECAUSE OF LEGAL OR REGULATORY CONSTRAINTS' BUT BECAUSE THEIR ACCESS TO OTHER PRODUCTION INFUTS IS LIMITED. THE MISSION'S EFFORT TO GET AGRO 21

1/2

UNCLASSIFIED

STATE 226104/01

. 2/2

2)

1:

3

* ...

STATE

226104/02

1

1

!

1

, 9

-!

. TO WORK WITH SMALL FARMERS WAS WELL RECEIVED, AND IT WAS - EXPECTED THAT THE SMALL FARMER LINKAGE PROGRAM WOULD IN - FACT ACEIEVE SIGNIFICANT SMALL FARMER PARTICIPATION . PP SHOULD MORE FULLY ANALYZE AND DESCRIBE THE SMALL THE FARMER COMPONENT AND WEAT STEPS AGRO 21 WILL TAKE TO ENCOURAGE SMALL FARMER INVOLVEMENT IN THE PROJECT THROUGH ALTERNATE LEASING ARRANGEMENTS (IF APPROPRIATE), CREDIT AVAILABILITY, AND OTHER ARRANGEMENTS. IF THE PROPOSED POLICY ON LAND REFORM AND EQUITY IS ISSUED BEFORE THE PP IS FINALIZED, THE CONSISTENCY BETWEEN THE PROJECT AND THAT POLICY SHOULD BE DISCUSSED. 111

7. IRRIGATION AND WATER MANAGEMENT. PROPER FUNCTIONING CF THE IRRIGATION SYSTEM WAS SEEN AS CRUCIAL TO ACHIEVEMENT OF THE PROJECT'S OBJECTIVES. THE ITTERIORATION OF THE IRRIGATION SYSTEM, THE LOW FEES FOR WATER, AND THE GOJ'S RECORD TO DATE WITH REGARD TO MAINTENANCE, WERE DISCUSSED. IN ADDITION, THERE WAS CONCERN THAT THE DESIGN OF THE SYSTEM MIGHT MAKE IT UNUSABLE FOR CERTAIN TYPES OF CROPS. AID/W UNDERSTANDS THAT AN ISRAELI TEAM WILL BE ARRIVING JUNE 30 TO REVIEW THESE ISSUES AND THAT DURING INTENSIVE REVIEW, ONE OF THE MEMBERS OF THE PP DEVELOPMENT TEAM WOULD ALSO EXAMINE THIS AREA IN DETAIL. THE MISSION STATED THAT THE PROJECT IZSIGN WOULD FOCUS ON EFFECTIVE MANAGEMENT AND THE FINANCING OF THE IRRIGATION SYSTEM THROUGH USER FEES. IT WAS SUGGESTED THAT PREFERENCE BE GIVEN TO PRIVATE MANAGEMENT OF THE SYSTEM, AND THAT FULL RECOVERY OF MAINTENANCE AND OPERATION COSTS EE ACHIEVED THROUGH USER FEES. (THIS ASSUMES THAT THE INVESTMENT REQUIRED TO MAKE THE SYSTEM USABLE WOULD BE RECOVERED TEROUGH THE YEARLY RENT UNDER LAND LEASES). THE SYSTEM TEROUGH WHICH IFFECTIVE MANAGEMENT AND FULL COST RECOVERY WILL BE ACHIEVED SHOULD BE FULLY DESCRIBED IN THE PP

9. ECONOMIC ANALYSIS. MISSION AND LAC/DR'AND DP RIPRISENTATIVES DISCUSSED THE PROPOSED ECONOMIC ANALYSIS AND AGREED THAT THIS WOULD FOCUS ON FOUR AREAS: ALTERNATE DESIGN CONSIDERATIONS, ECONOMIC ANALTSIS APPROACE TO BE USED FOR THE TOTAL PROJECT, ECONOMIC ANALYSIS FOR TEE INFRASTRUCTURE ELEMENTS' AND ECONOMIC ANALYSIS OF THE FARM LINKAGE PROGRAM, THESE ARE MORE FULLY DESCRIBED IN A MEMO TO THE MISSION DATED JUNE 27, 1985, WEICH WAS ALSO DISCUSSED BY PHONE WITH THE MISSION'S ECONOMIC ADVISOR ON JUNE 25.

13' EMPLOYMENT EFFECTS' PLEASE FULLY DESCRIPE EXPECTED IMPLOYMENT EFFECTS IN AN EARLY SECTION OF THE PP THE NUMBER OF DIRECT AND INDIRECT JOBS (FULL TIME AND SEASONAL), COST PER JOB CREATED, AND THE CHARACTERISTICS CI EXPECTED RECIPIENTS OF THOSE JOES SHOULD BE DISCUSSED.

11. DETAILED FIRST-YEAR IMPLEMENTATION PLAN. MISSION IS ALVISED TEAT LAC/DE WILL NOW BE REVIEWING THE IMPLIMENTATION PROGRESS OF NEWLY AUTHORIZED PROJECTS AS PART OF THE SEMI-ANNUAL PIPELINE REVIEW. TO PERMIT INFORMED DISCUSSION, PLEASE INCLUDE DETAILED FIRST-TEAR IMPLEMENTATION PLAN IN PP, AND INCLUDE DISCUSSION OF

	272	CLASSIFI ED	· 7	STATE	226104/02	•
	ACHÍEVEMENT OF PROJECT STATUS	EACH PLANNED ACTIVITY REPORTS.	IN SEMI-ANNUAL			•
ر ۱۲: ا	12./MISSION'S IS STILL UNDER DATE POSSIBLE. ET #6104	REQUEST FOR ALL GRANT REVIEW. WE WILL ADVIS SHULTZ	FUNDING OF PROJECT SE AT EARLIEST			,
٦						•
٦.	2/2	UNCLASSIFIED		STATE	226104/02	ا بر
٦					•	·
۱، ۱ ک						ا ک
Ŋ						Ň
m j						2
3)						, ,
11						، روب
-	•			•		
1						اند م
			•			
						• • •
•						1
1.						\$
1				•		. "
						••
						1. 1. 1.
						68

Annex 1 B. Logical Framework Page 1

HARLACIVE CINDIALY		MEANS OF	and the second
HARRATIVE SUMMARY	INDICATORS	VERIFICATION	ASSUMPTIONS
<u>6041.</u>			
To develop the agricultural sector to increase productivity, increase employment and enhance	Employment increase in the project area	GOJ employment statistics	Continued GOJ committment to crop diversification
the country's capability to earn and save foreign exchange	Increase exports	GOJ trade statistics	Normal weather patterns
	A greater degree of self-sufficiency in foods now being imported will have been generated thereby saving vital	HOA data	No adverse shift in terms of trade for agriculture vis a vis the rest of the economy
	foreign exchange resources.	1 7	Business investment climate in Jamaica remains stable
<u>FURPOSE</u>	HOPS		
To teinforce the institutional capacity of Agro 21 to develop private agricultural investment in	An enhanced institutional capability in Agro 21 to attract foreign and lamaican	Project Evaluations NIBJ records	GOJ funding of Agro 21 will continue at expected levels
Jamaica	private investment to diversified commercial agriculture, principally	Agro 21 leases	Technical advisorv services are of high quality
	substantial tracts of idle and underutilized traditional sugar growing land in St. Catherine's Plain will be under production by large and small private agricultural enterprises.		Political policies and economic conditions with respect to the investment environment in Jamaica do not shift significantly over the life of the project
			Profits are sufficient to attract firms to invest
			Foreign firms and Jamaican firms are willing to form joint ventures

50

Annex 1 B. Logical Framework Page 1 ""

Annex 1 B. Logical Framework Page 2

NAREATIVE SURMARY	INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
OUTPUTS		The second second	
Rehabilitation of infrastructure	Contracts let. Completion of work (canals, wells, access roads, electrical lines) thereby improving approximately 13,400 acres of land for planting of diversified crops.	Apro 21 records Site inspection	
Small Feimer Propram	Personnel hired. Development and execution of training programs for small farmers	Agro 21 records Site visits	Cooperation and participation of small farmers
	The establishment of practices and institutional arrangements through which small farmers can link to larger agricultural enterprises for the purpose of exploiting marketing channels, technology transfer opportunities, and other economic benefits.	Cooperation of Hinistry of Agriculture on linkage program	small farmer
Upgrading of O&M of the Tehabilitated System	Personnel hired. Development and execution of training programs for supervisors and canal attendants. Procurement of necessary commodities to enable RCIW/RCIA to carry out expanded 0&M program. Establishment of mechanism whereby RCIW/RCIA will finance these activities on a self-sustaining hasis from its collections of water user charges established at a level which adequately covers costs.	RCIW/RCIA records Agro 21 records Site visits	RCIW is reconstituted as RCIA Supportive relationship is developed between Agro 21 and RCIW/RCIA There is little attrition of trained personnel

60

Annex 1 B. Logical Framework Page 2

Annex 1 B. Logical Framework Page 3

1

NARRATIVE SUPPLARY	INDICATORS	HEANS OF VERIFICATION	ASSUMPTIONS
INPUTS	Yr1 Yr7 Yr3 Y-1	Project reports Project monitoring	Inputs supplied in a timely manner
Long Term TA: Expatriate Staff Consulting Irrig Eng, O&M 36 pm Irrigation Engineer 36 pm Procurement/Contracts Spec 36 pm Hydrogeolist 36 pm Irrigation Engineer 36 pm	<u>1095 1286 1180 40</u>	AID and Agro 21 records	
General Manager (RCIW) 24 pm Local Staff: Director, Small Farmer Prog 36 pm Resource Economist 36 pm Site Engineer 24 pm Site Engineer 24 pm Director, Admin/Liaison RCIW 36 pm On-Farm Water Management Spec 48 pm On-Farm Water Management Spec 48 pm		AID, RCIW and Agro 21 records	
Short Term TA: Agro 21 - 19 pm (Agricultural Engineer, Systems Analyst, Environmentalist, Agronomist, Soil Scientist, Pest Management, Social Scientist, Irrigat Design)	<u>Yr1 Yr2 Yr3 Yr4</u> 192 192 80 0	Yr5 Tot 0 464 AID and Agro 21 records	· · ·
RCIW - 10 pm (Irrigation Engineer, On-Farm Water Management Specialist, Economist/Sociologist, Management/Organizational Specialist, Financial/Institutional Development Specialist)		AID and RCIW records	
Commodities & Operating Costs: Apro 21 - \$505,000 RCIW - \$303,000 UWA - \$90,000	$\frac{Yr1}{497} \frac{Yr2}{273} \frac{Yr3}{187} \frac{Yr4}{0}$	Yr5 Tot 0 958 Agro 21 records RCJW records UWA records	
Ageo 21 - \$9,311,000 RCIW - \$856,000	$\frac{Y_{r1}}{3914} - \frac{Y_{r2}}{3568} - \frac{Y_{r3}}{2679} - \frac{Y_{r4}}{0}$	Yr5 Tot 0 10167 Agro 21 records RCIW records	Pac Pac
Training: RCIW - \$90,000 Agro 21 Swall Farmer - \$335,000	<u>Yr1 1r2 Yr3 Yr4</u> 160 185 50 15	Yr5 Tot 15 425 PCIW records Agro 21 records	Je 3 Je 3
Interim 06M Measures:	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	<u>Yr5 Tot</u> <u>Yr5 Tot</u>	ical j
<pre>int finitects fund: fvaluations/Andits:</pre>	$ \begin{array}{ccccccccccccccccccccccccccccccccccc$	0 331 Agro 21 records <u>Yr5 Tot</u> 0 156 AID and Agro 21 records	rame
Inflation:	<u>Yr1 Yr2 Yr3 Yr4</u> 0 575 906 151	<u>Yr5 Tot</u> 83 1715	work

61

Annex 1 C. Statutory Checklis Disted below are statutory criteria applicable to projects. This section is divided into two parts. Part A. includes criteria applicable to all projects. Part B. applies to projects funded from specific sources only: B.1. applies to all projects funded with Development Assistance Funds, B.2. applies to projects funded with Development Assistance loans, and B.3.	-	JM-10	September 30, 1982	TRANS. MEMO NO. 3:43	AID HANDBOOK	3, App 3M
5C(2) PROJECT CHECKLIST Listed below are statutory criteria applicable to projects. This section is divided into two parts. Part A. includes criteria applicable to all projects. Part B. applies to projects funded from specific sources only: B.1. applies to all projects funded with Development Assistance Funds, B.2. applies to projects funded with Development Assistance loans, and B.3.					Annex C. Sta	l atutory Checklist
Listed below are statutory criteria applicable to projects. This section is divided into two parts. Part A. includes criteria applicable to all projects. Part B. applies to projects funded from specific sources only: B.1. applies to all projects funded with Development Assistance Funds, B.2. applies to projects funded with Development Assistance loans, and B.3.			5C(2) PROJECT	CEECKLIST	-	
		Li Chapper an Upper a vi Du Dan Upper a vi Du Da	sted below are sta iteria applicable is section is divi rts. Part A. incl plicable to all pr applies to projec om specific source plies to all proje th Development Ass ids, B.2. applies ided with Developm sistance loans, an	atutory to projects. ided into two ludes criteria cojects. Part ts funded is only: B.1. ects funded istance to projects ent d B.3.		

CROSS REFERENCES:

ESP.

IS COUNTRY CEECKLIST UP TO DATE? EAS STANDARD ITEM CEECKLIST BEEN REVIEWED FOR TEIS PROJECT?

Yes (November, 1984)

Yes

GENERAL CRITERIA FOR PROJECT λ.

FY 1982 Appropriation Act 1. Sec. 523; FAA Sec. 634A; Sec. 653(D).

> Describe how (a) authorizing and appropriations committees of Senate and House have been or will be notified concerning the project; (b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than \$1 million over that amount)?

2. FAA Sec. 611(a)(1). Prior to obligation in excess of \$100,00, will there be

(a) Congress has been notified in accordance with routine AID procedures.

62

(b) Yes

<pre>(a) engineering, finan- cial or other plans (a) Yes necessary to carry out the assistance and (b) a reasonably firm estimate (b) Yes of the cost to the U.S. of the assistance?</pre>	
3. <u>PAA Sec. 6ll(a)(2)</u> . If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance? No further legislative action is required.	
4. <u>FAA Sec. 611(b); PV 1982</u> <u>Appropriation.Act Sec.</u> N/A <u>501.</u> If for water or water-related land resource construction, has project met the standards and criteria as set forth in the Principles and Standards for Planning Water and Related Land Resources, dated October 25, 1973? (See AID Handbook 3 for new guidelines.)	
5. <u>FAA Sec. 611(e)</u> . If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed S1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability effectively to maintain and utilize the project?	tor's

age no. 31-12	EFFECTIVE DATE		
	September	30,	1982

7.

No

 <u>FAA Sec. 209</u>. Is project susceptible to execution as part of regional or multilateral project? If so, why is project not so executed? Information and conclusion whether assistance will encourage regional development programs.

FAA Sec. 601(a). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; and (c) encourage development and use of cooperatives, and credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.

8. <u>FAA Sec. 601(b)</u>. Information and conclusions on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise). (a) Yes, through increased agricultural production of export crops.

(b) Yes, through inclusion of private sector firms in the development of diversified production.

(c) Yes, development of a "mother farm" system will encourage cooperation among small farmers and between the small farmers and the large investors.

(d) Yes, by encouraging free enterprise in agricultural production and marketing.

(e) Yes, by encouraging the transfer of technology and information through "mother farm" systems.

(f) Very little effect on labor unions.

 (1) Expand agricultural production and encourage joint ventures and private sector investment in diversified crop production. It is anticipated that these investors will form consortia consisting of one American investor and two Jamaican firms.
 (2) Equipment procured from U.S. private sector firms.
AID HANDBOOK 3, App 3M	TRANS. MEMO NO. 3:43	EFFECTIVE DATE September 30, 1982	PAGE NO.
------------------------	-------------------------	--------------------------------------	----------

- 9. FAA Sec. 612(b), 636(h); <u>FY 1982 Appropriation</u> <u>Act Sec. 507</u>. Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized in lieu of dollars.
- 10. <u>FAA Sec. 612(d)</u>. Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release?
- 11. <u>FAA Sec. 601(e)</u>. Will the project utilize compatitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise?
- 12. FY 1982 Appropriation Act Sec. 521. If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity?
- 13. <u>FAA 118(c) and (d)</u>. Does the project comply with the environmental procedures set forth in AID Regulation 167 Does

The loan/grant agreement will require that the Government of Jamaica contribute to the cost of the project.

No, there is no excess, U.S. owned local currency available for this project.

Yes

NO

No

Yes. An environmental assessment was called for in th IEE; the assessment was carried out and is included in the PP.

3M-14 September 30, 1982	3:43	AID HANDBOOK 3, App 5M	
--------------------------	------	------------------------	--

the project or program take into consideration the problem of the destruction of tropical forests?

14. <u>FAA 121(d)</u>. If a Sahel project, has a determination been made that the host government has an adequate system for accounting for and controlling receipt and expenditure of project funds (dollars or local currency generated therefrom)?

B. FUNDING CRITERIA FOR PROJECT

 <u>Development Assistance</u> <u>Project Criteria</u>

> FAA Sec. 102(b), 111, 2. 113, 281(a). Extent to which activity will (a) effectively involve the poor in development, by extending access to . economy at local level, increasing labor-intensive production and the use of appropriate technology, spreading investment out from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained basis, using the appropriate U.S. institutions; (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and

(a) The project will result in employment of permanent and seasonal workers in the project area.

(b) The project will establish practices and institutional arrangements ("mother farms")through which small farmers can link to larger agricultural enterprises for the purpose of exploiting marketing channels, technology transfer opportunities and other economic benefits.

N/A

N/A

AID HANDBOOK 3, App 3M	TRANS. MEMO NO. 3:43	September 30, 1982	PAGE NO. 3.1-15
------------------------	-------------------------	--------------------	--------------------

otherwise encourage democratic private and local governmental institutions; (c) support the self-help efforts of developing countries; (d) promote the participation of women in the national economies of developing countries and the improvement of women's status; and (e) utilize and encourage regional cooperation by developing countries?

b. FAA Sec. 103, 103A, 104, 105, 106. Does the project fit the criteria for the type of funds (functional account) being used?

c. FAA Sec. 107. Is emphasis on use of appropriate technology (relatively smaller, cost-saving, labor-using technologies that are generally most appropriate for the small farms, small businesses, and small incomes of the poor)?

d. <u>FAA Sec. 110(a)</u>. Will the recipient country provide at least 25% of the costs of the program, project, or activitiy with respect to which the assistance is to be furnished (or is the latter cost-sharing requirement being waived for a "relatively least developed" country)? (c) Upgrade the management and technical capabilities of Agro-21

(d) A number of the farming activities promoted by the project are carried out specifically by women

(e) N/A

Yes

Yes

Yes

N/A

3M-16	September 30, 1982	TRANS. MEMO NO. 3:43	AID HANDBOOK 3. ADD 3M
-------	--------------------	-------------------------	------------------------

FAA Sec. 110(b). e. Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing, or is the recipient country relatively least developed"? (M.O. 1232.1 defined a capital project as "the construction, expansion, equipping or alteration of a physical facility or facilities financed by AID dollar assistance of not less than \$100,000, including related advisory, managerial and training services, and not undertaken as part of a project of a predominantly technical assistance character.

f. <u>FAA Sec. 122(b)</u>. Does the activity give reasonable promise of contributing to the development of economic resources, or to the increase of productive capacities and self-sustaining economic growth?

9. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage No, capital assistance is scheduled to be completed within three years.

Yes, the project will contribute to the development of the agricultural sector by providing needed managerial/technical support and infrastructural development.

The project supports one aspect of a program initiated by the Government of Jamaica and to be implemented through Agro 21, a parastatal staffed by both local and expatriate talent.

3

AID HANDBOOK	3, App 3M	TRANS. MEMO NO. 3:43	September 30, 1982	PAGE NO. 3M-17
--------------	-----------	-------------------------	--------------------	-------------------

institutional development; and supports civil education and training in skills required for effective participation in governmental processes esential to self-government.

2. Development Assistance Project Criteria (Loans Only)

- <u>FAA Sec. 122(b)</u>. Information and conclusion on capacity of the country to repay the loan, at a reasonable rate of interest.
- b. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete with U.S. enterprises, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan?
- C. <u>ISDCA of 1981, Sec. 724</u> (c) and (d). If for Nicaragua, doe's the loan agreement require that the funds be used to the maximum extent possible for the private sector? Does the project provide for monitoring under FAA Sec. 624(g)?

3. Economic Support Fund Project Criteria

> a. <u>FAA Sec. 531(a)</u>. Will this assistance promote economic or political

Yes

N/A. Output generated by the project is not likely to be of sufficient quantity to compete significantly with U.S. producers.

N/A

Yes

69

PAGE NO.	EFFECTIVE DATE	TRANS. MEMO NO.		
3.1-18	September 30, 1982	3:43	AID HANDBOOK	3. App 3M
and the second sec		0110	ETAIL & CONTRACTOR OF THE CONTRACT OF THE	e, upp on

stability? To the extent possible, does it reflect the policy directions of FAA Section 102?

- b. <u>FAA Sec. 531(c)</u>. Will assistance under this chapter be used for military, or paramilitary activities?
- C. <u>FAA Sec. 534</u>. Will ESP funds be used to finance the construction of the operation or maintenance of, or the supplying of fuel for, a nuclear facility? If so, has the President certified that such use of funds is indispensable to nonproliferation objectives?
- d. <u>FAA Sec. 609</u>. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made?

Yes

N/A

N/A

N/A

Annex 1 D. GOJ Request for Assistance

Office of the Prime Minister

Jamaica Honse Ringston 25th September, 1985

Dear Mr. Joslin,

re Crop Diversification/Irrigation Project

On behalf of the Government of Jamaica, I would like to request the assistance of the U.S. Agency for International Development in undertaking a project for Crop Diversification and Irrigation.

The project will support the diversification of agricultural production on substantial tracts of traditional sugar growing land in St. Catherine's Plains by large and small private agricultural enterprises. The project as currently designed will (1) reinforce the institutional capacity of Agro 21 to attract foreign and Jamaican private investment to diversified commercial agriculture; (2) establish an initial small infrastructure development programme to rehabilitate and construct installations such as wells, irrigation canals, pumping stations, fencing, electrical line and storage facilities; (3) upgrade the capability of the Rio Cobre Irrigation Works to operate and maintain the rehabilitated system; and (4) establish practices and institutional arrangements through which small farmers can link to larger agricultural enterprises for the purpose of exploiting marketing channels, technology transfer opportunities, land, supplementary employment, and other economic benefits.

In order to ensure the rational operations and maintenance necessary to protect the investment proposed in the rehabilitation programme, we intend to pursue the following course of action. The Rio Cobre Irrigation Works will be upgraded to an Irrigation Authority with responsibility and authority to establish and collect water user charges that will be exclusively used to support improved operation and maintenance of the system. The Authority will be allowed to spend all such fee income by its own decisions. The Authority will be governed by a Board of Directors that will equitably represent the interest of both large and small water users of the system. Water users charges will be based upon actual water delivered and will be increased during the life of the project to

reflect the full costs of operation, maintenance and energy consumption.

Along/

7)

Mr. William Joslin, Director/USAID, United States Embassy, 6b Oxford Road, Kingston 5 Along with other on-going and planned projects, it will contribute to the overall goal of developing the agricultural sector to increase productivity, increase employment and enhance the country's capability to earn and save foreign exchange.

The main inputs of the project as identified by USAID in conjunction with Agro 21 will include: long and short term technical assistance, training, vehicles, equipment, infrastructure rehabilitation and construction. This assistance will be provided to Agro 21 which will implement the project.

The total cost of the project is estimated at approximately US\$24 million. Of the total cost, we request USAID assistance of US\$18 million over a 5 year period. This will consist of US\$13 in grant funds and US\$5 million as a loan. The balance of the funds required for the project, amounting to approximately US\$6 million is expected to be contributed by the Government of Jamaica, and will be deemed covered by the capital values of the lands which form a part of the project and the investment being made on these lands by the private sector investors.

The project has already been approved by the Pre-Selection Committee of the Ministry of Finance and Planning.

Yours sincerely,

Edward Seaga Prime Minister and Minister of Finance and Planning

うひ |

Annex 1 E. 611(e) Certification Page 1

CERTIFICATION PURSUANT TO SECTION 611(e) OF THE FOREIGN ASSISTANCE ACT OF 1961, AS AMENDED

Subject: Jamaica - Crop Diversification/Irrigation Project

I, William Joslin, as Director of the United States Mission to Jamaica, having taken into account among other things, the maintenance and ucilization of projects in Jamaica previously financed or assisted by the United States, do hereby certify that, in my judgement, Jamaica has the capability, both financial and human resources, to effectively maintain and utilize the Crop Diversification/Irrigation Project.

This judgement is based upon the record of implementation of AID-financed projects in Jamaica and the results of the consultation undertaken during review of this new project.

William Joslin Director

Date

The preliminary project proposal (PID) was approved by the Development Assistance Executive Committee (DAEC) on June 26, 1985. In the PID approval message (State 226104, See Annex A.l.), the DAEC presented a number of concerns and suggestions for Mission consideration in developing the Project and preparing the Project Paper. Key concerns are addressed below:

Jamaica's Competitiveness with Respect to the Investment Environment:

Annex 2.B.7. discusses Jamaica's competitiveness in the Caribbean context with respect to markets. With respect to the investment environment, according to a U.S. Department of Commerce survey, Jamaica leads the other CBI beneficiary countries in attracting new investment.

As part of the policy dialogue accompanying the past seven ESF cash transfers (CBI, P&E III, P&E IIIs, P&E IV, P&E IVa, P&E V, and P&E Vs), steps have been/are being taken to improve that environment. Initial steps included studies of factors influencing investor attitudes and the feasibility of combining GOJ agencies involved in investment and export promotion. As a result of the most recent cash transfer (P&E Vs), the GOJ has announced the formation of a joint Investment Committee to ensure that investment projects are not delayed in the bureaucratic process. The interministerial committee will set time frames for the execution of specific tasks which will result in the simplification and acceleration of the project approval and implementation process. Covenants in the PROAG also call for the GOJ to retain economic policy experts to evaluate the influence of existing elements of economic policy in terms of their compatability with increasing foreign and domestic private investment. Where applicable, recommendations will be made for alternative approaches. Review of these findings and the determination of necessary changes will be undertaken by the GOJ in consulation with AID. The following areas will be investigated: prices policy, import policy, wage and industrial relations policy, tax policy, foreign trade and payments policy, divestment policy, investment policy, export marketing policy, policy governing public sector/private sector roles in the eocnomy, credit policy, property rights policy, policy concerning foreign investment in Jamaica. Covenants also call for a revised Investor's Guide to the investment approval process for 12/15/85 publication and, if the GOJ determines that the process should be codified, the drafting of an Investment Code by 3/31/86.

Covenants in P&E IVa focus on liberalizing restrictions on agricultural exports, i.e. cacao, citrus, coffee, and pimento. More stringent steps were introduced in P&E Vs, which included time phased plans for deregulations of certain elements of the coffee sector and for the relaxation of cetain elements of regulation of citrus, pimento, cacao, and coconuts. Covenants also reguire that the GOJ review the structure and regulation of the cacao, citrus, coconut, and pimento sub-sectors in the context of their consistency with the objective of encouraging private investment, production, employment, and exports and that appropriate recommendations for change will be implemented.

2. Recurrent Costs:

Agro 21's costs during project implementation will be covered in part by GOJ budget allocations; in part by funding provided under this project for long and short term technical assistance, commodities, and operating expenses; and in part by funding provided under A.I.D.'s Agro Industrial Development Project for long and short term technical assistance. With respect to GOJ budget allocations, Agro 21's needs have been identified as a line item in the listing of expenditures for counterpart funds made available as a result of the ESF cash transfer loans. As the use of these funds transfers are mutually agreed upon during negotiations between A.I.D. and the GOJ, A.I.D. is in a position to recommend adequate funding for the continuation of Agro 21's activities.

Agro 21 was created as a quick action response group that responds to specific needs in the short term by organizing necessary resources and coordinating action with and among the appropriate GOJ agencies. Following completion of those aspects of the GOJ's diversification program for the St. Catherine Plain that involve Agro 21, responsibility will be turned over to other agencies and para-statals, i.e. operation and maintenance of the rehabilitated system will be the responsibility of the RCIW; lease collection will be the responsibility of the NIBJ which will then use the income from the leases to retire the debts run up by the public sugar companies.

Following completion of this project, therefore, the major recurrent costs with respect to the project area will be the costs of operating and maintaining the rehabilitated system and ensuring that it does not once again fall into disrepair. Steps are being taken to facilitate the RCIW's capability to maintain and operate the system on a self-sustaining basis. During pre-signing discussions, the Prime Minister committed the GOJ to upgrading the RCIW to an Irrigation Authority (Rio Cobre Irrigation Authority - RCIA) with responsibility and authority to establish and collect water user charges that will be exclusively used to support improved

operation and maintenance of the system. The Authority will be allowed to spend all such fee income by its own decisions, and will be governed by a Board of Directors that will equitably represent the interests of both large and small water users of the system. Water users' charges will be based upon actual water delivered and will be increased during the life of the project to reflect the full costs of operation, maintenance and energy consumption.

These objectives were further formalized in a Covenant to the PROAG (Section 6.2.) which states, "Except as A.I.D. may otherwise agree in writing, the Cooperating Country agrees to establish a system, including an administrative mechanism, which will authorize collection of water charges by an appropriate entity for deposit in an operations and maintenance account for use in operation and maintenance of the system."

3. Project Continuity:

Given the divisive nature of bi-partisan politics in the Jamaican experience, the possibility of bi-partisan representation on Agro 21's Board was rejected. Further, in light of the discussion in the previous section concerning Agro 21's limited role in the project area following project completion, an examination of RCIW/RCIA's makeup was deemed more appropriate. Initially, it was suggested that following conversion of the RCIW into an Irrigation Authority (RCIA), the Board should be constituted of elected members, rather than members appointed by the Minister of Agriculture. A compromise was reached with an agreement that the members would still be appointed, but on the basis of an equitable distribution based on the make up of the water user community vis a vis large and small farmers.

4. Time Frame:

The planned time frame for the project has been expanded from three to five years. This has resulted primarily from the decision to include an additional component upgrading the RCIW/RCIA to enable it to adequately maintain the rehabilitated system following project completion. It was determined that the institution building would primarily take place over the first three years of the project in the form of long and short term technical assistance and training. It is expected that the transition from RCIW to RCIA will have been completed at an early stage of the project and that by the third year of the project, the Authority will be running the system on a self sustaining basis. However, the project will continue to fund positions for On-Farm Water Management Specialists into the fifth year, given the critical nature of their work in working with the

water users to develop appropriate water use practices and confidence in the system. The project also funds some additional training into the fifth year in order to continue the upgrading of current and future RCIA staff.

5. Small Scale Farmer:

The Small Farmer Component describes the responsibilities that the Director of Small Farmer Programs and staff are expected to undertake. Analysis of the Small Scale Farmer is presented in Annex 2.8.6.

An additional component that impacts favorably on the Small Scale Farmer is the Operations and Maintenance component. The upgrading of the system as a whole will benefit the small farmers as well as the larger investors. Funds have been included in this component specifically to enable the RCIW/RCIA to rehabilitate those portions of the canal system (i.e. the Old Harbor Branch) that provide water to the Small Farmer communities immediately to the west of the diversification program lands. The inclusion of funds for On-Farm Water Management Specialists was directed specifically towards the smaller water users, who have historically been uninformed with respect to appropriate water use and who have lost confidence in the ability of the system to provide water. An additional step aimed at restoring this confidence is the Board member apportionment outlined in the previous section. By including Small Farmers as representatives on the Board, the Board and thus the RCIW/RCIA should be more responsive to the needs of the smaller farmers.

The position of the Small Farmer in the project area is protected by a covenant in the PROAG (Section 6.4.) which states, "Except as A.I.D. may otherwise agree in writing, the Cooperating Country shall take all appropriate steps necessary to assure that land in the Project area is available to be leased by small farmers." The intent of this covenant is to defuse any criticism of Agro 21 and the project as an inequitable approach which favors large, foreign investors. As stated above, within the project, both the Operations & Maintenance and Small Farmers components specifically address the issue of equitable development. Lands currently in the project area available to small farmers for leasing will continue as such.

Further, the GOJ has decided to allocate 2,000 acres of land on the Innswood and Bernard Lodge estates for future distribution among full time employees of the Bernard Lodge, Caymanas, and Innswood estates who may eventually lose their jobs as a consequence of subsequent diversification projects. Although the diversification sponsored by this project is taking place on under and unutilized lands, therefore resulting in no direct displacement of workers, it is expected that future expansion of diversified cropping into lands

yet in sugar will logically occur as there is an increased awareness that sugar cultivation is no longer economically viable. Should be noted that Agro 21 will not have responsibility for cogram of settling the displaced workers and that the strategy for distribution of the land has not yet been determined.

Irrigation and Water Management:

The addition of a fourth component adequately addresses the concern of effective management of the system. This component is described in the body of the PP and further elaborated in Sections 2, 3, and 4 above.

It is expected that an RCIA Board with membership representing the users will improve relations and reduce conflict among farmers and between government agents and farmers; increase the collection of water fees; increase the contribution of users to maintenance of the system; and improve water distribution and on-farm management.

As mentioned in Section 2 above, the water user charges will be increased to reflect the actual cost of operation, maintenance, and energy consumption.

Also as mentioned in Section 2 above, the lease income is collected by NIBJ. This consists of a base rent (of approximately J\$150/acre/year or 5% of the value of the land) plus an incremental amount determined by the cost of the infrastructrue rehabilitation allocated to that particular land and amortized over 25 years.

7. Economic Analysis:

The Economic Analysis is presened in Annex E. This was prepared following reciept of Ben Severen's memo dated 6/27/85 and addresses the concerns therein.

8. Employment Effects:

The employment effects are described both in Section II.C. of the PP (Rationale) and in Annex 2.C. Although AID funding under the rehabilitation component will be used to upgrade the portion of the system affecting some 13,400 acres, the social analysis deals with the entire 20,000 odd acres identified for investment in the project area. To summarize the information requested by the PID cable:

From the anlysis of labor demand, it appears that much of the employment will be seasonal. This is to be expected, given the

seasonal nature of farming and does not conflict with traditional patterns of employment in the area. The analysis bases this information on data from studies on similar crops grown with similar technology and takes a conservative view, i.e. with respect to numbers of crops.

Direct Jobs (Seasonal) created:

Vegetable Crops - single crop on 9,000 acres 504,000 person davs Off-Season Grains - mechanized 9,000 acres 70,000 person days

Grains - double crop on 10,500 acres 189,000 person days

Ornamentals - 400 acres

Total Estimated Labor Requirements

1,363,000 person days

600,000 person days

or 52,423 person months per year

Indirect Jobs (Seasonal) created:

Vegetables: significant quantity of additional labor required in sorting, grading, packaging, transportation and shipping;

Grain: significant levels of ancillary tasks such as transportation, maintenance and milling; and

Ornamentals: shade house construction, storage, transportation and shipping.

There will also be substantial levels of one time employment for those engaged in infrastructure rehabilitation and some additional full time employment for a limited number engaged in the operation and maintenance of the irrigation system.

Cost per job: Current wage levels for agricultural labor in the project area (J\$10-12/day) are low, providing little incentive for participation and resulting in an unreliable labor supply as workers seek alternative opportunities to supplement their income.

Characteristics of recipients: Those persons living on subsistence plots or small farms within a 5 - 10 mile radius of the project area. Labor previously employed in sugar during the operations of the cooperatives are also possible targets. Although many of the urban unemployed have agricultural experience, they are likely to be seeking urban-type employment and are probably not interested in agricultural work.

9. Detailed First Year Implementation Plan:

The implementation schedule is presented in Section V.C. of the PP.

. 2

ANNEX 2

TECHNICAL ANNEXES

ANNEX 2.A.: ADMINISTRATIVE ANALYSIS

1. ORGANIZATIONAL BACKGROUND

A. Introduction

Agro 21 (Corporation Ltd.) is a corporation organized under the Companies Law of Jamaica. All the stock in the corporation is owned by National Invested Bank of Jamaica. Under the Articles of Incorporation of Agro 21 (copy available in files), Agro 21 is empowered to undertake all the functions and activities described in this project paper.

As part of a general decline, the reduction in demand for traditional exports caused a severe shortage in foreign exchange. With the reduction in revenues from mining and exports of bananas and sugar, emphasis was put on agricultural and non-traditional exports for new earnings and on expanded domestic production to reduce imports of basic food items.

Agro 21 was organized to stimulate agricultural development by attracting local and foreign investors to agriculture production and processing enterprises. While investments are basically in production, they involve processing, packaging, transportation and marketing as well. Essential elements of an investment package include technical knowledge, managerial ability, and access to markets. Equity is provided by local and/or foreign investors and often underwritten by GOJ government agency investments. Agro 21's portfolio of projects is a combination of investments arranged since its inception and others such as those developed by TNIP and turned over to Agro 21 for monitoring. Agro 21 now has 70 to 80 projects for which it has monitoring or developmental responsibility.

Agro 21 is deeply involved in the GOJ's program of divestment of government owned lands for diversified agriculture. It is charged with lease preparation, negotiation, and renting in addition to promoting investor interest and providing technical assistance. Agro 21 is in the process of advertising 39,000 acres of GOJ owned land for divestment to the private sector for growing self-sufficiency crops. The lease, on the basis of which such lands will be made available for development by investors, was developed by Agro 21 and is discussed in detail in Appendix A.1 below.

Organized first as a secretariate under the Prime Minister in October of 1983, Agro 21 was changed to a public sector corporation in April, 1985. The new charter of the corporation is quite broad allowing all business and corporate functions under

Jamaican corporate law. Specific objectives remain essentially the same as they were under the secretariat; i.e. increase exports, provide import substitutes, increase land productivity, create new employment opportunities, find new investors, enhance technology transfers and improve both foreign and domestic market access for agricultural producers. Small-scale farmers are to be more fully integrated into the commercial economy by association with large commercial farmers or through local producer/processor ogranizations which provide ecomomies of scale for input purchases, processing and marketing.

Agro 21 functions as a catalyst to bring together the separate parts of an investment enterprise (capital, production technology, processing and marketing). Short term underwriting of equity by a Agro 21 may be needed on occasion. Agro 21 designs, administers, and monitors projects but does not have the staff or mandate to directly execute projects. Project execution is provided by other GOJ agencies or by contract with private sector companies.

Current performance of some of these functions is summarized in the following table and provides a quantitative sense of the extent of Agro 21 operations..

Further insight into the quality of performance of Agro 21 is provided by an evaluation of the organization performed for USAID by Rouhana and Hollingshead submitted in December, 1984. This evaluation is discussed at length in Section B below.

Agro 21 is independent of the Ministry of Agriculture, JNIP, and NIBJ at the institutional level. However, close relations between the organizations are maintained at the working level and policy integration is promoted both at the level of the Board of Directors of Agro 21 and by the Prime Minister's close interest in the activities of these organizations.

B. Disposition of the December 1984 Agro 21 Evaluation by USAID:

The first evaluation of Agro 21 was generally favorable, particularly in terms of staff recruitment and orientation, and public relations with the business community and Jamaican public. Good rapport was established with various public and private banks and loan agencies involved with agricultural and development credit. Also presentations were made regarding investment opportunities in Jamaican agriculture investment opportunities to numerous prospective foreign and domestic investors. Some of these investors conducted feasibility studies and established enterprises. Others are still conducting in-depth investigations leading to possible investment.

In addition to a broad range of investment and technical assistance to potential investors which are either provided directly or under contract, Agro 21 supervises numerous studies, commodity profile and sub-sector analyses.

In response to the recommendation of the evaluation team, Agro 21 is developing an extensive data base on Jamaican agriculture and is providing a computerized tracking and reporting system on corporation tasks and activities. A Deputy Managing Director position was established and Mr. Tommy Easterling, formerly of Castle and Cooke, has accepted the position and reported for duty.

With the development and approval of the new corporate organization the way has now been cleared for Agro 21 to oversee the divestment of idle or underutilized government lands to private investors for productive purposes. In addition, as part of the self-sufficiency program, forty-seven properties have been advertised for lease and inquiries are now being processed.

CONCEPTS AND STRATEGY:

A. Organizational Concepts

In organizational concept, Agro 21 is a fast acting, highly motivated, catalytic agency with broad ties to both public and private sector entities involved with agricultural investment. Rather than work along traditional organizational lines, Agro 21 is able to contract directly for needed service or expertise. This allows them to move rapidly to take advantage of an investment or development opportunity.

Numerous attempts have been made in the past to activate and motivate agricultural development in the Jamaican private sector. Oldline ministries face the constraints of any entrenched and inflexible bureaucracy. Development and investment banks do not have the technical skills or practical knowledge to develop agricultural enterprise packages attractive to either local or foreign investors. Certain types of investment activity related to under or unutilized land, self sufficiency and non-traditional enterprise development require more technical knowledge and capability than development and investment banks have available. Consequently a catalytic agency had to be established that could readily interact with both local and foreign agricultural investors, arrange for necessary technical inputs for infrastructural, cultural practice, and post production development, and assist with gaining Jamaican Government project approval.

Founded on the above criteria Agro 21 has shown unusual skill in

recruiting and developing a highly talented and innovative staff. Also they have been successful in arousing the interest of local and foreign investors in Jamaican agriculture. Further they have raised the awareness of the general population to their dependence on agriculture in the current and foreseeable economic future and to the potential of agriculture being the salvation to their present economic malaise.

Agro 21 has retained the strong support of the Prime Minister as it has evolved into a corporate entity; it has the political clout to get needed support and funds for its activities. The organizational style of Agro 21 tends to retain its fast moving, innovative and flexible operational character. All employees are on short term contracts with the corporation (one to two years). No employee benefits or long term tenure positions are provided.

The only staff incentives are higher than normal salaries, 25% of salary as a bonus upon completion of contracts and the opportunity to work in an environment unencumbered by bureaucratic rules and regulations. Innovative and unique solutions to problems are encouraged. A side effect of this organization is that it strives to develop an appreciation for the private sector and free enterprise system in each employee.

Agro 21 is the logical entity in which to locate the Crop Diversification/Irrigation Project. It has both the organization and operational environment to make use of project staff and resources. This new project meshes well with the USAID Agro Industrial Development Project which provides staff and support for Agro 21, as well as foreign exchange and loan funds for agricultural commodities and project development.

Agro 21 functions as a private sector corporation in order to understand and attract local and foreign investors. Their new charter as a Jamaican corporation provides the flexibility to not only promote and advise but to invest, issue stock, conduct research and training, carry on business activity and generally function as a private company.

The Crop Diversification/Irrigation project will be fully integrated into the Agro 21 organization. To conform with their multi-disciplinary team approach to management, project funded staff will be assigned to the appropriate existing units of For 21 with primary responsibility for the Crop Diversification-/ Irrigation Project activities. It is envisioned that by using a combination of existing and new project staff, fewer project staff will be required to achieve project objectives. This conforms to the Agro 21 management style of gaining maximum productivity from minimum numbers of staff.

It is not necessary for each project to have a full compliment of new staff when services can be provided from existing core staff. Examples of this type of staff utilization are the temporary assignment of the Strategic Planning Unit's Financial Analyst to the Land Utilization Unit in preparation for crop diversification activity. Also a Marketing Unit Officer has been assigned to the Self Sufficiency Unit to assist with the marketing, i.e. leasing of 47 parcels of land. Integrating rather than allowing full staffing of each project reduces the tendency of empire building and employment of excessive staff. Rather, it encourages optimal use of existing staff and of contracting with other private or public entities to perform implementation activities. This leaves Agro 21 staff free to accomplish their primary function of administrating, coordinating and serving as a catalyst for investors, producers and processors.

B. Operational Strategies

Operational strategies involve taking advantage of market driven opportunities to promote local and foreign investment in the production and processing of commodities either for export or import substitution. Of immediate high priority is making government owned agriculture resources productive, preferably by bringing them under intense cultivitation with high income crops. Increased employment and improved worker skills and attitudes is also being emphasized in order to provide industry wide benefits within the private enterprise system.

Given the nature of Agro 21's basic objectives and initial operational style, planning has focused on the short term. For the next four to five years Agro 21 expects to lease non-productive government lands for 49 year periods to large and small investors, and sell some land to small scale farmers.

Organizational and infrastructure development of Agro 21 will be keyed to investor commitment and requirements. Potentially quick pay-off projects are expected to be in greatest demand; however this does not preclude long range planning and development for long term sustained growth. These are necessary activities for self sufficiency and a self sustaining economy, a long term goal to which Agro 21 can contribute.

ORGANIZATION AND MANAGEMENT

A. Management

The new charter provides for a much different organization if so determined by the Board of Directors.

The Board of Directors currently number five as follows:

Chairman and Managing Director, Mr. Ralph Thompson

Representative of the Office of the Prime Minister, Mrs. V. Logan

Representative of NIBJ, Mr. John Williams

Representative of the ACB, Mr. Ed McKie

Representative of the Private Sector, Mr. Derrick Gibson

The current management style in Agro 21 is strong control from the top. Multi-disciplinary teams carry out activities and tasks with detailed tracking and supervision being provided by weekly executive meetings. Divisions are managed by Program Directors staffed according to function. The five technical divisions are administered by a Deputy Managing Director and six staff or support divisions are administered by the Managing Director. It is foreseen that as tasks and activities expand and the operations becomes unwieldy for committee supervision, sub-director supervisors will need to be appointed from within the multi-disciplinary team.

Agro 21 functions primarily as an administrative, design and catalytic entity and contracts with public and private agencies for implementation services. Further all staff are under a two year or shorter contract and no provisions are made for the services or bureaucracy of permanent career staff. This greatly increases the productivity and flexibility of staffing and reduces the chance of a build-up of non-productive staff. Turnover is greater, but the operations of Agro 21 often require short term staff and the regular injection of new blood makes for a more dynamic organization. Staff members employed in other agencies spread the Agro 21 philosophy to other organizations and the economy as a whole.

B. Personnel and Staffing Patterns

The impact of this project on Agro 21 is reflected in the following table which shows planned Agro 21 staff levels by their source of funding. The positions are identified by employee titles and incumbants where applicable. Positions identified as vacant will be filled in the immediate future. An Organizational Chart is included as Appendix A.2.

SENIOR STAFE AND SCORES OF FOUNDIN	SENICR	STAFF	AND	SCUFCE	CF	FUNDING
------------------------------------	--------	-------	-----	--------	----	---------

Postition	ಯ	AID AIDP	Other AID	AID CD/I
1. Managing Director, Thompson		(33)		
2. Deputy Managing Director, Easterling		(X)		
3. Director of Finance		(X)		
 Director Strategic Planning, Murphrey 		(X)		
5. Director Small Farmer Program				(L)
6. Director Interagency Coordinator, Morris	(L)		an 17	
7. Director Energy Cane Project, Keppler			$(x) \neq$	
8. Director Public Relations, Marley	(1)	111		
9. Director Export Marketing, Vacant		()		
10. Director New Product Development, Noor		(1)		
12. Director Export Crops Program, Rogers	17.1	141		
12. Director Self-Sufficiency Crop Program, Guidavi	17.1			
13. Director Dana Otificization and Intigation, Fampler	(1)			
15 Director Acusculture 2055	(1.)			
16 Director Livestock, Hendricks	(L)			
17. Director Administration/Liaison Rio Copre Water System	n		(L)	
18. System Analyst, Vacant		(X)		
19. Field Test Coordinator			(X)≟/	
20. Administrator Coordinator, incumbent			(L) =	
21. Manager Public Relations, Lovinder	(L)			
22: Unit Controller Irrigation, Stephenson	(L)			
23. Consultant Irrigation Engineer, Reynolds				(X)
24. Manager of Land Utilization Planning, Harrison	(L)			
25. Chief Accountant, Richards	(L)			
16. Manager Data Processing, Portor	(L)			
27. Manager Personnel	(ニ)			
28. Word Processors	(L)		1 1	
29. Word Processors	(L)			
30. Strategic Analyst, Hutchinson				
31. Profile Coordinator, Lewis	(1)			
32. Strategic Planning Analyst, Carby	1			
33. Librarian	()			(7.)
34. Resource Economise	(7.)			(=)
16 Manager Livestock Idams	(1.)			
37 Manager, Local Markering, Sterling	(L)			
18 Sire Engineer			· · ·	(L)
19. Civil Engineer, French			(L) <u>2/</u>	+3/
40. Consultant Hydrology, Murty	(TCN)			+3/
41. Irrigation Engineer				(3:)
+2. Irrigation Engineer	(TCN)		4.4	*3/
43. Agronomist, Burke			(L) ±	
44. Draftsman	(L)			- 10 B/0 - 1
45. Draftsman	(L)			
47. Draftsman	(L)			
48. Procurement Specialist				(X)
Secretaries	(L)			
(one/each director level; one/each two manager levels)			La martin all	

5

X) = Expatriate
(L) = Local
TCON = Third Country Mational
A 34E/Eng.
AID Grant
A subsequently by AIE under CD/I.

. *

The above recommendations for staff have been based on currently funded GOJ staff, the Agro-Industrial Project contributions and the needs occuring as a result of new activities of Agro 21 both under the corporate charter and the CD/I.

Short term consultants will be requested as needed to supplement project and Agro 21 expertise. A sample of expected needs are as follows:

Disciplines	Year l	Year 2	Year 3
	(Person	Months	Required)
Agricultural Engineer	1	1	
System Analyst	2		
Environmentalist	1	1	
Agronomist	2	2	1
Soil Scientist	2	1	S
Pest Management	1	1	1
Social Scientist	1		1
	10	6	3

5. OPERATIONS

The shift from a Secretariat under the Prime Minister to a corporate structure has greatly broadened the potential scope of operations for Agro 21. However, since incorporation in April of 1985 there has been little change in functions and objectives. However, the new corporate charter, in addition to the objectives under the Secretariat, permit it to:

- Foster agricultural research and extension;
- b. Carry on trade and business;
- c. Make acquisitions of business or property of all type and mortgage, sell or trade interests in the properties;
- Construct, maintain, own and control all types of structure;
- Acquire license, patents and trade marks advantagous to the company;
- f. Amalgamate or form partnerships with other private or public entities in-country and overseas;

- g. Issue debentures or stocks, or take mortgage to raise money;
- Issue stocks and bonds and distribute dividends and interest; and
- In all legal ways conduct business and provide financial and property management commensurate with company interests.

More specifically, Agro 21's operations in the support section are as follows:

- Financial and monitoring activities along with accounting and data processing.
- b. Strategic Planning which conducts commodity profiles and sub-sector analysis to provide information to prospective investors and technical staff. They collect external secondary data and are establishing a small technical library. In-service training, study tour and short courses and other training activities of Agro 21 are administered in the Division.
- c. The Small Farmer Coordinator's activities will be explained under that section of this report (Annex B.6).
- d. Inter-Agency Coordination to assist in bringing other government and private sector resources to bear on current problems and to remove disincentives in the overall system. These resources may either be contracted or traded for appropriate Agro 21 assistance.
- e. The Public Relations Division works through local and foreign media to make known the services available in Agro 21 and informs the country of corporate accomplishments.

In the technical section:

f. Export Marketing and New Project Development investigates new market areas for Jamaican products, investor clientele and new products that can be produced in Jamaica.

g. The Export Crops Division assists with marketing currently available products.

h. The Self Sufficiency Programs deal with investors interested in domestic food production as import substitutes and ethnic crops both for domestic food and for potential export. Also they are closely involved with preparing lease documentation and other leasing activities.

i. The Land Utilization Division is responsible for the overall planning use and crop zoning for all government owned lands as well as developing the off-site infrastructure needed by potential investors in particular areas, supervising and monitoring project funded infrastructure works and monitoring small farmer and environmental interests that may be affected by large commercial agricultural development.

- j. Bio Energy Project. This is currently a research activity by a U.S. study team to investigate sugarcane as a bio-gas energy source.
- k. Agro Industrial Project. Provides technical and administrative staff and general support services and commodities for Agro 21, through USAID support.

While Agro 21 presently has a considerable array of technical and support staff of some 49 professionals, their basic assignment is to attract investors and to provide administrative and monitoring functions on land that is being turned over to investors for productive purposes. Once the land is divested either by lease or sale Agro 21's primary objective is realized and the organization will concentrate on project monitoring and marketing of Jamaican agricultural products.

A number of facility requirements have been identified which will help Agro 21 perform its current and expanded functions more efficiently. It is expected that this project will finance of portion of these requirements, which are summerized in the following table and discussed in further detail below:

		Adued by Pro	oject
Requirement	Current Availability	Description	Amount
a. U.S. Survey & Engineering Equipment	limited/primitive	standard	60,000
b. GOJ Internal telecommunications	severely overloaded phone system		13,000
c. Communications	radios:base + units	12 more units	25,000
d. Video Equipment	rented at high cost	video set projector tape recorder supplies	20,000
e. Library	personal books	professional library	40,000
f. Photocopy	2 xerox rented	buy 2	30,000
g. Computer Equipment	1 PC, 10 mg	6 PCs	35,000
h. Computer-based information access	"Dialogue"	other US; tie into data bases at Min Agriculture ACB, JNIP	5,000
i. Vehicles	2 large 4WDs	5 small 4WDs	55,000
j. GOJ Furniture & Office Equipment		8 new sections	12,000
k. Misc US\$ Expenses			5,000

a.	Survey and Engineering Equipment: The Agro	2l engineering
	group has functioned for several years with	limited
	equipment. Among the requirements are:	
	a set of surveying equipment	25,000
	Map filing cabinets	15,000
	Digitizer board (to "draw" information	
	into computer memory	5,000
	Field engineering equipment	5,000
	Supplies (formats, sepias etc)	5,000
		55,000

- b. Internal telecommunication equipment: Agro 21 has attempted to make do with an archaic telephone system inappropriate for a modern agri-business corporation. Among the requirements are a PBX and improved support systems.
- c. Radio communications: Agro 21 personnel spend a great deal of time in the field working with clients, engineering operations, and other related work. There is a need for better communication. Often key personnel who have or or need crucial information are unable to contact or be contacted by the main office. The project will greatly increase the efficiency of Agro 21 staff by providing for much improved radio communication.
- d. Video Equipment: Video extends the reach and effectiveness of Agro 21's promotional activities and enables Agro staff to gain access to technical information now commonly available in a video format. Cameras permit recording descriptive information which can help clients rapidly narrow down and select the specific types of locations which they seek.

The scope of Agro 21's public relations department technical activity will expand to training and a wider range of contact requirements. Agro 21 has been creative in the use of video, but has been forced to rent such equipment at high prices. A capable staff is available to use such equipment.

Equipment required includes:

Video recorder, monitors, and related supplies Portable video camera slide projector tape recorder supplies

e. Library: Agro 21 does not have a professional library. Professional staff members have made use of their personal professional books and often bought required volumes, commonly at considerable expense, for the use of the

9%

organization. This is not a satisfactory arrangement. The project will provide \$40,000 to purchase a basic professional library including books and subscriptions to professional journals.

- f. Photocopy Equipment: Agro 21 has a single large Xerox copier to handle a large volume of large and small copying jobs. Often secretaries line up waiting for access to the machine. An additional small photocopy machine is needed to service copying requirements on the floor above that where the large machine is located.
- G. Computer Equipment: Agro 21 makes extensive use of computers for analysis, data transfer, and word processing. The dedicated word processing machine must be supplemented to relieve peak utilization on the single word processor. The single personal computer used for data analysis, storage, accessing a U.S. data base, and data transfer is heavily overloaded leading to inefficiencies as priorities shift from hour to hour. Almost all senior staff members as well as technical staff indicate that they would work more efficiently if computer access were more convenient.

While a number of configurations of computer systems might be workable for Agro 21, and the precise configuration will be subject to further study before precurement, current thinking favors the simplest approach possible to making computational capability available to staff members. The project will provide funding for six stand-alone personal computers compatable with existing equipment along with necessary peripheral equipment and standard software. Consideration will be given later to networking.

- h. Computer-based Information System Access: Agro 21 presently accesses "Dialogue" but cannot access electronically data bases in the Ministry of Agriculture, the Agricultural Development Bank and JNIP. Telephone lines are apparently adequate to support modum use in accessing local data bases. Agro 21 will study what services in addition to those accessed though "Dialogue" which it may require. The project will provide funding as follows for these purposes:
- i. Vehicles: Agro 21 staff spends a great deal of time in the field in connection with the multiplicity of tasks involved in agricultural investment promotion. There are two large 4 wheel drive vehicles available now but additional transportation is required. In particular, the inefficiency of use of "city" cars off the road in agricultural areas should be stopped.

The project will provide the following vehicles to bring the organization's motor pool to a condition conforming with efficient response to transportation needs..

j. Furniture and Office Equipment: Additional staff members will require additional furniture. Further, Agro 21 will provide office space to visiting clients which will require additional equipment.

6. COMMENTS AND RECOMMENDATIONS

Delegation of Authority: The management style of Agro 21 involves a multi-disciplinary team approach with weekly senior staff meetings to track individual tasks or activities. Reporting and tracking is handled by the Project Monitoring Office from action office reports. A problem arises when tasks and activities increase to the extent that they cannot be fully discussed and directed at weekly meetings. Further delegation of authority to sub-director staff will be necessary while maintaining a multi-disciplinary implementation style. Given the highly motivated innovative personalities of the staff, they should respond positively to greater responsibility.

Interagency Cooperation: Additional modification in the resolution of policy issues and paper-work simplification are part of a continuing process of organizational development. Also critical to such development is improving interagency working relations. Project funds which allow contracting for the services of other agencies facilitate the improvement of relations and simplify operating procedures.

Jamaican vs. Expatriate: Corporate policy is to have Jamaican staff in director positions. However, it will take time to identify and train staff to fully implement this policy. Where possible counterparts are being provided to Jamaican and expatriate staff. A training plan under project sponsorship is being developed to upgrade local staff. However, the opportunities for career development are limited by the short tenure of staff contracts. The flexibility afforded by contracting, however, more than outweighs any advantage that might be provided by permanent long tenured staff in an organization such as Agro 21.

The response of Agro 21 to the evaluation has been positive and most recommendations have been accomplished or are in the process of being implemented.

<u>O&M</u>: The St. Catherine irrigation system which will be rehabilitated by project funds has suffered from lack of maintenance for 15 to 20 years. This is true of both the surface

distribution canals and the wells. Such neglect has resulted in the abandonment and/or underutilization of a high percent of the 20,000 acres that are to be improved by project activity.

A system for funding the operation and maintenance of the rehabilitated facilities must be established with demonstrated ability to function. A local water authority, which in the spring of 1985 was put under the administration of the Ministry of Agriculture, is in place and to some extent staffed. However, they do not have funds for maintenance. One way of providing these funds would be to charge reasonable rates for water and have these funds accrue to the local water authority to meet their operation and maintenance expenses. Currently water charges that are collected go to the central government.

A practical approach to initial O/M would be for the project to provide Agro 21 with the necessary funds and for Agro 21 to contract with the Rio Cobre Water Authority to establish, train staff and conduct O/M activities during the life of the project. This would provide time to establish funding and operating procedures for the long term.

Training Plan: Training funds of \$355,000 are programmed under the project. This involves a wide range of training activity primarily in-country and of a non-academic nature. To adequately and efficiently use these funds, Agro 21 should develop a training plan indicating:

- i. Participant numbers and cost of training
- ii. Type and location of training
- iii. Curriculum content and duration of training.

Types of training that have been discussed are:

- i. O.J.T. on farms and in business for prospective farmers ii. Local and foreign short courses, workshops and
- conferences
- iii. Workshops farm surpervisors, technicians, and field and packing shed personnel.

APPENDIX A.1.: AGRO 21 LEASE

The Agro 21 lease (and related farm plan) provides a binding and enforceable commitment of the GOJ to maintain the terms and conditions of the lease for up to 49 years, assuming lessee compliance with its obligations. The lease thus constitutes both a GOJ "asset" contribution (repayable on the basis of rentals negotiaced in advance), an assurance of the sanctity of the GOJ commitment for the term of the lease, and a "bankable" asset for the investor. The standard Agro 21 lease has been approved by the Cabinet. The lease agreement is considered to be a full and adequate protection of investors' rights both with respect to security of investment and protection from arbitrary inteference in the operation of the enterprise. Because of the strong British legal tradition of the country, the Agro 21 leases are considered to be effective in future administrations.

LEASE UNDER THE REGISTRATION OF TITLES ACT

THIS INSTRUMENT OF LEASE made on the date set out at item 1 of the schedule hereto between the party named and described and whose address is or are set out at item 2 of the schedule hereto (hereinafter called "the Lessor" which expression shall where the context so admits include the person for the time being entitled to the reversion immediately expectant on the determination of the term hereby created) of the ONE PART and the party or parties named and described and whose address or addresses is or are set out at item 3 of the said schedule (hereinafter called "the Lessee" which expression shall where the context so admits include the context so admits include the term hereby created) of the ONE PART and the party or parties named and described and whose address or addresses is or are set out at item 3 of the said schedule (hereinafter called "the Lessee" which expression shall where the context so admits include the Lessee's personal representatives and permitted assigns) of the OTHER PART

W I T N E S S E T H IN THIS INSTRUMENT:-

1. (a) <u>Definitions</u>: The following expressions shall have the meanings shown opposite them:

"the term" shall mean and refer to the period commencing on the date at item 4(a) of the said schedule and terminating on the date at item 4(b) thereof.

"the leased land" shall mean and refer to the land briefly described at item 5 of the said schedule.

"the base rent" shall mean and refer to the yearly rent reserved set out at item 6 of the said schedule and as varied in accordance with the terms of this lease set out at sub-clause (e) of clause 5 hereof.

"the additional rent" shall mean and refer to the additional rent referred to at sub-clause (d) of clause 5 hereof.

"the rent" shall mean and refer to the base rent and the additional rent collectively.

"the zoned crops" shall mean and refer to the crop or crops described at item 7 of the said schedule.

"the rent adjustment dates" shall mean and refer to the several dates set out at item 8 of the said schedule.

(b) Masculine gender to include other genders: The masculine gender shall include the feminine and neuter genders and the singular shall include the plural and vice versa.

(c) Joint Covenants if more than one Lessee: If there be more than one Lessee, all covenants and agreements hereunder on the part of the Lessee to be performed and observed shall and shall be deemed to be joint and several covenants and agreements by all of the Lessees.

2. The Term:

The Lessor in consideration of the rents hereby reserved payable by the lessee annually in arrears and of the Lessee's covenants herein contained and subject also to the onditions and powers contained in the Registration of Titles Act unless hereby negatived or modified HEREBY LEASES the leased land to the Lessee for the term.

3. Lessee's Covenants:

The Lecsee to the intent that the obligations may continue throughout the term or any extension thereof HEREBY COVENANTS with the Lessor as follows:-

(a) <u>Rental</u>: To pay the rents at the times and in the manner aforementioned.

(b) Not to Assign etc: Not to underlet or part (otherwise than as hereunder stipulated) with possession of the leased land or any part thereof and not without the written consent of the Lessor first had and obtained such consent not to be unreasonably withheld in the case of a reliable and responsible person approved by the Lessor to transfer or assign this lease EUT an assignment by a mortgage under his power of sale shall not be subject to this restriction.

(c) To Repair: To keep the boundaries, gates, hedges and fences and all buildings constructions and/or other improvements now or hereafter to be crected or placed on the leased land in good and substantial repair (damage by accidental fire, act of God, the Queen's enemies, riot and civil commotion and fair wear and tear excepted) and so to deliver up the same at the end of the lease or the sooner determination thereof. (d) To Cultivate the Zoned Crops: As a condition precedent to the granting of this lease the Lessee has agreed in writing with the Lessor to establish in a proper and generally approved and accepted manner on the leased land the zoned crops within the time schedule shown in the said agreement (hereinafter called "the farm plan") which shall also set out the yield per acre of such crop or crops reasonably anticipated by the lessee on the basis of the leased land being farmed and cultivated in a proper and husbandlike manner and the Lessee shall at all times during the term or any extension thereof:-

(i) faithfully and punctually do and comply with all obligations on his part contained in the farm plan (a true signed copy whereof is hereunto annexed and marked with the letter "A") whether as to its original content or as from time to time amended pursuant to sub-clause
(d) (ii) of this clause;

(ii) not without the written consent (such consent not to be unreasonably withheld) of the Lessor to farm or cultivate on the leased land any crop other than the zoned crops or in any other way to vary the farm plan;

(iii) farm and cultivate the zoned crops and/or such other crops as may from time be agreed in writing by the parties hereto pursuant to sub-clause (d) (ii) of this clause in a proper and husbandlike manner;

(iv) not commit or permit or suffer to be committed any substantial or unreasonable spoil, waste or impoverishment on any part of the leased land.

(e) <u>To Keep Gutters etc. Clean</u>: To clean out and keep open and in working order all ditches, gutters, drains, sewers, culverts and watercourses.

(f) Not to Fell Trees: Not to cut down, fell, injure or destroy any growing or living timber or timberlike trees standing and being upon the leased land without the consent in writing of the Lessor.

(g) Not to Advertise: Not to errect or permit the erection of any hoarding or advertisement board on the leased land without the consent in writing of the Lessor.

(h) Not to Commit Nuisance: Not at any time during the said term to use, exercise, carry on or bring on or permit or suffer to be used, exercised, carried on or brought on in or upon the leased land or any part thereof, any act, matter or thing whatsoever which shall be to the annoyance, nuisance, grievance, damage or disturbance of the occupiers of the adjoining lands.

(i) To Permit Inspection: Subject to the giving of not less than 48 hours written notice by the Lessor to permit the Lessor or his duly appointed agent at all reasonable times during the day time to enter into and upon the leased land and view and examine the state and condition thereof.

(j) <u>No Encroachments</u>: Not to permit any encroachment or trespass upon the leased land and (with the collaboration of the Lessor) to prevent the acquisition of any new rights of way public or private or easements over any part of the leased land.

(k) To deliver Notices, Orders, etc.: Upon receipt of any notice, order, requisition direction or other thing from a competent authority affecting or likely to affect the leased land whether the same shall be served directly on the Lessee or the original or a copy thereof be received from any other person whatsoever the Lessee will so far as such notice order requisition direction or other thing or the law regulations or other instrument under and by virtue of which it is issued or the provisions hereof require it so to do comply therewith at his own expense and will forthwith deliver to the Lessor a copy of such notice order requisition direction or other thing.

(1) To Comply With Lessor's Notices: Forthwith upon any notice being served by the Lessor in respect of any breach of any cf the Lessee's covenants to comply with such notice and execute in accordance therewith any repair or other work thereby required to be done to the leased land.

(m) To Permit Notice For Re-letting: At all times during the three calendar months immediately preceding the termination of the term or any extension thereof to permit the Lessor or his agents to affix upon any part of the leased land a notice for re-letting the same and during the said period to permit intending tenants and others with written authority from the Lessor or his agents at reasonable times of the day to view the same.

(n) <u>To Pay Rates</u>: To punctually bear and pay and discharge all water rates and to pay all charges for gas, electric current, telephone rental and charges for any other service at the leased land.

(o) To Yield Up: To yield up the leased land and all fixtures cultivation and crops thereon at the end or sooner determination of the lease in such a state of repair cultivation and management as shall be in compliance with the Lessee's obligations herein contained.

(p) To Pay Costs: To pay to the Lessor one-half of the total of Stamp Duty and Registration fees and one-half of the Lessor's Attorneys costs in accordance with the Jamaica Bar Association Scale of Fees in respect of preparation and completion hereof.

(q) Not to Erect Dwelling House: Not without the consent in writing of the Lessor first had and obtained to erect or construct or permit or suffer to be erected or constructed on the leased land any dwelling house or any other structure designed for human habitation.

Rights Reserved to Lessor: At all times during the (\mathbf{r}) term the Lessor his agents servants independent contractors and others authorized by him shall have full right and liberty to enter in and upon the leased land and to remain there for the purpose of installing and repairing replacing and maintaining water pipes, poles and such other material as shall be requisite for the provision of water and other amenities to the leased land and/or the remainder of the land of which the leased land forms part AND also for the purpose of laying down therein and repairing and maintaining roadways required to provide or to improve the means of ingress and regress to and from the remainder of the lands of which the leased land forms part and so that all persons being Lessees of such remainder of land their respective invitees and licensees shall have full right and liberty to pass and repass over and upon such roadways whether on foot or however otherwise.

PROVIDED HOWEVER:-

(i) any such roadway water pipes, poles and other material shall be placed as closely as possible to a boundary of the leased land;

(ii) any such water pipes as shall be placed more than six (6) feet from a boundary of the leased land shall be sunk to a depth of not less than two (2) feet below ground level;

(iii) any damage caused to the leased land by reason of the exercise of such rights shall forthwith be repaired and made good by the Lessor and the Lessor shall compensate the Lessee for any cultivation and/or crops which shall thereby be damaged or destroyed;

(iv) if by reason of the exercise of such rights the use for agricultural purposes of any portion of the leased land shall be lost to the Lessee the rent shall abate proportionately;

(v) the Lessor shall carry out all works authorised by this sub-clause with due diligence and shall indemnify and save the Lessee harmless in respect of all third-party claims where damage or injury has been caused or alleged to have been caused by reason of such works.
4. Lessor's Covenants:

The Lessor to the intent that the obligation may continue throughout the said term or any extension hereof HEREBY COVENANTS with the Lessee as follows:-

(a) <u>Peaceable Possession</u>: That the Lessee paying the rents hereby reserved and observing and performing the several covenants and stipulations herein on his part shall peaceably hold and enjoy the leased land during the term without any interruption by the Lessor or any person rightfully claiming by or under him or on his behalf.

(b) <u>To Pay Taxes</u>: To pay and discharge regularly and punctually all sums from time to time due and payable in respect of rates taxes and outgoings on the leased land without lessening or reducing the Lessee's obligations under Clause 3 Sub-Clause (n) hereinbefore appearing.

5. PROVIDED ALWAYS AND IT IS HEREBY AGREED AND DECLARED between the parties as follows:-

- (a) Power of Re-entry:
 - If -

(i) the rents hereby reserved or any part thereof shall be unpaid for twenty-one days after becoming payable (whether formally demanded or not); or

(ii) any covenant (other than the covenants as to compliance with the farm plan and the practice of good husbandry set out in sub-clause (d) of clause 3 hereof) on the Lessee's part herein contained shall not be performed or observed for a period of thirty (30) days after delivery of a notice by the Lessor requiring the Lessee to remedy the breach within such period of time; or

(iii) the Lessee shall be in breach of his covenants as to compliance with the farm plan and the practice of good husbandry aforementioned or any of them and such breach shall not have been unavoidable by reason of Act of God, riot and civil commotion; or

(iv) the Lessee for the time being shall become bankrupt or being a company shall enter into liquidation whether compulsory or voluntary (save for the purpose of reconstruction or amalgamation); or

(v) The Lessee for the time being shall enter into any arrangement or composition for the benefit of the Lessee's creditors; or

(vi) The Lessee shall suffer any distress or execution to be levied on his goods;

then and in any of the said cases it shall be lawful for the Lessor at any time thereafter to re-enter upon the leased land or any part thereof in the name of the whole and thereupon this lease shall absolutely determine but without prejudice to the right of action of the Lessor in respect of any antecedent breacn of the Lessee's covenants herein contained.

(b) Notices: Except where otherwise specifically provided herein all notices hereunder shall be in writing and may be signed by any agent or Attorney-at-law on behalf of the party giving such notice. Any such notice or demand shall be sufficiently served on the Lessor and the Lessee if sent by registered post prepared addressed to the Lessor and the Lessee at their respective addresses shown herein. Any notice or demand so posted as aforesaid shall be deemed in either case to have been received within Five Days after posting.

(c) <u>No General Waiver</u>: No neglect, omission or forbearance on the part of the Lessor to take advantage of or to enforce any remedy, right or power arising out of any breach or non-observance of any of the covenants or conditions herein contained or implied nor the receipt of rents after knowledge of any such breach or non-observance shall be deemed to be or operate as a general waiver of such covenant or condition or the right to enforce the same in respect of any breach or non-observance thereof either original or recurring.

(d) Additional Rent for Provision of Infrastructure: The Lessee has been made aware by the Lessor that it is the intention of the Government of Jamaica to carry out certain capital infrastructural works in the vicinity of the leased land a brief description of such works an estimate of the actual capital cost thereof ("actual capital cost") and the number of acres of agricultural land capable of being benefited thereby ("the total acreage") being set out respectively at items 11, 12 and 13 of the said schedule and it is hereby specifically agreed by the parties that upon completion or substantial completion (hereunder defined) of such works there shall be an additional rent payable by the Lessee. Such additional annual rent shall be fifteen per cent (15%) per annum of the result of the following mathematical formula (hereinafter called "the increased value"):

Actual Capital Cost x Acreage of Leased Land Total Acreage

Such additional rent shall accrue from the date of completion or substantial completion of such works and be payable at the end of the then current year and of each succeeding year of the term. Such works shall be deemed to be "substantially completed" upon the leased land becoming capable of being benefitted thereby notwithstanding that actual benefit shall require expenditure by the Lessee. PROVIDED HOWEVER that if the actual capital cost exceeds by more than twenty per cent (20%) the said estimate thereof any additional excess shall not be used as a basis for the computation of the additional rent.

Adjustment of Base Renc: At each rent adjustment date (e) there shall (if found requisite pursuant to the provisions of this sub-clause) be an increase or decease (as the case may require) of the base rent payable by the Lessee. Such adjusted base rent shall be computed at the rate per cent set out at item 9 of the said schedule of the capital unimproved value of the leased land ("the unimproved value") and at the rate per cent set out at item 10 of the said schedule of the capital value of structures or other capital improvements thereon ("the improved value"). In the absence of agreement within thirty (30) days of the relevant base rent adjustment date between the parties hereto as to each of such cpaital values each party shall within sixty (60) days of the relevant base rent adjustment date have the leased land appraised by a valuer appointed by him and a written report of such appraisal delivered to the other party. If there shall be a differential of not more than ten per cent (10%) as to each of the unimproved and improved values between such appraisals the adjusted base rent shall be based on the median figures. In any other case a third appraisal shall within a further period of thirty (30) days be carried out by a valuer to be nominated by the President for the time being of the Bar Association of Jamaica and the rent shall be based on the average of each of such unimproved and improved capital values as found by the three appraisals. In arriving at the capital values the value of the Lessee's improvements shall not be taken into account and there shall also be deducted therefrom the increased value as defined at sub-clause (d) of this cluase PROVIDED HOWEVER that the base rent payable hereunder shall at no time be less than the amount set out at item 6 of the said schedule hereto.

Option for Further Term: If the Lessee shall be (£) desirous of taking a lease of the leased aland for a further term of twenty-four (24) years from the expiration of the term at the rents and on the terms and conditions hereinafter mentioned and shall not more than twelve (12) months nor less than six (6) months before the expiration of the term give the Lessor notice in writing of such his desire and if he shall not at the time of the giving of such notice be in breach of any covenant or agreement on his part herein containedup to the termination of the term in particular those covenants and agreements relating to the payment of the rents compliance with the farm plan and the practices of good husbandry on the leased land then the Lessor will let the leased land to the Lessor for a further term of twenty-four (24) years at the rents to be determined in the manner provided in this sub-clause such rents to be payable and such new lease to be subject in all other respects to the same covenants and stipulations as are herein contained save that:-

(i) this present sub-clause for renewal shall not be included therein; and

(ii) there shall be included therein the following proviso and agreement by the parties:-

"the Lesses shall keep an accurate account supported by vouchers of all capital expenditures expended by him in the creation of fixed assets on the leased land during the last five (5) years of the term and (provided that such capital expenditures shall have been approved in writing by the Lessor) upon the termination of this lease by effluxion of time (but not otherwise) and upon production by the Lessee to the Lessor of such account and supporting vouchers the Lessor shall compensate the Lessee in respect of those of such fixed assets as shall at such date of termination be in esse and capable of the use for which they were created to the extent of their respective values written down in accordance with normal and accepted accounting practice."

The computation of the base rent payable both at the commencement of the new term and at the base rent adjustment dates thereunder and the provisions as to valuation of the leased land set out at sub-clause (e) of clause 5 hereof shall apply mutatis mutandis BUT the additional rent shall be payable for only such period as to ensure that the same will be payable for a total period of twenty-five (25) years (including the period of this present term during which it is paid).

Suspension Of Rent In Case Of Damage Or Destruction: (q) If any structure or other permanent improvement or a part of any structure or other improvement which shall be erected or placed on the leased land at the date hereof shall be destroyed or damaged by accidental fire or any other peril and such destruction or damage shall not have been caused in whole or in part by the act or default of the Lessee or his agents, invitees or licensees and such structure or other permanent improvement shall not be rebuilt or reinstated by the Lessor within six (6) months after such destruction or damage a fair proportion of the rents hereby reserved according to the nature and extent of damage sustained shall after the expiration of such six (6) months be suspended until the structure or other permanent improvement shall again be rendered fit for use in the same capacity as it was prior to such damage or destruction and any dispute concerning this clause shall be determined by two

 $V_{0r}($

arbitrators one to be chosen by the Lessor and the other by the Lessee subject and according to the terms of the Arbitration Act.

Lessee may terminate Lease if no agreement for (h) re-zoning: If pursuant to sub-clause (d) (ii) of clause 3 hereof the Lessor shall not within thirty days of the Lessee delivering to him a written application for permission to farm or cultivate on the leased land a crop or crops other than the zoned crops have granted such permission in writing the Lessee may if such be his desire within a further period of sixty days serve a written ninety day notice on the Lessor of his intention to terminate this lease and at the expiration of such ninety days this lease shall determine and any rents which shall have accrued during the then current year of this lease shall be apportioned and the Lessee shall pay such apportioned rents to the Lessor but without prejudice to the right of action of the Lessor in respect of any antecedent breach of the Lessee's covenants herein contained.

IN WITNESS WHEREOF the parties hereto have hereunto caused their respective seals to be affixed the day and year first hereinbefore written.

)

)

)

)

)

)

THE COMMON SEAL of) was hereunto put and affixed) by) Director and countersigned by) the Secretary of the said) Company in the presence of:-)

SECRETARY

DIRECTOR

THE COMMON SEAL of was hereunto put and affixed by Director and countersigned by the Secretary of the said Company in the presence of:-

DIRECTOR

SECRETARY

, í . ¹.

1. The Date: 198 . The day of 2. The Lessor: Name: Description: Address: 3. The Lessee: Name: Description: Address: 4. The Term: Commencement: (a) The day of 198 . Termination: (b) The day of 20 . 5. The Leased Land: ALL THAT parcel of land 6. The Base Rent 7. The Zoned Crops: (a) (b) (c) (d)(e) (£) 8. The Rent Adjustment Dates The day of The day of The day of The day of 9. Percentage of unimproved value referred to at sub-clause (e) of clause 5 hereof% 10. Percentage of improved value referred to at sub-clause (e) of Clause 5 hereof 11. Brief description of the works referred to at sub-clause (d) of Clause 5. 12. Total acreage referred to at sub-clause (d) of Clause 5 acres. 13. Estimate of the Capital cost c: the works referred to at sub-clause (d) of clause 5. \$

 d_{j}

APPENDIX A.2.: SAMPLE GROWERS CONTRACT AND EXCERPTS FROM FARM PLAN

EXECUTIVE SUMMARY

AMITY HALL PROJECT

FEASIBILITY REPORT OF RICE FARMING AND MILLING

(G.L. ENTERPRISES LIMITED

Based on the recommendations from Agro 21 for a rice project at Amity Hall and a rice milling project at Spanish Town, the Steering Committee had decided in December 1984, to approve in principle the project and ask G.L. Enterprises who were the best potential investors from a list of three to prepare a Feasibility Study on the project.

This Study was completed recently by the above mentioned investors and the following is a brief summary of the project and its Feasibility Study.

AMITY HALL FARM

A total of 3,202 acres of land is located in the Amity Hall property, which is presently leased by the National Investment Bank of Jamaica (NIBJ), from the Agricultural Development Corporation (ADC), who are owners of this property. From this acreage, G.L. Enterprises is requesting the lease of 2,250 acres for rice production (with other rotational crops). The breakdown of

A "mother' farm will act as an independent unit and provide various services to small farmers. These farmers operate their farms usually in close proximity to the "mother" farm as satellite.

These services, provided by the "mother" farm are as follows:

- Technical advice and expertise training as well as providing results of the applied research carried out by the "mother" farm.
- b. Assistance in the production by providing the necessary inputs, seeds, chemical fertilizers, herbicides, other raw materials that are required by the farmers from time to time and mechanical services.
- c. A marketing organization which purchases all the outputs from the small farmers.

- d. Processing and packaging facilities for the processing of the product to an acceptable level in the marketplace.
- e. Interim financing for the purchase of the inputs of the satellite farmers as well as to provide credit to the farmers until the crops are reaped and sold to the "mother" farm. The farmers will receive at harvest time, the net amount of revenues, less costs incurred to the "mother" farm.

Selection of Satellite Farmers

To guarantee a successful association with the satelite farmers, the relationship must be governed by minimum criteria, such as:

- a) Landowner (lease) status
- b) Present employment
- c) Present ability of rice farming
- d) Location of land in the vicinity of the "mother" farm.
- e) Willingness to live up to contract conditions.
- f) Availability of water resources.

Involvement of the farmers in growing rice will be critital if expansion of the rice industry is to be materialized.

It goes without saying that, the improvement of the Rio Cobre Irrigation Works is of great importance, as well as the availability of other idle lands to farmers for rice production.

Farmers' Training

Another aspect of great importance to successful involvement of satellite farmers is training.

IRCJ will provide to interested farmers, training and extension services as follows:

- Training of the farmers will be practical and adapted to the particular needs and possibilities of experienced (although traditional) adult rice cultivators who have full responsibility for their family existing farm holdings.
- Farmers training will be given by the Company Management and be part of the services offered to the farmers in order to apply the most modern and scientific technology in growing rice.
- Past experience has shown that the most suitable training system for those farmers is the "training and visit system" which consists of a through-the-year services of the method demonstrations, discussion meetings, video-visual sessions and intensive follow-up guidance when the candidate-farmers have to apply their newly acquired knowledge on their own farm land.

2

The timing, subject and frequency of the various training meetings and activities are tuned to the rice cropping calendar and the observed training needs are identified on the basis of actual field performance.

The Need for Applied Research

- Agro-economic monitoring is required of all on-scheme farm operations of the candidate-farmers, maintenance work on bunds and canals and drains, including an inventory of the off-farm activities of the farmers. Reliable data are necessary for identification of particular farming system, constraints and possibilities for improvement.
- With double cropping of irrigated rice, the present rather high salinity levels in the soil (or ground water) will drop, which will cause initially, with good crop and water management, a rise in paddy yields.
- To maintain those yield levels, however, rotation with dry crops that periodically dry out the clay soil (e.g. soy beans, sunflowers, sorghums, etc.) will become necessary to avoid physiological diseases. These second crops should be tried out in true-scale experiments.
- Experimental data on economically justified fertilizations dosaged for irrigated rice are not available in Jamaica. On-farm observation trails are recommendable.
- Aerial application of herbicides and pesticides by aircraft required a close investigation to the level of applied concentration of chemicals, not only for a good coverage but also for mortality.
- Economic optimum and mortality effectively is to be balanced out as well as possible negative effects to the environment.

Farmers Credit System

A fundamental issue that needs to be solved urgently is the problem of seasonal credit to farmers.

An appropriate sytem to give the farmers access to credit partially in cash, for production costs and possibly food, should be agreed on and organized forthwith.

It is proposed in this study to create a tri-party agreement between the Peoples Cooperative Bank (P.C. Bank), the farmers and the Company, which is interlocking to mutual benefit of all parties concerned. A model such as that developed at the Meylersfield Development Project, can be adapted and updated.

The Liaison Officer

The Company will appoint an Agronomist with extension skills to carry out the Satellite Farmers Program. He will also be in charge of the seed production at the "mother" farm, as well as to implement the Farmers Credit System in conjunction with P.C. Bank in the parish.

A letter from the Chairman of the St. Catherine Rice Growers Association is attached to this study as indicated of interest to participate in the Satellite Farmers Program.

MARKETING

At present the prices of paddy and finished rice are controlled solely by the GOJ. Consequently, the commissioning of prices is controlled centrally and does not necessarily relate directly to the actual production cost. It follows, therefore, that future government pricing will have a significant bearing on the financial viability of the Company.

With Jamaica currently importing approximately 96% of its rice, locally produced quality rice would be welcomed by Government and the consuming public alike as on the one hand Government will save vital foreign exhcange used to purchase importged rice, while on the other hand consuming public would enjoy an augmented and more reliable supply of rice.

Paddy produced by both the "mother" farm and satellite farmers will be sold to the Rice Mill operated by IRCJ at a fixed price of \$0.50 per 1b dry weight (14% moisture content). The following formula is used in calculating payments by rice mills to pay farmers for the sale of paddy:

- Formula: Total weight of paddy multiplied by 100 minus moisture content of paddy supplied, divided by 100 minus 14.
- Example: A farmer supplies 100 pounds of paddy with 18% moisture content, then payment to him will be:

 $\frac{100 \text{ lbs x (100-18)}}{(100 - 14)} = 95 \text{ lbs at $0.50} = 47.50 $\frac{100 \text{ x 82}}{86} = 95 \text{ lbs at $0.50} = 47.50

MANAGEMENT & ORGANIZATION

Management

It is thought that a two tier level of management will evolve. The Management Consultants that will initially consist of the Group Financial Controller and Mr. J. Kasantaroeno, Agronomist/Rice Expert. Middle management will consist of those managers responsible for:

- a) Farm Manager. This person will be responsible for the mother farm at Amity Hall to ensure the highest possible yield. To oversee his supervisors in the areas of irrigation, harvesting and land preparation.
- b) Satellite Farmers Liaison Manager. To ensure that all satellite farms receive the technical and operational back-up necessary to produce the best yield from their particular lot of land. To recruit and train new farmers into the prospect of growing rice on their land.
- c) Business Manager. Administrative Officer for both the Farm and the Mill. To look after the day to day affairs of the office. To act as the Personnel Officer in times of personal office and industrial disputes.
- d) <u>Mill Manager</u>. Responsible for the best grade of rice possible from the paddy he receives. To oversee operations in both the mill and in the technical workshop.

Organization

IRCJ will organize its operations into two cost centers, where the farm is one, and the mill is the other, with the administrative costs being shared by both.

It will be one of the primary function of the Business Manager to ensure that the accounting for both the farm and the mill are kept separately and to show a profit for both legs of the operation.

Contract Growing Agreement

The following agreement is currently in use in Jamaica:

MEMORANDUM OF AGREEMENT

This AGREEMENT made this ______day of _____One Thousand Nine Hundred and Eighty______BETWEEN ______a Company incorporated under the Companies Law of Jamaica and having its registered office at _______in the Parish of ______and who and whose successors and assigns are hereinafter called the Processors - of

11

the one part and Projects for People Limited/Hillside Farmers Association - an association of farmers cultivating lands at Hillside Farm - Monymusk, Clarendon with registered offices at 25 Waterloo Avenue, Kingston 10 and at Hayes P.A., Clarendon (hereinafter called the Association) of the other part, witnesseth as follows:

1. The Association, having entered into a contract with each of 25 farmers (whose names are recorded on a list attached to this memorandum) to act as marketing agents for the disposal of a crop of Roma Tomatoes grown by each farmer on approximately one acre of land at Hillside Farm in the Parish of Clarendon (hereinafter called the Said Land) and

2. The Association, having been authorized by the 25 farmers named on the list attached, to dispose of all marketable Roma Tomatoes produced on said land in the manner deemed by the Association to be the most advantageous for its members;

3. The Processors having agreed to purchase all Roma Tomatoes of satisfactory quality provided by the Association at an agreed collection station on Hillside Farm and between the months of December 1983 and June 1984 at a price of Twenty Cents (J\$0.20) per lb.

The Association covenants as follows:

(a) To provide planting material, manure, fertilizer and necessary weedicides, insecticides and fungicides as may be required by the said farmers for the production of a crop of Roma Tomatoes during the period October 1983 to June 1984.

(b) To monitor and where necessary control and direct the use and application of materials provided for the production of the 1983/84 crop of Roma Tomatoes.

(c) To monitor and where necessary control and direct the reaping and transport of Roma Tomatoes from the field to the collecting stations on Hillside Farm as agreed with the Processor and to endeavour to ensure that a minimum total of five (5) tons of Roma Tomatoes from the 1983/84 crop is made available for purchase by the Processor under the terms of this AGREEMENT.

(d) To receive and observe all advice or instructions offered by the Processors especially as regards reaping, post-harvest treatment and transport to collecting stations and to afford full cooperation to the Processors to facilitate efficient and speedy despatch of transporting vehicles.

(e) To provide the Processors with reliable estimates of produce likely to be available two weeks in advance so that adequate arrangements for collection and transport to factory can be made.

The Processor Covenants as follows:

(a) To provide timely advice to the Association on all matters relating to the reaping and post-harvest treatment of the produce to be collected, in general and in particular on the timing of reaping exercises in order to avoid excessive delay between reaping and transport to the factory.

(b) To collect all of the produce subject to this contract at such times and at such frequencies as shall be necessary to avoid wastage.

(c) To arrange for the weighing of all produce collected, at the time and place of collection, in the presence of a representative designated by the Association for this purpose.

(d) To arrange payment to the Association for all produce collected and satisfactorily delivered, within 7 days of delivery of the produce. The price being Twenty Cents (J\$0.20) per lb.

Signed this_____l9____

At

Signed for and on behalf of the Processor

Signed for and on behalf of Projects for People Limited/ Hillside Farmers Association

WITNESS



(*) AIDP funded

* CD/I funded

ANNEX 2.B.: TECHNICAL ANALYSIS

B.1 CLIMATE:

<u>Rainfall</u>: The St. Catherine Plain of Jamaica has a warm tropical but very dry (semi-arid, Koppen "Bsh" or "steppe") climate with a 30 year average rainfall of 28 inches per year. Rainfall is bi-modal with peaks in October and May. The Blue Mountain Range intervenes a large percentage of the moisture carried by the E.N.E. trade winds, hence the southern coastal plains east and west of Kingston receive low rainfall amounts (Hall, 1923). Robotham (1952) reproduced a rainfall map showing the South Coastal Plains as having the lowest rainfall in Jamaica.

At Lawrencefield within the Bernard Lodge Estate rainfall is well below the level of potential evaporation, which deviates slightly around 7 inches for each month; rainfall is less than 2 inches from January to April. Rainfall increases in May but not enough for crop production. Only in October is rainfall greater than potential evaporation, but the amount is barely minimal and decreases rapidly again in November (see Water Balance Chart). Hall (1892) stated that the area from Portland Point to Kingston, which includes the St. Catherine Plains, is remarkably dry with strong surface winds from the southeast.



Figure 1

Rainfalls vary monthly, yearly and in irregular Caribbean drought cycles. For example, the 15 year annual rainfall at Bernard Lodge for the years 1965 to 1979 was 29 inches, with a high in 1979 of 62 inches and a low in 1976 of 9 inches.

Table l

		ANNUAL RAINFA	ALL, BERN	NARD LOCO	GE 1965-1	L979
Year		Inches	Year	Inches	Year	Inches
1965	=	22	1970 =	27	1975 =	17
1966	=	44	1971 =	19	1976 =	9 (drought)
1967	=	l6 (drought)	1972 =	29	1977 =	19
1968	=	22	1973 =	26	1978 =	27
1969	=	49	1974 =	38	1979 =	62 (wettest)

Since 1870, Jamaica has experienced island-wide droughts (these also were Caribbean-wide) in 1871-77, 1880-85, 1920, 1922-23, 1946-47, 1267-68, and 1975-76. 1985 appears as another drought year.

Since 1880 hurricanes have struck the St. Catherine Plains only twice; the most recent one in 1951. Winds may be as high as 100 m.p.h. during storms.

Temperature: The annual average temperature is 80°F with a mean annual variation of 10°F ranging from 64-88°F in the coldest months (January and February) to 70-90°F in the warmest months (July and August). (See comparative Rainfall and Max/Min Temperature. Figure 2).

Diurnal (day-night) temperature fluctuations span 20°F.

Humidity: Relative humidity is 77 to 86% in early morning dropping to 65-70% soon after mid-day. Sunshine hours per day range from 7.2 to 7.9 during the short days and from 8.2 to 8.9 during the long days.

Evaporation: The daily annual evoraporation from a class A (freewater surface) evaporation pan is 5.3 mm per day or 1,935 per year, equivalent to 76 inches or 6.3 inches per month. Evaporation ranges are 0.26 inches per day in July and 0.15 inches per day in January.

Wind: Wind speeds during the day in this area are high. On shore winds are reported to begin at approximately 10 a.m. and subside at 4 p.m. One in 20 year storm winds can reach up to 100 miles per hour (1951?).

Winds are a factor in evaportranspiration rates in the use of sprinklers.





RAINFALL IN MILLIMETERS

B.2 SOILS:

Profitable crop production requires suitable soil(s), slopes, climate, water supply(ies), fertility, crop protection, crop varieties, knowledgable production technology and favorable marketing.

Two major soils; Caymanas (Mollisol), Churchpen and Sydenham (Vertisol) soils, cover most of the the project area (phases 1, 2, 3; Caymanas, and Bernard Lodge sugar estates) of the St. Catherine Plain. The Caymanas Estate lies southeast of Spanish Town. The Bernard Lodge Estate lies west of the Caymanas Estate, south and southwest of Spanish Town.

The Caymanas, Churchpen and Sydenham soils are nearly level, on a l to 2 percent sloping alluvial plain. Caymanas soils (clay, clay loam, sandy loam and Dawkins clay loam - loam complex) are well drained, alkaline to calcareous, developed from "young" alluvium that does not flood at the present time. Sydenham soils (including Churchpen clay are imperfectly drained clayey soils of shrinking-swelling clay slightly acid to alkaline, developed on "old" alluvium with varying degrees of salinity. Salinity increases southwestward becoming strong in the moderately drained Salt Island clay soil south of Hartlands.

Caymanas soils cover all of the Caymanas Estate and the eastern half of the Bernard Lodge Estate. Sydenham and related soils cover the western half of the Bernard Lodge Estate.

Soils Classification of Project Area: Caymanas soils have been classified by the 1984 - 85 Dutch directed soils team as "Mollisols". Mollisols are high natural fertility soils developed from high base status parent materials under grassland and/or high lime status trees and shrubs. In low rainfall, high temperature regions, as the St. Catherine Coastal Plains, coarse grasses and low woody shrubs probably were the original vegetation. Such Mollisols are called Hapustolls (meaning: other ("hap") dry ("ustic") climate Mollisols). The Caymanas and related soils have been identified by the Dutch Soil Survey group as "Hapustolls". The clay types of the Caymanas soils (clay, clay loam and Dawkins clay loam-loam complex) are 1:1 non-swelling illite and kaolinite.

Sydenham, Churchpen, Springfield and Salt Island clay soils that have shrinking-swelling clays (sometimes called "cracking" clays) are classified as "Vertisols". Vertisols are high in montmorillonitic clays (2:1 type) that shrink upon drying causing deep (1 1/2 or more feet) cracks in the soil and that swell closed upon moistening. These soils are very hard when dry, sticky when wet, and require timely tilling. Water movement in Vertisols is very slow. Original vegetation of Vertisols was grassland and/or

scattered small trees. The Dutch Soil Survey directed team have identified three kinds of Vertisols in the St. Catherine Coastal Plains; the Sydenham clay with its dark surface soil as a Pellustart, the Churchpen clay with its brown colored surface as a Chromustert, and the poorly drained Springfield clay as an Aquic (meaning wet) Chromustert. The Salt Island clay soil that occurs southwestward receiving drainage water from the other Vertisols of the Bernard Lodge area is strongly saline and alkali throughout.

Irrigation Water Management of Vertisol Soils: Because water movement in Vertisol soils is very slow and if irrigation is necessary, as it is in the dry ("ustic") climate of the St. Catherine Plains, the degree of salinity as well as the content of calcuim and magnesium of such irrigation water is of critical importance to long term successful management of these soils. Unless sufficient excess water is used to adequately leach the accumulated residual salt (sodium and chloride) as well as the calcium and magnesium left in the soil from evaporation and crop transpiration, the soil becomes increasingly saline and pH continues to increase. These currently are the conditions of the Vertisol soils on the St. Catherine Coastal Plains. In fact, the situation is being intensified currently by inadequate amounts of irrigation water to supply crop requirements for high yields. Increasing pH further intensifies the chemical unavailablility of most secondary and trace element nutrients not supplied by fertilizers.

Increasing salinity of the soils used for sugar cane is reported by the Sugar Industry Research Institute as reducing cane yields by 0.2 ton per acre per month over a 15 year period, 1965 - 1979, on the Bernard Lodge Estate.

The Sugar Industry Research Institute uses a lower salinity level, less than 2 EC mm hos/cm for a non-saline :oil whereas the Soil Survey uses 4 EC mm hos/cm as non-saline. Modern text books use 4 mmhos/cm and exchangeable sodium percentage less tahn 15.

The less than 2EC of the Sugar Industry Research Institute versus 4EC of the Soil Survey to define a non-saline soil may be of importance in vegetable production on the Caymanas soils that have salinity because some vegetables, especially beans, peppers, onions and carrots have low tolerance to soil salinity. For example, bean yields may be reduced 10% at soil EC of only 1.5 and 25% at EC 2.3. During germination pepper yields may be reduced 10% at EC 2.2 and 25% at EC 3.3. (Table 1, CRC Handbook of Irrigation Technology).

<u>Soil Salinity</u>: With an increase in soil salinity plant roots extract water less easily from the soil solution. This situation is more critical under hot and dry than under humid conditions.

J/l

High soil salinity may result in also toxic concentrations of ions in plants. Soil salinity is determined by finding the electrical conductivity of the soil saturation extract (ECc). The electrical conductivity is measured in millimhos per centimeter (mmho/cm). One mmho/cm is equivalent, on the average, to 640 ppm of salt.

Crop Response to Salinity:

Salinity			
(ECc, mmho	o/cm at	25o <u>C)</u>	Crop Responses
0-2			Salinity effects mostly negligible
2-4			Yields of very sensitive crops may be restricted
4-8			Vields of many crops restricted
8-16			Only tolerant grops yield satisfactorily
Above 16			Only a few very tolerant crops yield satisfactorily
Adapted fr	om Leor	Berste	in, Salt tolerance of plants, USDA
Agricultur	al Info	ormation	Bulletin 283 (1970).

Relative Salt Tolerance of Vegetables:

The indicated tolerance to the period of rapid plant growth and maturation from the late stage onward. With most crops there is little difference in salt tolerance among varieties.

	ECe	mmho/cm	at 25°C)	
Vegetables Ranked in Order of	at Which	Yields	Decreased	by
Decreasing Salt Tolerance	10%	25%	50%	
Beet	8	10	12	
Spinach	5.5	7	9	
Tomato	4	6	8	
Broccoli	4	6	8	
Cabbage	3	4	7	
Cucumber	3	4	6	
Muskmelon	3	4	6	
Potato	3	4	6	
Corn	2.5	4	6	
Sweet potato	2.5	4	6	
Lettuce	2	3	5	
Pepper	2	3	5	
Radish	2	3	5	
Onion	2	3	4	
Carrot	2	3	4	
Bean	1.5	2	4	
Adapted from Leon Berstein, Salt to	lerance of	Plants.	USDA.	
Agricutural Information Bulletin (1	970).		,	

Soil Surveys: The first comprehensive soil map and report of the St. Catherine Parish was by K. C. Vernon and T. A. Jones of the Trinidad Imperial College of Tropical Agriculture published in 1958. Soil names, descriptions, capabilities, and management suggestions determined during the course of that study are referred to currently, some 30 years later. The 1982 CRIES (green book) compilation "Jamaica Resource Assessment" drew its soil information for St. Catherine Parish primarily from the 1958 Vernon report with up-dating soil classification terminology, climate types and crop suitabilities. (The CRIES up-dating soil classification is not in this project report. The 1984 - 1985 soil classification terminology is used in this project report.

Currently, 1984 - 1985, an island-wide modern soil survey is in progress through the Rural Physical Planning Division of the Ministry of Agriculture in cooperation with the Dutch and U.S. Governments. A provisional soil map sheet showing the soils of the St. Catherine Coastal Plain at a scale of 1" = 1.26 miles (1/50,000) was made available to the team. The 1958 Vernon soil map was published on the same scale, although the actual field mapping of both projects were/are on the much larger scale of 1/12,500 or 1" = approx. 0.3 miles.

For detailed planning the units shown on the 1/12,500 scale field sheets may be of considerable value, particularly to show sandy spots, clayey wet spots or other small areas of soils not possible to show on the 1/50,000 scale provisional map. Statements of inclusions contained in the general description of soil mapping units confirm this possibility.

The soils units shown on the 1984 provisional St. Catherine Plains sheet use the same names as of the 1958 Vernon map with refinements including approximately 250 salinity site determinations. One refinement, that of a soil complex of different soil textures of the Caymanas sandy loam (#127 of the Vernon map), named as the Dawkins complex on the 1984 map (# AR3) is of significant importance to developing the phase 1 Caymanas area for winter vegetables. The Dawkins soil complex areas have a micro relief of rises which are usually sand textured and numerous shallow depressions that would collect irrigation water. Land levelling would be necessary of areas of this soil complex to make it more uniform for water, crop and fertilizer management.

Salinity of Project Area Soils: Another 1984 St. Catherine Plains Soils Survey sheet shows the "Distribution of Salt-Affected Soils" in four classes; (1) non-saline, (2) slightly saline, (3) moderately saline, and (4) strongly saline. All of the phase 1 Caymanas Estate of Caymanas soils are non-saline by Soil Survey using less than 4EC salinity as non-saline, but some areas may not

be by Sugar Industry Research Institute using 2E as non-saline. Most of the eastern half of the Bernard Lodge Estate (Caymanas soils) also are non-saline. The western half of the Bernard Lodge Estate (mostly Sydenham clay and Churchpen clay soils) are non-saline to slightly saline (using 4FC as non-saline). Moderately saline areas with small areas of strongly saline soils occur south of Hartlands.

Two examples of yield reduction due to soil salinity of sugar cane, a deep rooted saline sensitive crop, was reported by the Jamaican Sugar Cane Research Institute on Bernard Lodge Estate for the 15 year period 1964 - 1979. As soil salinity increased from non-saline (less than 2EC) to medium saline (EC 3 to 4) on the Caymanas clay loam. Cane yields in tons per acre per month decreased from 2.52 to 2.32. On the Sydenham clay soil, cane yields decreased from 2.23 to 1.96.

<u>Crop Adaptation and Fertility Status of Soils</u>: Caymanas soils (AR1, AR2, and AR3 on the 1984 soil map; 127 and 128 on the 1958 soil map) are well suited for vegetable crops, as well as sugar cane, papaya, mango, corn, red beans, soybean and lime-tolerant ornamentals, if adequate amounts and quality of irrigation water can be supplied, and existing soil salinity does not exceed crop tolerances. Because the Caymanas soils have high pH - the Caymanas clay soils are calcareous (free lime throughout the profile) these soils are not suited for pineapple or acid soil requiring ornamentals.

Caymanas soils are low in available nitrogen, high in available phosphorus and moderate in available potash, (table 3, appendix C, table 4). Because of high soil pH of Caymanas soils the Troug soil test readings may not be very reliable. Because of high pH and limestone-derived parent materials the Caymanas soils are low in available sulphur, zinc, iron, manganese, and probably low in available boron. Soil analyses for minor element availability and field trials are advised. "Blanket" applications of these minor nutrients are suggested for immediate crops until field trial research results become available.

The imperfectly drained Sydenham clay, the Churchpen clay and the poorly drained Springfield clay are well suited to irrigated wetland culture of saline tolerant varieties of rice, and if artificial drainage is adequate, are suited to saline tolerant varieties of irrigated sugar cane, soybeans, corn and sorghum, and perhaps tomatoes. Because of increasing salinity southwestward in the Bernard Lodge Estates, resulting from insufficient irrigation of sugar cane with 400 to 500 Ec mmhos/cm salinity Rio Cobre River water that contains unspecified amounts of calcium and magnesium, as well as from 300 Ec mm hos/cm salinity waters that also contribute calcuim and magnesium from alluvial wells, significant

 χt^{t}

declines in yield of existing sugar cane varieties has been documented for many years by the Sugar Cane Research Institute of Jamaica. The use of saline tolerant sugarcane varieties have reduced these yield declines somewhat. It is suggested that secondary and trace element deficiencies resulting from increasing pH of these soils may also be contributing to the declining sugar cane yields observed on the Bernard Lodge Sugar Estates. According to the 1958 Vernon Soil Survey these soils were slightly acid in 1955, but 30 years later, 1985 these same soils are mildly alkaline.

Rice varieties also differ in their tolerance of saline soil conditions. Prior determinations of such saline tolerances should be made before to selecting a rice variety(ies) to grow on these "cracking" clay soils.

All rice varieties have high requirements for available zinc and sulphur. At pH values of the moist surface of 6.8 or higher, zinc, sulphur, iron and manganese deficiencies almost always occur. Rice varieties differ in their tolerance to zinc deficiency, and probably also differ in their tolerance to sulphur deficiency.

Zinc deficiency is inexpensively and easily corrected by applying 5 to 10 pounds of zinc sulfate (22 percent zinc) per acre to the upper inch of the harrowed soil just prior to sowing. Applications may need to be made for each crop at first; After a few crops, an application before each second or third crop may suffice.

Sulphur deficiency of wetland culture irrigated rice has been recognized only in recent years. Dramatic increases in rice yields have been obtained from the addition of sulfur on soils high in pH and on any soils where low or non-sulphur containing fertilizers, particularly triple superphosphate and/or diammonium phosphate are used. Sulphur deficiency is easily and inexpensively corrected by harrowing in at least 100 pounds per acre of gypsum (17 pounds of sulphur) - preferably 200 pounds per acre, at the last harrowing before sowing. Initial applications may be necessary for each crop, afterwards perhaps after every second or third crop. Jamaica has abundant supplies of gypsum.

Rice requires available silica. No information was found on the silica availability of the "old" alluvia Sydenham and Churchpen clay soils. Soils high in weatherable primary alumina - silicate minerals usually contain sufficient available silica for rice.

Gypsum (calcium sulfate - CaSO4.7 H_2O) may be needed as a treatment on the more saline cracking clay soils to displace some of the excess sodium ions (Na⁺) with calcium ions (Ca⁺⁺) on

the soil clays and to physically increase the aggregation of the clay particles of these soils. The correction of sulphur deficiency also would occur.

Possible Soil Related Problems

1. No information was found concerning the existence of harmful nematodes in the soils of the Caymanas areas. This information is essential for crop production management. Furthermore, no information was found on the possibility of Rio Cobre River irrigation water contributing any yield reducing nematodes from run-off of moist climate hillside vegetable farms.

2. There may be limitations on the amounts of irrigation water that can be pumped from the alluvial wells as a result of the St. Catherine Plan being declared a "Critical Area" in February 1969 under the 1959 Underground Water Control Law 2 of Jamaica. (From May 1985 - Tate & Lyle Technical Services, "Sugar Industries Studies" - Irrigation, appendix VIII, sheet 4.

3. There may be a possibility of harmful pollution from the Rio Cobre River water used for irrigation. In this regard a 1983 paper by the National Resources Conservation Department of Jamaica states on page 2 ... "It is a well established fact that upstream, the Rio Cobre is subjected to organic affluent from the Condensary, Citrus, Coffee and Milo factories at Bog Walk. It also receives overflow (wash) water from Alcan Works which is highly alkaline (pH 9-11)" but this has declined in recent years with the introduction of a new "red mud" drying procedure.

4. A pollution hazard area exists south of Spanish Town that is reported to be due to occassional discharges of alkali from a manufacturing plant. (From June 1985 "Water Status Map" of the Rural Physical Planning Division of the Ministry of Agriculture.

Observations: Gutters area:

1. Preliminary field observations of small scale farms of the St. Catherine Vegetable Marketing Association in the vicinity of Gutters is that most are located on the well drained, high pH, high phosphorus, high potassium Whim clay loam soil in the "young" alluvial valley of Coleburns Gully. The Whim soil is similar to the Caymanas soil (1984 Provisional St. Catherine Soil Map and 1958 Vernon Soil Survey map). This area is not within the currently planned project area.

2. South of the railroad track (Shady Park area) (abandoned irrigation viaduct area) the irrigation water hazard is "medium" according to the June 1985" Water Salinity Status" map, and the 1984 Soil Salinity Map.

 $\chi \psi'$

3. The clay soils in the vicinity of Amity Hall being considered for a large scale rice farm are:

a. moderately drained Lodge clay with saline subsoil.

b. moderately drained Salt Island clay, strongly saline and alkali through the soil profile. (1984 Provisional Soil map and 1984 soil salinity map). It is likely that saline tolerant rice varieties should be tested on these soils.

ANNEX SOILS APPENDIX

Selected statements from the 1958 Vernon "Soils and Land Use Survey of St. Catherine Parish, Jamaica," applicable to the project.

"Areas of recent alluvium in St. Catherine include as expected the most valuable soils of the parish. Soils of loamy or sandy texture occurring extensively include Caymanas Clay Loam and Sandy Loam. Caymanas Clay Loam and Samdy Loam occur on well drained recent alluvial soils on the recent flood plain of the Rio Cobre River. Of fair structure and high natural fertility these soils are extremely productive when irrigated. Main limitations to their use involve loss of structure under cultivation especially in the case of Caymanas Sandy Loam. Present uses are entirely sugar-cane, bananas and coconuts".

"Sydenham Clay is its near relative Sydenham Sandy Loam are soils of fair natural fertility developed over sandy old alluvium. Salinity occurs sporadically in the subsoil which is very impeded. Difficulty of cultivation and occurrence in a dry area restricts the potential uses of these soils. Present use includes sugar-cane, rice and pasture".

"A large group of soil types occurring on the plains display salinity to a variable extent. Churchpen Clay is a dark brown poorly drained saline clay occurring over gravelly old alluvium. It is a difficult soil to cultivate and although found on relatively flat relief, sheet erosion is active in dry unirrigated pastures. Springfield Clay, frequently associated with Churchpen Clay and also with Sydenham Clay, is developed as a very dark grey brown deep extremely poorly drained soil in depressions and drainageways of the old alluvium of the plains. Of very limited potentiality, Springfield Clay is at present under swampy pasture".

"Suggested Lines of Investigation and Research":

"The following suggestions for research are presented briefly, but previty is not intended to imply that minor emphasis only is

required in solving these problems. In fact it is imperative at the outset to appreciate that they represent a pivotal position around which an improved land use program must be orientated".

"Irrigation":

"The greatest opportunity for increased agricultural production in the near future in St. Catherine lies in the greater use of irrigation on the St. Catherine Plains. This can be achieved by irrigation of new areas and by more efficient use of irrigation water in present irrigation areas. Much good land on the plains is today almost unproductive due to lack of irrigation water. This is an intolerable situation in a land of dense population and severe unemployment like Jamaica".

"To increase the irrigated area on the plains two steps should, if at all possible, be taken:

i. Increase by all practicable means the amount of water available through the Rio Cobre Irrigation Scheme, and increase the area served by the Scheme.

ii. If an economically sound basis for the supply of water can be found, the proposed St. Dorothy Plains Irrigation Scheme should be started as soon as possible. This will permit intensive use of thousands of acres of land which at present are almost non-productive".

"The St. Catherine Plains - Recent Alluvia. These are areas of well-drained naturally fertile soils which irrigation makes into some of the most productive land in Jamaica. This is land eminently suitable for bananas and sugar-cane. Perhaps high yielding improved pastures, alfalfa or other legumes, and intensive growing of food crops can be expected here in the near future if these areas are to be intensively farmed. Rotational cropping will ensure high production and at the same time maintain fertility.

The St. Catherine Plains - Old Alluvia. On the heavy, poorly-drained, often saline soils of this flat area, the emphasis must be on three main crops, all irrigated - sugar-cane, rice and grass. Improved well managed pastures of high carrying capacity could well be introduced into rotations with rice. Fish-farming should have a part to play in the local economy if adequate quality water are available.

16

SOILS RECOMMENDATIONS:

1. Draft a detailed soil map from the 1:12,500 field sheets of the 1984 Soil Survey for the project area, particularly of the Caymanas soil area for Phase I development. This recommendation assumes that there is more detail on the 1:12,500 scale field sheets than on the 1:50,000 scale provisional soil map made available to the team. On August 23, 1985 Mr. Cameron, Head Soil Survey, Rural Physical Planning Division, Ministry of Agriculture, suggested that very little detail was omitted from the 1:50,000 scale map, especially for the sugar estates. But for detailed planning that detail may be important. An additional 1:10,000 soil map of the Bernard Lodge Estate is Fig. No. 5 in the 1980, "The Salinity Survey of Bernard Lodge Estate, St. Catherine, Jamaica".

2. Assemble any existing pertinent soil test result data that would confirm the current soil fertility status of the soils of the project area, especially the micro nutrient status data for zinc, sulfur, iron, manganese, boron and perhaps copper.

3: If no such soil test data as suggested in No. 2 above is available, then arrange to field sample and analyze sufficient soil samples to indicate current status.

4. No information was found concerning harmful nematode populations in the Caymanas soils nor of possible introduction of nematodes in the Rio Cobre River water used for irrigation. Such determinations are recommended.

5. Determine from the Underground Water Authority the implications on ground water availability and development as a result of the February 1969 declaration of the Rio Cobre Basin, i.e. St. Catherine as a "Critical Area" under the 1959 Underground Water Control Law.

6. Determine the amounts of (a) sodium and chloride (b) calcium, magnesium and potassium being introduced to soils irrigated with Rio Cobre River water on a per acre per foot of water basis. Such data can be computed from Sugar Research Institute reports for some alluvial wells, but not for all wells.

7. Determine the source of the "High Pollution Hazards" of the large area south of Spanish Town shown in the June 1985 "Quality of Irrigation Water" map contained in the Rural Physical Planning Division, May 1985 Report of the Ministry of Agriculture.

8. Determine from the Rice Research Division of the Ministry of Agriculture the status of rice variety research results, including responses to zinc, sulfur, iron, manganese and silica, under specified soil pH and water management conditions. Also determine (1) insect and disease problems of rice production on the south coast of Jamaica, (2) tolerance of rice varieties to salinity status of Sydenham and Churchpen clay soils and use of Rio Cobre River irrigation water of 400 to 500 EC micromho/cm on possible salinity build-up on those soils.

9. Some areas of Caymanas soils may have EC salinity values high enough to reduce yields of low salt tolerant vegetables such as beans and peppers.

a) Rural Physical Planning Division furnished a photocopy of manuscript of 1985 Soil Survey of St. Catherine Plains. Short decriptions of the soils and inclusion in the 1:50,000 mapping units and, general management from the text are recommended as a reference.

b) A short text of soils used by small scale farmers in the Gutters Bushy Park area and a copy of their 1984 report of their serious problems with lack of and interuptions of irrigation waters from Rio Cobre and deep wells is recommended as a reference.

- 10. Pending the compilation of accurate data suggested in these recommedations, it is recommended that a mixture of secondary and trace elements (zinc, sulfur, iron, manganese and perhaps boron) be added to the fertilizer applications in the project area.
- 11. Because of some salinity of the imperfectly drained Sydenham and Churchpen clay soils of Bernard Lodge Estate it is recommended that development of the essentially non-saline well drained Caymanas soils of the Caymanas Estate and eastern portion of the Bernard Lodge Estate receive first priority pending field trials of saline tolerant crop varieties on the Sydenham and Churchpen soils of the Bernard Lodge and Innswood Estates.

12g

REFERENCES USED - SOILS

- Vernon, K. C. and Jones, T. A. 1958, Soil and Land Use Surveys, No. 1, Jamaica, Parish of St. Catherine, Imperial College of Tropical Agriculture, Trinidad, B.W.I., 42 pp, maps, figures, tables.
- CRIES, 1982, Jamaica Resource Assessment, Rural Physical Planning Division, Ministry of Agriculture, Jamaica, Michigan State University, U.S. Department of Agriculture/Soil Conservation Service, Ohio State University, "Green Book", USAID, Washington, D.C. pp, figures, tables.
- Ministry of Agriculture, Rural Physical Planning Division, Jamaica, 1984, Draft Soil Map of the St. Catherine Coastal Plains, scale 1:50,000.
- Ministry of Agriculture, Rural Physical Planning Division, Jamaica, 1984, Draft Salinity Class Map of the St. Catherine Coastal Plains, scale 1:50,000.
- Ministry of Agriculture, Rural Physical Planning Division, Jamaica, 1985 - Quality of Irrigation Water, St. Catherine Plains, Map, scale 1:50,000.
- Hall, Maxwell, 1982 Rainfall of Jamaica, Special Publication of Institute of Jamaica No. 1, Kingston, Jamaica, 8 pages, 13 maps, (year and each month).
- Hall, Maxwell, 1923, Rainfall of Jamaica from about 1870 to end of 1919, 20 pages, tables, maps, Government Printing Office,

Kingston, Jamaica.

- Ministry of Agriculture, Rural Physical Planning Division, 1985 -Quality of Irrigation Water, St. Catherine and Clarendon Plains, Mulilith, 11 pages, tables, maps, Kingston, Jamaica.
- Sugar Industry Research Institute (Agricultural Division), 1980 -Salinity Survey of Bernard Lodge Sugar Estate, St. Catherine, mines, 28 pages with 16 tables, Kingston, Jamaica.
- National Oceanic and Atmospheric Administration, 1979 A study of the Caribbean Basin Draught/Food Production Problem: Final Report. University of Missouri, Columbia, Multilith.

State of Israel - August 1985. St. Catherine, St. Dorothy Plains.

Water Supply System Study, preliminary summary - Centre for International Agricultural Development Cooperation, Water Resources Division, USAID, Agro 21, Kingston, Jamaica, Mimeo, 19 pp, maps, tables, part 2, Improving Irrigation Methods and Use of Water on Farms for Crop Irrigation, 7pp, tabless.

- Ministry of Agriculture, Rural Physical Planning Division 1985-, St. Catherine Plains Irrigation Potentials mimeo, 3 pages, tables, Kingston, Jamaica.
- Little, Derek W. 1978-, Soil Salinity and Methods for Its control in the Irrigated Sugarcane Region of Jamaica. Ms thesis, Cornell University, Ithaca, New York, U.S.A., 90 pp, typewritten, tables, illustrations, 5 pages of bibliography references, many from Jamaica.
- UNDP/FAO, 1974 -, Development and Management of Water Resources of Rio Cobre River Watersheds, project No. AGL-DP/Jamaica/70/512.
- Agro 21, 1985 Proposed Development Part of Caymanas and Bernard Lodge, 6 pages with 5 appendixes, memeo.
 - <u>Appendix 1</u> Location of Soil Auger Borings and Profile Pits --- pp 8 - 21
 - <u>Appendix 2</u> An Irrigation Proposal for Bernard Lodge Half Way Tree --- pp 22 - 34
 - Appendix 3 Site Evaluation of Caymanas Vegetable by James Cauble of Ball Corporation, 1984 pp 35 - 60
 - Appendix 4 Ground Water Reports Caymanas and Bernhard Lodge by Water Resources Division pp 61 - 71
 - Appendix 5 Jamaica Well and Services Report Caymanas Vegetables -- pp 72 - 79 Kingston, Jamaica.
- Agro 21 1985 Maps of Proposed Caymanas Bernard Lodge Innswood Sugar Estates Development Proposals, Phase 1, 2, 3, Kingston, Jamiaca
- Tollennaar, P., 1984, Water Resources and Irrigation Requirements, South St. Catherine and Clarendon, Rural Physical Planning Division, Ministry of Agriculture, Hope, Kingston 6, Jamaica, multi. 45 pp, tables, diagrams.

- Natural Resources Conservation Department 1983, Rio Cobre Water Quality (an overview) Aquatic Resources Division, Water Quality Branch, Kingston, Jamaica, 5pp tables, mimeo. (comments on factory pollution of Rio Cobre at Bog Walk).
- Irrigation Water Situation Report No data, probably 1984, Lawson H. and McAvoy, G. Details conditions of irrigation St. Catherine Plains, St. Dorothy Plains, including National Water Commission operations of irrigation wells St. Dorothy's Plain are - particularly near gutters, and numerous interagency constraints - Ministry of Agriculture, Zenny, F. Director, MACD, Kingston, Jamaica, pages mimeo 9x14 plus 3 diagrams.
- U.S. Department of State, 1982 "Draft Environmental Profile on Jamaica. USAID, U.S. Men and the Biosphere Secretariat, Washington, D.C. approving 100 pages maps, diagrams, multilith.
- Tate & Lyle Technical Services May, 1985, Sugar Industrial. Rhodes, Irrigation - Appendix VIII, sheet 4 of 20 - Legal Considerations - Rio Cobre River Basin - St. Catherine declared a "critical area in February 1959 under the "Underground Water Control Law of 1959 - Jamaica" Underground Water Authority".
- Soil Survey Manual Agric. Handbook No. 18, reprinted 1982 (1957) U.S. Dept. of Agriculture.
- Keys to Soil Taxomony 1983, Soil Management Support Services Technical Monograph No. 6. - Chapter 10 - Mollisols, pp 169 - 201 (pp 189 - 191) - Chapter 14 Vertinals, pp 241 - 244 (pp 242 - 243).
- Agro 21 undated Involvement of the Small Farmer 4 page leaflet Kingston, Jamaica Conference Center, 14 - 20 Port Royal Street.
- Agro 21 undated Rice Growing 4 page leaflet Kingston, Jamaica Conference Center, 14 - 20 Port Royal Street.
- deKruyff, R. H. July 1985 two page letter to H. T. Ramdatt, Acting Permanent Secretary, Ministry of Agriculture, Jamaica: Subject: "Soil and Water Salinity Survey of the St. Catherine Plains".
- Robotham, H. C. 1952-, Jamaica: An Analysis of Food and Population Problems - Ms. Thesis, Cornell University, Ithaca, N.Y., U.S.A. 152 pp, typewritten, maps, tables, graphs, excellent bibliography.

3

- Palmer, R. W. 1968 The Jamaican Economy, F. A. Praeger, Publishers, New York, 111 Fourth Avenue, 10003, U.S.A. 183 pp multilith, tables, long bibliography. Chapter 3 is on the Agricultural sector pp 42 - 61.
- deWitt, H. A. undated (probably 1985?) Preliminary Results of a Salinity Survey Carried out in the St. Catherine Plains. Mimeo report by soil correlator, National Soil Survey Project, Jamaica, Rural Physical Planning Division, Ministry of Agriculture, Kingston, Jamaica, 4 to pages, mimoegraphed text to accompany the 1984 Soil Salinity Map scale 1:50,000.

NP-

 $\sqrt{2}$

B.3 IRRIGATION WATER

Introduction: Irrigated lands produce a far greater proportion of the world's food supply because their yields are about twice that of non-irrigated lands. When the farmer controls the quantity of water and its timeliness for irrigating to suit his needs, he can plan with assurance his other operations that will lead to increased crop production. The farmer can produce more on irrigated land by utilizing higher yielding varieties of seeds, increased plant populations, and increased inputs such as fertilizers and pesticides with far less risk than traditional farming.

Sources: Sources of water for the St. Catherine plain and surrounding areas include seasonal rainfall, groundwater stored in the aquifer, and the Rio Cobre. The Rio Cobre is supplied by groundwater and runoff in the Rio Cobre Basin which has a watershed area of about 1283 km² (495 square miles), and an annual rainfall rate of about 193 cm. (67 inches per year). Groundwater, contributes greatly to the river flow, as much as 60% in some periods.

The Rio Cobre produces some 343 million metres³/year of water during a mean year and some 226 million metres³/year in a dry year of which 172 million metres³/year is diverted to the irrigation canal, to meet only in part an irrigation water demand of 202 million metres³/year (mean year) or 259 million metres³/year (dry year).

The remainder of the water required for irrigation not supplied by the Rio Cobre is to be supplied by wells and the proposed Rio Cobre Pumping Station. With full refurbishing of the canal and the new pumping station, the canal system can then provide 23,000 cubic metres/hour (225 cfs) leaving only a deficit of water required for irrigation for January through April and from June through July (mean year) that must be made up from the wells. In a dry year there is a deficit for irrigation water supplied by the irrigation canal for January through September. The length of the above periods may change depending upon the type of irrigation practiced and the demand for irrigation water.

Theoretically, from 23,226 acres to 24,235 acres can be irrigated depending on cropping patterns from revitilized canals and wells in an average year (28 in. of rain); and in a dry year (12 to 15 in. of rain) 19,045 to 19,972 acres. This includes anticipated losses plus a leaching factor of 10%. Increasing the irrigation efficiencies and minimizing losses would enhance these figures considerably, perhaps as much as 40% to 50%. Use of sprinkler or drip irrigation would also add to more total acreage.

Estimated Existing Water Resources $\frac{1}{2}$

1.	Existing canal's capacity -	137 cfs.
2.	Planned canal's capacity -	225 cfs.
3.	Estimated wells yield -	179 cfs.
4.	Rio Cobre Dry Year - April (Planned) <u>2</u> / - July - Dec.	176 cfs. 225 cfs. 225 cfs.

1/ Israeli Report, 1985 (Page 23) 2/ Maximum capacity in planned canal.

<u>Conclusion</u>: There is sufficient low saline water of good quality to irrigate some 20,000 acres, with the present irrigation system refurbished and updated, with water from the Rio Cobre conveyed by the renewed irrigation canal and water from local wells, plus the new Rio Cobre pumping station.

B.4 IRRIGATION SYSTEM

Introduction: Restoring the canal system to its designed capacity providing lower cost gravity flow irrigation water will be given the highest priority. Data concerning soil and water resources in the St. Catherine Plain supports the potential for irrigation development to reduce farming risks and to increase productivity. Irrigated farmland development paves the way for employment generation and private farmer investment, both vital for the area.

Because of inadequate attention for many years, the Rio Cobre Irrigation System has been steadily deteriorating, causing a serious reduction in the supply of irrigation water in the canal system. The irrigation canals are in very poor condition because of siltation, bank erosion and vegetative growth. The main Rio Cobre Reservoir has a high siltation problem. The reservoir sluice gate and the main canal headgate are not functioning properly; these must be restored to operable condition. The main canal requires major updating and revamping, and must have an obstruction removed at Spanish Town, to attain levels of service that were previously available.

Data concerning soil and water resources in the St. Catherine Plain support the potential for irrigation development to reduce farming risks and increase productivity.

Shortage of water is the major reason given by well over 1,000 growers in the area as to why they are not now producing food crops. There is very little confidence among the growers, even if assured of water in adequate amounts, that they will have a reliable supply for the complete crop season. This is based on their previously poor experiences which resulted in crop failures because of a sudden cut-off of water supplies during the growing season; a production input which is beyond their control. A reliable source of irrigation water needs to be established and maintained to bring these growers back into production.

 $\langle \eta \rangle$

136

List of Canals

Rio Cobre Irrigation Works

Canal	feet	miles	Lined/Unlined
Main Canal	30,900	5.8	Unlined
Cumberland Pen	9,500	2.0	Generally Unlined
Cottage Pen	2,256	0.43	Generally Unlined
Lawrencefield	5,503	1.04	Unlined
March Pen	2,346	0.44	Generally Unlined
Port Henderson	16,000	3.03	Generally Unlined
Turners Pen	11,169	2.1	Generally Unlined
Caymanas	16,793	3.2	Partially Lined
Old Harbour	27,984	5.3	Partially Lined
Sydenham	12,000	2.27	Generally Unlined
Hartlands	11,687	2.2	Generally Unlined
Mango Walk	6,000	1.14	Lined
Grange Lane	2,000	0.38	Generally Unlined
		29.33 miles	

The infrastructure component of the proposed project involves the rehalibitation and upgrading of an old existing system to restore it to its original design capacity and operation potential in addition to augmenting such system with some new wells and a pump station downstream of the Rio Cobre diversion dam. The rehabilitation and upgrading work proposed includes nine subprojects and some common infrastructure listed below in order of their priority. Engineering planning for the first four subprojects and Common Infrastructure (1) (Phase 1) has been completed and cost estimates prepared in compliance with Section 6II (a) 1 of the Foreign Assistance Act. These projects will therefore be funded under the first obligation of funds. Additional infrastructure work (Phase 2), for which engineering planning is incomplete, is contemplated for subsequent obligations following completion of the necessary engineering planning.
Item	Acres	Cumulative Acres	Cost	Cumulative (J\$ M)	e Cumulative (US\$M*)
A. B. C. D. COMMOM	1,000 1,000 400 2,000 (1)	1,000 2,000 2,400 4,400	3.739 4.425 3.387 5.600 4.500	3.739 8.164 11.551 17.151 21.651	0.545 1.408 1.992 2.957 3.733
	Coi	npletion of Pha	se l (lYe	ear)	
COMMON E. F. G. COMMON H. I.	<pre>(2) 2,000 1,000 2,000 (3) 2,000 2,000</pre>	6,400 7,400 9,400 11,400 13,400	1.700 5.700 4.000 2.200 4.950 6.200 7.600	23.351 29.051 33.051 35.251 40.201 46.401 54.001	4.026 5.009 5.698 6.078 6.931 8.000 9.311
* US\$1.0 The subp A. 1000 Infra	Cor 00 = J\$5.80 rojects are out] acres vegetable astructure requi	npletion of Pha Lined in more d es - Bernard Lo irements	ise 2 (2¥6 etail as odge	follows:	
1.	Rehabilitation	and equiping c	of four of	ld wells.	
	-Cookson 3 -Half Way Tree -Half Way Tree -Half Way Tree	600 4 600 5 600 6 350	g b w d b w d b w	\$ \$ 1 \$ \$ 1 \$ \$ 1 \$ \$	L58,000 L60,435 L55,768 L48,594 522,797
2.	Drilling and ed	quiping of four	replacen	ment wells.	
	-Newlands l -Newlands 2 -Half Way Tree -Cookson 4	500 700 2 600 700	дБш дБш дБш дБш	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	202,529 209,059 206,076 209,059 326,723
3.	Extension of el Cost \$121,900	lectrical suppl	y 3/4 mi]	Le \$]	.21,900

137

4.	Reconstruction of Cumberland Pen Canal - capacity 7000 cubic years per hour. Canal is made of rubble stones and concrete bottom. Length of canal 230 chains Cost of canal	d	000 000
		\$1	.,000,000
5.	Pumping Station on canal 100 H.P. Station cost	\$	168,000
6.	Fencing - 6 feet high fence made out of hog wire and barbed wire to keep our small and large stock.	\$	200,000
7.	Road and drainage Repair to on farm road and drainage system	\$	300,000
8.	Extension of underground pipe replacement of 60 hydrants	\$ <u>5</u> \$3	<u>,000,000</u> ,739,431
1000	acres vegetable - Watson Grove/Cedar Grove,	Cav	manas
1	Republication and oppining of a state the	#	······
1.	- South Syndicate gpm - Cedar Grove I gpm	\$ \$	160,000 170,000
2.	Drilling and equiping of four replacement we - Salt Pond - Watson Grove - Belmore I - Belmore II	11s \$ \$ \$ \$	203,000 208,000 207,000 209,000
3. 4.	Pumping Station on canal Installation of new electrical power lines to wells by Jamaica Public Service	\$1 \$ \$,157,000 168,000 300,000
5. 6. 7. 8.	Underground piping and hydrants Fencing as above Rio Cobre - Lawrence Field Canal Road and drainage rehabilitation Total 1 - 8	\$1 \$ \$1 \$ <u>4</u> \$ <u>4</u>	,200,000 100,000 ,100,000 ,000,000 ,425,000

в.

sugar. Overhead sprinkler or drip irrigation recommended.

Annex 2	
B. TECHNICAL	ANALYSES
Page 25	

с.	400	Acres Ornamental Horticulture		
	1.	Equiping and utilization of one		
		old well	\$ 1	60,000
	2.	Drilling and equiping of 3		
		replacement wells	\$6	27,000
	3.	Underground piping and hydrants	\$1.,2	00,000
	4.	Installation of new electrical		·
		power lines to service wells	\$2	00,000
	5.	Fencing using hog and barbed wire		·
		to keep out small and large stock	\$2	00,000
	6.	Road and drainage rehabilitation	\$1,0	00,000
		Total 1 - 6	\$3,3	87,000
D.	2000	grains Bernard Lodge		
	Turn	ers Pen canal	\$1,5	00,000
	Port	Henderson canal	\$2,0	00,000
	La C	aridad/Hill Run canal	\$1,3	00,000
	Road	& Drainage	\$ 6	00,000
	Fenc	ing	\$2,0	00,000
		-	\$5,6	00,000
COM	MON I	NFRASTRUCTURE (1)		
1)	Pump	ing Station Located on the banks of the Ric) Cobre	at a nodal

point to serve three main branches -1. Caymanas 1500 Acs. ----Cumberland Pen 2. 3500 Acs. ----3. Port Henderson 2000 Acs. 6000 Acs. Canal System permeate 6000 acres of land that can be served by gravity. Discharge of the pumps will be 6000 cubic yards per hour at capacity. Pump Station as designed by Gentech to be protected against high flood waters. Cost of civil works \$ 750,000 Pumps and pipes \$1,050,000 Cost of pumping station \$1,800,000 2) Cleaning of weeds in canal. Canal is infesced with the Canadian Pond Weed that causes blockage, reduce velocity and results in low discharge from the canal. Sections of the canal has also silted up. Cost of doing the above \$1,900,000 3) Repair to canal bridge and gate. Many of the canal bridges and gates have deteriorated and these are in need of repair. The canal is crossed by seven bridges. Cost of this work is \$ 300,000

4) Removal of blockage in Main Canal. Near the first bifurcation of the canal at the take-off for the water works reservoir. The canal is blocked using re-inforce concrete - size approximately 4 feet high by 12 feet wide. This causes the water level in the canal to rise and supply water to the reservoir. With the removal of the blockage canal, capacity will be increased by approximately 33%. Cost of doing this job is \$ 500,000

COMMON INFRASTRUCTURE (2)

- 1) Main River Deweeding and Clearing. The Rio Cobre River above the dam has silted and is heavily infested with weeds both Canadium Pond Weed as well as water hyacinth. The depth of water behind the dam averages about four feet. Removal of weeds and desilting would imporve the velocity of flow as well as water storage potential of the dam. Cost of this job is \$1,600,000
- 2) Repair to flushing gate on dam. There are two flushing gates on the dam that have not been opened for over 15 years. The purpose of these gates is to keep the entrance gate to the canal clear of silt. These entrance gates are partially blocked with silt. The re-opening of these gates will alleviate the problem. Cost of this job is
- E. Bernard Lodge 2,000 acres Vegetables

1.	15 wells	\$3,000,000
2.	Rio Cobre Government Park/	,
	Phoenix Park channels	\$ 600,000
3.	Electrical supplies	\$ 30,000
4.	Drainage	• • • • • • • • •
	Main	\$ 100,000
	Secondary	\$ 800,000
5.	Road	,,
	Property	\$ 200,000
	Internal	\$ 100.000
6.	Fencing	\$ 200,000
7.	Piping	\$ 400,000
		\$5,700,000

			Annex 2 B. TECHI Page 27	NICAL	ANA	LYSES
F.	$\frac{1,00}{1}$	<u>0 acres Caymanas vegetable</u> 5 wells		\$1,2	00.00	00
	2. 3. 4.	Rio Cobre Caymanas, Ferry Electrical supplies Drainage		\$1,3 \$2	00,00)0)0
	-	Main Secondary		\$ 1 \$ 2	00,00 00,00) ()) ()
	5.	Road Property Internal		\$ 3 \$ 1	00,00	00
	6. 7.	Fencing Piping	-	\$ 2 \$ 4 \$ 4	00,00 00,00 00,00	
G.	2,00 Rio	0 grains Bernard Lodge Cobre				
	1. 2. 3.	Rhodens Pen 3 miles Salt Pond Hut 5 miles Road		\$1,00 \$ 10	00,00 00,00) ()) ()
	4	Property Internal		\$20 \$10	00,00 00,00) ()) ()
	4.	Main Secondary		\$ 10 \$ 10	00,00 00,00	00
	5. 6.	Fencing Piping	_	\$ 20 \$ 40 \$2,20	00,00 00,00 00,00	00 00 00
COM	MON II	NFRASTRUCTURE (3)				
	Desi 3/4 1 = 13	lting River mile long 25 yards wide x 3 yards deep 2,000 yards @ 50]er cubic yard =	•	\$4,99	50,00	0
Η.	2,00 Rio (0 acres vegetable Caymanas Cobre				
	1. 2. 3. 4. 5.	Caymanas sub-branches Caymanas branch 4 wells Fencing 5 miles @ 71,000/mile Electrical supplies Drainage		\$ 60 \$1,90 \$ 70 \$ 40 \$ 30)0,00)0,00)0,00)0,00	
	7.	Main Secondary Road		\$30 \$20)0,00)0,00	0000
	8.	Property Road Internal Piping		\$ 40 \$ 20 \$1,20 \$6,20)0,00)0,00)0,00	

 $'q_i$

I. Bernard Lodge 2,000 vegetables

1.	7 wells	\$1,700,000
2.	Rio Cobre, Sydneham Channel	
	5 miles	\$1,600,000
3.	March Pen channel 7 miles	\$2,200,000
4.	Electrical supplies	\$ 300,000
5.	Drainage	4 3007000
	Main	\$ 200.000
	Secondary	\$ 300,000
6.	Road	4 3037000
	Property	\$ 300,000
	Internal	\$ 200,000
7.	Fencing	\$ 200,000
8.	Piping	\$ 500,000
		\$7,600,000
		\$7,600,000

<u>Wells</u>: Because of insufficient irrigation water from the Rio Cobre Trrigation System caused by deterioration of the canal system, several wells were drilled more than 20 years ago to provide additional water to replace the reduced of water in the system. Presently, because of age, misuse and other reasons, the majority of the wells are out of service or pumping at extremely low rates. To meet the requirements for irrigation water existing wells must be reactivated if feasible and new wells must be drilled, to produce water in a reasonable amount at or near full capacity. Both the wells and a renovated irrigation system are needed to meet irrigation water requirements in the project area and for nearby private growers.

It should be noted that the quality of the water from the wells is subject to medium to high salinity hazard due to possible salt intrusion when overpumping occurs, especially in dry years and seasonal high demand periods for water.

<u>Pumping Station</u>: A 6,000 cubic/yard/hour (45 cfs) pumping station will be installed near the Spanish Town bypass along the Port Henderson road. At this point, the river and the canal system come close together. Two electric pumps and two diesel pumps are proposed. It will require about 600 feet of piping and a pumping station and modification to the existing canals.

The pumping station will be working at full capacity about 6 months of the year. Of the total volume of water pumped, 2,000 cubic yards (15 cfs) will be discharged into the Caymanas Branch Canal and 4,000 cubic yards (30 cfs) into the Cumberland/Lawrencefield Branch Canal.

The irrigation water pumped at this location may be at hazard due to sewage treatment effluent and industrial waste, because it is proposed to be located directly below Spanish Town. A large part of the irrigation water is destined to be used on fresh vegetables.

Type of Irrigation: The type of irrigation to be utilized for each farm will be the independent decision of each farmer leasing the land. However, the project should plan for or aim for a certain type of irrigation in each general area. First depending upon the type of irrigation selected the amount of land leveling required varies with the type of irrigation to be used. Sprinkler and drip irrigation requiring no land leveling except for taking care of areas with depressions. Furrow irrigation and level basin irrigation requiring a maximum amount of either land grading or land leveling depending upon the type of irrigation selected.

Sprinkler irrigation would be suitable for the phase 1 project area because of lighter soils and slightly irregular topography. Sprinkler irrigation is usually more costly then surface irrigation. This type of irrigation, subject to reduced application efficiency by wind action, could be used from 16 to 18 hours per day to avoid the windy hours of 10 a.m. to 4 p.m. during windy periods. There may be some problems with fungi and disease with sprinkler systems depending upon management techniques utilized.

Another type of irrigation, drip irrigation is best suited for high value crops such as orchards, vineyards and vegetables; requires only 1/3 to 1/2 as much water as other systems, can provide excellent distribution of water over a wide range of soil type and acreages, and can irrigate irregular topography. Clogging or plugging of emitters caused by physical, chemical or biological contaminants is considered to be the largest maintenance problem with drip systems. The most serious problem with emitter clogging is that severe or permanent crop damage may occur before the clogging is detected. Naturally, this can be prevented by careful High pH water gives emitters serious problems. In inspection. addition, rodents can damage emitters. Fewer salinity problems are encountered with drip type irrigation if the operating instructions are closely followed. Also fewer problems are encountered with fungi and disease on foliage and fruit. Use of drip irrigation for phase 1 of the project is considered marginal if high pH water is used, unless in-line high-turbulent emitters are utilized. Filtered Rio Cobre water is probably satisfactory for most drip systems.

Surface irrigation, furrow or level basin, is considered to be the lowest cost type of irrigation using gravity flow water. Maintenance costs are also lower. Salinity problems are usually less. However, a leaching factor of 10% should be included. This system does require extensive land grading or land leveling, which is a one-time operation. The surface type of irrigation is recommended for use in the proposed rice-growing areas of the project. The water conserving level basin type of irrigation, depending on the height of the bunds or levees, will retain all the natural rainfall without run-off, reducing irrigation water requirements for the area, an important consideration in a water short area.

17

Phase 1, 2 and 3 are presently aimed at growing winter vegetables utilizing sprinkler irrigation provided by pump water from wells (electric powered) in the areas east and south of Spanish Town. For the areas south and west of Spanish Town designated for growing rice, which will be utilizing surface type irrigation water from the Rio Cobre, a decision must be made on the amount of land leveling and drainage that is required based on detailed surveys and topographic maps of the area. This same area will also have some pumped water from wells.

The project area has a gentle slope of 1-2%. However, there are several depressions located in the phase 1 and phase 2 areas. These depressions must be either filled or properly drained to avoid the potential for crop waterlogging. Also, the amount of land leveling required is related to the type of irrigation used. If sprinkler irrigation is utilized little or no land leveling will be required, while furrow or level basin type irrigation will require precise and high amounts of land leveling.

The soils in the phase 1 and phase 2 project areas drain well requiring only upgrading and maintenance of existing drains. New drains must be constructed for any new road construction in the area. Building a proper drainage system is required for the remaining areas.

In addition, the soils in the project area may be subject to a salinity build-up problem. The Rio Cobre river water contains 400 to 500 mm hos/cm salinity from the limestone upland watershed, and the alluvial wells have 300+ EC mm hos/cm salinity. Salinity in the soils may accummulate reducing crop yeilds unless sufficient water in excess of crop needs is applied. In the project area water should be applied by at least 10% in excess as a leaching factor to prevent a possible salinity problem.

Land leveling requirement for surface irrigation may involve the movement of earth of 2 to 50 cubic yards per acre to permit a more even distribution of water over larger fields. Yields should increase, as even distribution will reduce the water required, increase the use efficiency of water and equipment, and reduce weed problems. Precise amounts of earth to move to achieve proper leveling should be determined from topographic maps and surveys.

Management: However, restoring the canal system to 1964 levels only is not sufficient to meet the needs of the farmers involved. There is an urgent need for proper management of the irrigation system and the provision for policing and providing security for the system. A farmer organized water users association is suggested to have a voice in the system, whereby complaints about overdrawing head area water to the detriment of tail area users could be handled at this level, and to provide an input to police the system for the welfare of all the water users.

14

The Water Authority under the Ministry of Agriculture holding responsibility for managing the Rio Cobre Irrigation System requires technical assistance to enhance their expertise to interface with the water user association and to properly manage the multiplicity of water problems they face daily. Technical assistance is also needed to monitor the irrigation system and to provide a management plan to more efficiently use the irrigation water in a water short area. Provisions for the even distribution of water must be made for the mutual benefit of all farmers. Improving the system's water use efficiency from 40% to 50% will significantly increase available water throughout the system. Also, it would help ensure there was enough water available to always include at least 10% extra water as a leaching factor to prevent salt build-up in the soil and its accompanying deteriorating effect on crop yields. Unless the above problems are addressed the system will gradually decline to the present low state of affairs.

Technical assistance for the maintenance and operation of the canal system is very important for the on-going success of the system. Technical assistance providing actual maintenance services and training, and with improving operational services should be provided.

The irrigation system, through improper management, has a very low efficiency rating and is wasteful. This can be monitored and corrected by having a built-in method, in the canal system, to provide at each turnout for the measurement of water flow rates on a volume basis. For encouraging the conservation of water farmers should pay only for the water they use to meet their irrigation water demands.

A security fence surrounding the farms to be leased is a necessity to minimize trespassing problems. This is because the land is located close to a residential area with animals and people possibly trespassing onto the property frequently. This will conform to local customs concerning providing fencing to prevent free roaming domestic livestock (cattle and goats) from trespassing.

A further suggestion is that guards be hired to patrol the canal system to provide security, and for the purpose of reporting any damage caused by man, animals or storms to the system for their proper repair and maintenance. The repairs should be carried out promptly.

Water Resources and Irrigation Requirements, South St. Catherine and Clarendon by P.T. Tollenaar - Rural Physical Planning Div. (April 1984)

<u>Conclusion</u>: Irrigation water sources and conveyance renovation must proceed as rapidly as possible to provide the realiability of the supply of good quality irrigation water for the use of St. Catherine farmers in the Crop Diversification/Irrigation Project area. Clearly the benefits of this program will be a great asset to Jamaica and to the individual farmers and laborers involved.

The fulfillment of providing adequate irrigation water is a vital step forward and must take place before any expansion in agricultural production can be contemplated. Certainly water is the key element for realizing a successful program for St. Catherine Plains agriculture.

B.5 INFRASTRUCTURE REHABILITATION PROCESS

Rationale: This project activity is viewed as one of the most important activities in providing investors incentives to develop the St. Catherine Plains area. Much of the unutilized lands in the region has been tied up in government owned and operated sugar cane estates as these marginal sugar lands have been taken out of production because of low or negative returns to resources and infrastructure has been allowed to deteriorate. Consequently, investors are not sure what it would take to bring the lands back into cultivation as part of the Crop Diversification Program. This project activity provides technical assistance in determining the off-site and some specific on-site costs to bring these lands back into cultivation.

This project activity also provides some sources of funds to finance off-site and some specific on-site development costs. Project funds are used to finance such costs and revenue from water charges is to be used to recover such costs. Other off-site costs such as road improvements and electricity are financed with project funds and are recovered through service charges or additional land rents.

Certain specific on-site development costs are also financed from project funds in support of Agro 21's overall effort to attract investors. Rehabilitation of irrigation wells, major on-farm irrigation delivery systems (canals and pipes) and land leveling are examples of specific on-site development costs that can be financed from project funds if justified for the investor. Specific on-site costs are recovered from the land rent add-ons.

(1) Phased Development of Off-site Infrastructure Development: Much of the Caymanas water delivery system has been allowed to deteriorate. The technical analysis shows the proposed phased development of the system in terms of how water is to be supplied to bring back into production the next unit of land. The proposed phased development is preliminary at this time and additional technical information will be developed as engineering planning is completed. However, the first 4,400 acres of land to be rehabilitated has been identified and the off-site or common costs of development determined.

The off-site costs associated with land development such as improved access road and electricity are financed by the project and the costs are recovered either through service charges as in the case of electricity or through capitalized add-ons to land rent. The procedural steps for implementing off-site infrastructure projects are a combination of the following:

a. Project identification - the first off-site infrastructure projects have already been identified by Agro 21 and are identified in the section above. Additional projects will be identified as engineering plans are developed.

b. Engineering study - Agro 21 will complete the engineering study in-house or will contract for study completion.

c. Economic evaluation - Agro 21 will complete the economic evaluation on feasibility of the project based on engineering cost estimates and the estimated marginal value product of water supplied.

d. Construction bids - local cost financing procedures will be used to obtain construction bids.

e. AID approval - if USAID is requested to finance the off-site infrastructure, plan is submitted to USAID for the approval.

f. Contracting - local cost financing procedures will be used to contract for construction of off-site infrastructure projects.

g. Project construction - once contracting has been completed, monitoring and supervising of project construction carried out by Agro 21.

It is not anticipated that this project will finance all off-site land and water infrastructure projects. Agro 21 will obtain additional funding from other sources to develop a major part of the whole area. However, this project is used to start the process of rehabilitating canals and improving the water delivery systems.

(2) <u>Investor (market)</u> Driven On-site Infrastructure Project <u>Development</u>: The demand for land drives the on-site infrastructure development component. This is the essence of the investor (market) driven model. On-site infrastructure development is only for purposes of stimulating the demand for land in the Caymanas region. A potential investor approaches Agro 21 with a need for land that correlates well with the resource structure at Caymanas. However, certain on-site infrastructure development is necessary before the investor is willing to commit. Financing of these on-site infrastructure costs can be met from project funds if required by the investor.

The procedural steps for implementing this strategy are a combination of the following:

142

a. Proposal solicitation - this proposal contains the farm plan plus any requests the investor may have for on-site infrastructure development.

b. Proposal review - criteria developed by Agro 21 is used to select and/or prioritize proposals.

c. Engineering study - if on-site infrastructure is requested, Agro 21 either completes the engineering study internally or contracts for study completion.

d. Economic evaluation - if on-site infrastructure is required, Agro 21 completes subproject feasibility based on the farm plan and the engineering study.

e. Construction bids - local cost financing procedures will be used to solicit construction bids for on-site infrastructure development based on the engineering plan.

f. AID approval - if USAID is requested to fund the on-site infrastructure development costs, the plan is submitted to USAID for approval.

g. Lease agreement negotiated - Agro 21 negotiates the lease agreement with the investor based upon land rent and on-site infrastructure development.

h. On-site infrastructure construction - once the contractor has been selected, AID approval obtained, and the lease agreement negotiated, construction of on-site infrastructure is commenced and completed.

i. Production start-up - Agro 21 turns the land over to the investor to start production.

Although the procedural steps appear onerous, in reality the system should work in an expeditious manner. The system is investor driven but removes much of the uncertainty investors have concerning actual costs of putting the land back into production.

 u_{i}

B.6 SMALL SCALE FARMERS

Historically the structure of Jamaican agriculture has been divided between export oriented plantation-based sugar cane production and domestically oriented small-scale farmers producing food crops and small herds of livestock. These farmers also produce some selected export crops such as bananas but their participation in the export market has been generally considered secondary to larger primary producers and declining.

Small farmers are critical to domestic production. The domestic agricultural sector contributes more to the GDP than the export sector. During the last year, the domestic sector has continued to grow, showing an increase in volume of 22.8% and 32% increase in terms of current prices over 1983.

The approach of Agro 21 has, up to now, concentrated on large-scale commercial farming and this project represents the first attempt at incorporating small and medium-sized farmers into the export of non-traditional crops. The strategy for addressing small farmer involvement is being cautiously developed and tested, bearing in mind the social and technological constraints inherent in the small farm sector.

Definition

An investigation of the small-scale farmer sector quickly uncovers a series of problems related to definition, type of operations and relations to markets. The definition of a small-scale farmer depends on the source consulted. For example, a small-scale farmer is variously described as producers owning about 2.5 acres of land (Bushy Park), holding less than 10 acres (by private consultants such as Agribusiness Associates Inc.), or less than 25 acres (by the Mininstry of Agriculture). A further refinement exists in terms of credit; farmers with less than J\$80,000 investment are considered small and apply for credit through the Peoples Commercial Bank. Those with investments over J\$80,000 must seek credit through commercial banks.

The definition of a farmer is further clouded by the Farmer's Register, 1982, of the Ministry of Agriculture. According to it, the farmer may be a single individual, government agency, private company or any such corporation or institution (Farmer's Register, 1985:2). There is no size limit in defining a farm either, except that it must contain at least one of the following: 1 square chain of cultivation, 12 economic trees (e.g. citrus, mangoes, breadfruit), 1 head of cattle, 2 head of pigs, goats or sheep, 1 dozen poultry (including ducks, turkeys etc.), 6 bee hives or 1 dozen rabbits (Farmer's Register, 1985:3). Such confusion in definition of farms and farmers hampers distinguishing among

individual producers, private companies or public institutions or among farm units. Such distinctions become increasingly important as the government encourages private joint venture companies to engage in agriculture, and as the need increases to document the profitability and success of various farming enterprises.

Variation in Type of Small-Scale Farmer Operations

In addition to a variety of institutions as well as individuals being given farmer status, the small-scale farmer category tends to mask significant levels of participation of producers as well. Distinctions can be made among at least three types of small-scale farmers.

1. Full time farmers dependent on farm income as their main source of earnings. These generally represent farms of 5 to 50 acres.

2. Small holders dependent on off farm income earned through seasonal agricultural wage labour, nonagricultural employment (often also seasonal), small-scale trading activity of female family members (higglers) and a significant number of retired or semi-retired people.

3. The part time farmer who enjoys professional, technical or civil service status. These individuals tend to produce export oriented specialty crops such as vegetables, or ornamentals such as anthuriums and leather leaf fern (Agro 21).

This variation in type of farmer suggests significant differences in levels of investment, capital needs, mechanization and technology. Such variation also suggests quite different production patterns and marketing relations. Poorer part-time farmers may produce only to meet household requirements with little linkage to formal markets. Full time small-scale farme: are likely to produce for the domestic as well as selected export markets, and private investors, as mentioned, are likely to concentrate production for export. Each type has different needs and require different kinds and amounts of inputs, services and technology.

Small-Scale Farmer Profile

Size of Holding: As already noted the exact delineation of the small holder is somewhat clouded. If one relies on the available statistics, one finds that the agricultural sector is generally categorized by size of holding. Depending on the definition being used, small-scale farmers owning less than 10 acres represent 93 percent of all farmers and 36 percent of farm acreage. However, 33 percent of the total have less than 1 acre and would not represent farmers as is normally accepted. Extending the category to those

owning less than 25 acres adds an additional 6 percent of the farmers and another 15 percent of available acreage. This includes, in effect, 99 percent of all farmers and 51 percent of farm holdings. Clearly the problems of generalizing to the entire sector are only too apparent, particularly in regard to program design and implementation. The issue for the Agro 21 small-scale farmer program is determining the extent to which distinctions among types of farmers are important in overall program development.

<u>Geographic Location</u>: The general dispersal of farming operations appears to be that many producers farming less than 10 acres tend to be located in the hills, while the lowlands are the site for plantations and holdings above 10 acres. In the area of St. Catherine this delineation appears accurate as the plains are the location of the Government owned Caymanas, Bernard Lodge and Innswood estates which are the focus of this land diversification scheme. Small holdings are noted on the hillsides bordering the plains, and to the southwest in the Bushy Park area.

<u>Cropping and Labor Patterns</u>: According to Gardner (1982) most food for local consumption is grown in the hills, which suggests a salient role for the farmer holding less than 10 acres. Some export crops are also grown in the hills; however, hillside production involves farming marginal land, and encompasses a number of production constraints related to potential mechanization, productivity, technology, water and credit.

Small Farmers in the Project Area: The only area in which concentrated small farming occurs is Bushy Park, where there is an estimated 2,000 farmers. The main small farming activities take place in the uplands of St. Catherine 15 - 20 miles from the project area, and are not easily administered from the plains.

The main constraints of farmers in Bushy Park are water, markets and production in-puts. Other problems are labor, and praedial larceny. The CAPEVA (St. Catherine Vegetable Growers Assocation), a producer marketing organization under the Ministry of Agriculture's Agricultural Marketing Project has had to address the common problems of markets and inputs in order to stimulate production. The farmers continue to experience losses from lack of water and praedial larceny. Labor supply is also a constraint, and farmers report difficulties in supervision. The CAPEVA model provides for a cooperative structure with two full time technical assistants to service 75 - 100 farmers (1 - 10 acre plots). This association primarily stresses the marketing objectives of farmers and has proven to be successful in meeting some of the farmers' needs.

The direct benefits to small farmers from this project will be improved infrastructure and access to water. General rehabilitation of the main canal upstream of the first bifurcation will have

beneficial results for all of the system's users. In addition, funding will be provided to upgrade the Rio Cobre Irrigation Works capability to maintain and operate the entire system. In the long term, the Small Farm Linkage Program has significant benefits provided that its addresses the constraints i.e. technology transfer, access to credit, geographic proximity to a large commerical farm, and an equitable relationship between the small farm and the large commercial enterprise.

The design of the Small Farm Linkage Sub-project calls for technical expertise to provide generalized support and management arrangements within Agro 21, such that activities can be developed and tailored to the specific opportunities as they arise. While the Mother-Farm concept is under consideration, other approacnes are also being explored e.g. contract-growing. Small farm production models are being developed by Agro 21 staff and credit arrangements are being designed.

The continued development of the framework of this approach is the primary objective of this project. The issues which must be addressed are as follows:

- The extent to which technology transfer between Mother-Farm and satellites occur will determine the product quality and volumes. Small farmers are constrained by educational level, labor and know-how, as well as access to credit and in-puts. There is now only rudimentary use of pesticides and fertilizer among small farmers.
- How the relationship between the large commercial farm and the small farmers is defined, established and developed will determine farmer's willingness to participate
- 3. The locus of institutional responsibility for ensuring small farmer involvement must be identified. Bearing in mind that there is no obligation on the part of commerical farms to foster an outreach program, and giving regard to the small farmers's dependence on government agencies, it will be necessary for Agro 21 to define its role viz a viz other agencies and viz a viz foreign investors.
- 4. The identification of sufficient numbers of farmers, in geographical proximity to large farms (so that they can benefit from infrastructure, water resources, storage facilties, etc) will be an important task of this project.

This project will therefore concentrate on devising and testing an appropriate strategy for incorporating small farmers into commercial agriculture.

 $\sqrt{\frac{1}{2}}$

B.7 MARKETS

Some Factors Affecting

Fresh Fruit and Vegetable Exports

from Central America and the Western Caribbean

Prepared by don Braden, PhD Agronomic Advisor USAID/LAC/DR/RD June 1985

	Page
Title Page.	i
Index	11
Abstract	v
Topics	Page
Introduction	1
Objective	2
Limitations	2
Market of Choice	3
US Fresh Fruit and Vegetable Consumption	3
Total US Fresh Fruit and Vegetable Imports	4
US Fresh Produce and Banana Imports by Country in 1983	5
US Fresh Produce Imports from Central America, the Western Caribbean, Mexico, and All Other Countries	6
US Fresh Produce Imports from Different Regions	6
US Fresh Fruit and Vegetable Imports from Central America and the West Indies in 1983	8
US Fresh Fruit and Vegetable Imports from Mexico	9
US Winter Market for Fresh Produce	10
Allowable US Fresh Fruit and Vegetable Imports	10
Estimated Production Areas for US Imported Fresh Produce	11
Estimated Wholesale Dollar Value for US Imported Fresh Produce	11
Estimated Total Value of US Imported Fresh Produce Using Average New York Wholesale Prices	12

INDEX

-ii-

INDEX

Topics (Continued)	Page
Ocean Freight Costs for Cucumbers and Melons from Certain	
Countries	12
Foreign and Domestic Inland Freight Rates	14
Truck Rates for Specific Markets and Commodities in the US	15
Comparative Freight Costs for Fresh Produce from Central America and the Western Caribbean	16
Projected Profit and Loss Statements for Cucumber and Melon Production in Honduras and the Dominican Republic	17
Conclusions and Indications	18
Appendix	21

Appendices

Table	1.	1978- US Per Capita Consumption of Commercially Produced Vegetables.	AØ 1
Table	2.	US per Capita consumption of Commericially Produced Fresh Fruit and Vegetables and Calculated Total Consumption and Per Cent Change.	A02
Table	3.	US Fresh Fruit and Vegetable Imports by Country and Year.	A03
Table	4.	US Fresh Fruit & Vegetable Imports from Different Regions- 1980.	A04
Table	5.	US Fresh Fruit & Vegetable Imports from Different Regions- 1981.	A05
Table	6.	US Fresh Fruit & Vegetable Imports from Different Regions- 1982.	A06
Table	7.	US Fresh Fruit & Vegetable Imports from Different Regions- 1983.	A07
Table	8.	US Fresh Fruit & Vegetable Imports from Different Regions- 1983.	A08

 $\langle \rangle^{l_{p}}$

INDEX

Appendices	(Continued)	Page
Table 9.	US Fresh Fruit and Vegetable Imports from Mexico by Month in 1983.	809
Table 10.	Distribution costs for Some Fresh Produce Imported from Mexico.	A10
Table 11.	US Allowable Imports (USDA/APHIS/PPQ).	A11
Table 12.	Selected US Imports from Different Regions and the Calculated production Area for each Commodity.	A12
Table 13.	Average Weekly New York Fresh Fruit & Vegetable Wholesale Prices in 1982.	A13
Table 14.	Average Weekly New York Fresh Fruit & Vegetable Wholesale Prices in 1983.	A14
Table 15.	Average New York Wholesale Prices per Pound for Fresh Fruit & Vegetables in 1982 and 1983.	A15
Table 16.	Calculated Total Dollar Value of US Fresh Produce Imports Using New York Wholesale Prices.	A16
Table 17.	Estimated Ocean Freight Costs for Fresh Cucumber from Different Countries and Regions.	A17
Table 18.	Estimated Ocean Freight Costs for Melon from Different Countries and Regions.	A18
Table 19.	Estimated Cucumber & Melon Inland (Domestic & Foreign) Freight Costs.	A19
Table 20.	Truck Rates, Per Load, to Selected Markets in the US.	A20
Table 21.	Estimated Freight Costs for Cucumber and Melon from Central America and the Caribbean.	A21
Table 22.	Profit and Loss Statements for Cucumber and Melon Produced in Central America and the Caribbean.	A22

 $\langle \rangle$

ABSTRACT

Countries in Central America and the Western Caribbean have increased their interest in the development, expansion, and promotion of agricultural exports, especially non-traditional commodities. Western Caribbean countries include the Bahamas, Jamaica, Haiti, and the Dominican Republic. The establishment of fresh fruit and vegetable export operations often exposes local farmers to state-of-the-art agricultural technologies, export operations provide an inexpensive, abundant, and nutritional food for the domestic market, and export operations are labor intensive. The objective of this paper is to discuss some aspects of fresh fruit and vegetable exports from Central-America and Western Caribbean countries and to examine specific conditions or factors which affect the comparative advantage of one country or region over another. Once these factors are understood, the potential of a certain country or region to be able to successfully export produce can be better assessed and sound management decisions can be made which will allow for realistic project design, implementation, supervision, and/or management.

In the US, the per capita and total consumption of fresh produce is increasing and the US is the market of choice for Central American and Caribbean fresh produce exporters. Total US fresh produce imports have been increasing since 1980 and 98 per cent of these imports originate from ten countries. Over fifty-one kinds of fresh produce are imported into the US, Mexico is the largest supplier, and the principal commodities imported are bananis, followed by tomato, cucumbers, grapes, onions, and watermeion. Greater variety and volumes of fresh produce, excluding banana and pineapple, are exported from the Western Caribbean region to the US than from Central America. In 1983, large quantities of tomato, cucumber, cantaloupe, dry onions, and bell pepper were imported from Mexico and about 78% of Mexico's imports were made during the US winter vegetable market season which is from December through May.

Lists of allowable US fresh fruit and vegetable imports, prepared by USDA/APHIS/PPQ, indicate that allowable imports vary by country and region, and more imports are allowed from Western Caribbean countries than from Central American countries. Production areas for some imported fresh commodities in 1983 were estimated using average US yield data and reported import volumes; production areas ranged from 22 to 14,101 hectares for fresh broccoli and tomato, respectively. The average weekly New York wholesale prices were calculated for imported produce for 1982 and 1983 and the average price per pound was \$0.55 and \$0.62, respectively. Using average New York wholesale prices, the total value of imports in 1982 and 1983 was \$3.1 and \$3.6 billion, respectively.

Ocean freight costs for different commodities and from different countries, obtained January, 1985, were compared. Ocean freight costs

for cucumbers were slightly greater than for melons and costs were less from the Western Caribbean region than from Central America; also, service is available from the Western Caribbean to Miami and to New Jersey. Additional transportation costs are incurred when exporting fresh produce, as produce must be transported from packing or assembly areas to the port of embarkation and moved from the port of entry to a receiving point. The costs for this transportation will depend upon distances to and from the ports, local prices for fuel, and the competitive situation.

During the US winter vegetable market, a large proportion of fresh vegetables are imported from Mexico and most of this produce enters the US at Nogales, Arizona. If the cost of producing, packing, and delivering produce from Central America or the Western Caribbean regions to Florida, is equal to, or less than, the cost of Mexican produce at Nogales, then Central American and Caribbean produce can compete in markets in the eastern US where over half of the population, with more than half of purchasing power in the US, resides. Assuming equal quality and costs at the different ports of entry, Florida and Arizona, the delivered price to the wholesalers will be determined by the cost of freight from the port of entry or receiving point to the wholesale facility. In December, 1984, refrigerated truck rates were more favorable for produce shipped from Florida to Chicago than from Nogales to Chicago.

Total cost of shipping would include charges for ocean freight, foreign and domestic inland freight, US trucking to wholesaler's facility, and the necessary handling. In some Western Caribbean countries, refrigerated container service is available to Miami and New Jersey, while in Central America only service to Miami is available. Produce entering the US at Miami must be re-shipped to reach markets in the Northeastern US. A comparison of shipping costs for shipping cucumbers and melons from Honduras and the Dominican Republic to Miami, then New York, and from the Dominican Republic to New York were made. The estimated cost of shipping fresh produce directly from the Western Caribbean to New York, rather than shipping to Miami and then New York, is clearly financially advantageous. Also, we must consider the additional damage that will result from the extra handling. Fresh produce is perishable and extremely delicate: excessive and improper handling uill dramatically increase postharvest losses and will negatively affect value.

Projected profit and loss statements for melons and cucumber production in Honduras and the Dominican Republic indicate that melon is more profitable than cucumber, and fresh produce exports from the Dominican Republic are more profitable than from Honduras due to greater distribution costs.

A

Introduction

Countries in the Caribbean and in Central America have increased their interest in the development, expansion, and promotion of agricultural exports. This increased interest has been stimulated by many factors and it would be less than correct to assume that all regions or countries were stimulated by the same reasons. Nevertheless, it seems some of the present day interest in exports, especially non-traditional exports, has been stimulated by the following factors or conditions:

- 1. The Caribbean Basin Instative (CBI).
- Lesser developed country (LDC) government export promotion, more often than not, stimulated by balance of payment problems.
- 3. LDC private sector's need for US dollars, rather than local currency, to run unrelated businesses.
- 4. The development of an international entrepreneural spirit.
- 5. The leadership and initiative of certain individuals who have demonstrated that fresh produce can be successfully produced, packed, exported, shipped, and sold in demanding foreign markets at a profit.
- The decline in the monetary value of traditional exports, such as sugar, bananas, coffee, and others.
- 7. Previous and existing USAID financed projects to promote agricultural exports.

The business of successfully exporting fresh fruits and vegetables is a complex operation and requires knowledge, hard work, and attention to detail. A little luck in the start-up phase of the operation would always be appreciated: lacking luck, one must depend upon skill. Although the basic motives for developing exports would probably be the generation of profits and foreign exchange, there are numerous additional benefits that can be derived from export operations. Often, export efforts must utilize state-of-the-art technologies, and some of this technology is applicable to domestic crops and production systems. Export farming operations often provide the first visible demonstration of the full production potential of land to local

 $\sqrt{\frac{1}{2}}$

farmers. Rarely can all of the production be exported; non-exportable produce is mostly rejected for cosmetic reasons and usually enters the domestic market system as inexpensive, abundant, and nutritional feed. Cucumber exports were initiated in 1978 in the Comayagua Valley of Honduras; today, Honduran field-workers carry a small bag of salt, mixed with pepper, to condiment fresh, peeled cucumbers. When in production, cucumbers are a new food to the peasant's usual diet of beans and tortillas.

Generally, fresh produce export operations are very labor intensive. In Haiti, the labor required to harvest and process their fresh mango exports has been reported to envolve over 40,000 peasants. In Central America the labor requirement for export cucumber production is sixty man-days per hectare (ha) per twelve-week crop cycle, or 260 man-days/ha/year, while field corn production requires only eleven man-days per ha per six-month cycle, or 22 man-days/ha/year. Most of the labor utilized on the farm or in the packing house does not require intensive training nor specialization, and there is work for women, men, and youth.

Objective

The objective of this paper is to discuss some aspects of fresh fruit and vegetable exportations from Central American and Western Caribbean countries and to examine specific conditions or factors which affect the comparative advantage of one country, or region, over another. Once these factors are understood the potential of a certain country or region to be able to successfully export fresh produce can be better assessed and sound management decisions can be made which will allow for realistic project design, implementation, supervision, and/or management.

Limitations

The scope of this paper is such that topics are only superficially discussed, as an in-depth study of any of these areas would require a serious, sophisticated effort involving considerable time, effort, and expertise. The data presented herein are from readily available sources. They should not be considered as absolutes but are considered adequate for our purpose to represent trends, illustrate situations, and support opinions. Our discussions will not consider traditional or ethnic fresh produce exports in depth. Western Caribbean countries include the Bahamas, Haiti, the Dominican Republic, and Jamaica. Also, some data on fresh produce shipments originating in Puerto Rico are presented. Data are summarized in the text while complete tables of data are presented in the Appendix.

Market of Choice

Historically, the market of choice for most fresh agricultural exports from almost all Central American and Western Caribbean countries has been the United States (US). Although other markets have developed, the US continues as the market of choice due to its proximity, existing shipping and transportation patterns, and the immensity and diversity of the marketplace.

US Fresh Fruit and Vegetable Consumption

It is generally assumed that in the US, the consumption of fresh fruit and vegetables has increased in recent years. It would be beneficial to know the past and present patterns of fresh produce consumption to attempt to predict future demand. As the list of fresh fruits and vegetables consumed in the US is so extensive, a careful study of their consumption would envolve from fifty to one hundred items and it is doubtful whether satisfactory or sufficient information on many items could be obtained. Some information on per capita consumption for twenty-five vegetables is presented for 1978 in Knott's Vegetable Grower's Handbook. These data represent only the consumption of commercially produced vegetables for fresh, canned, and frozen markets and are presented in Table 1. (See Appendix for complete tables.) $f_{\rm c}$ arently this information was prepared by the Economic Research Service (ERS) of the US Department of Agriculture (USDA). It is not clear how these types of data are generated but it is presumed that they originate from household and industry interviews.

Other per capita consumption data were reported by the Statistical Reporting Service of the USDA (USDA/SRS). Data for only a limited number of commodities were available and these data are presented in Table 2. This information differs slightly from the data presented in Table 1. Some of the data presented were as follows:

	USDA/ERS		USDA/SRS	
Vegetable	1978	1975	1980	۲ Change
Cabbage	8.90	9.20	9.00	-2.2
Cantaloupe	9.10	6.90	7.20	4:3
Lettuce	26.60	24.50	27.40	11.8
Onien	10.60	9.50	9.90	4.2
Pepper, Bell	-	3.10	3.60	16.1
Tomato	13.40	12.10	13.40	10.7

1671

US per Capita Consumption of Fresh Vegetables (Pounds)

The total consumption and the average percent change in total consumption were calculated from US population and per capita consumption data for fifteen fresh fruits and vegetables provided by the USDA/SRS for 1965, 1970, 1975, and 1980 (Table 2.). These data indicate that in the US, the per capita consumption patterns for fresh fruits and vegetables are changing and the important trends that have occurred since 1965 are as follows:

Fresh Fruit and Vegetable Consumption in the US.

- 1. Total consumption is increasing.
- 2. Per capita consumption is increasing.
- 3. Consumption patterns have changed.

Total US Fresh Fruit and Vegetable Imports

Reports of US fresh fruit and vegetable imports by the Fruit and Vegetable Division of the Agricultural Marketing Service of the USDA (USDA/AMS/F&V) are a readily available source of information. These reports do not include fresh fruit and vegetable exports from Central American and the Western Caribbean to countries other than the US. Also, the data presented for US imports are imprecise. Nevertheless, these data are considered sufficiently accurate for indicating trends and estimate volumes. Data for 1980 through 1983 are presented in Table 3. and indicate that US fresh produce imports were as follows:

و و و و و و و و و و و و و و و و و و و	
Year 1,000 CWI % Increas	e
	-
1980 83,183 -	
1981 83,339 0.2	
1982 92.138 10.5	
1983 92,268 0.1	

Fresh produce US imports are increasing and the erratic nature of this increase, in recent years, is largely due to unfavorable weather conditions in Sinaloa, Mexico in 1981 which negatively affected vegetable production.

US Fresh Produce and Banana Imports by Country in 1983

In 1983, US fresh fruit and vegetable imports were reported from twenty-five different countries, from as close as Mexico and Canada, and as far away as India and Australia; and, the number of different commodities imported per country varied from one to fifty-one. Imports were greatest from the following countries:

	Tabal	Banar	as	% of
Country	Inports 1,000 CWT	1,000 CWT	% of Total	US Imports
Mexico	25,448	828	3.2%	27.6%
Costa Rica	12,901	12,806	99.3%	14.0%
Honduras	11,750	11,008	93.7%	12.7%
Ecuador	9,851	9,838	99.9%	10.7%
Colombia	8,282	8,280	99.9%	9.0%
Canada	7,291	0	0.0%	7.9%
Panama	4,877	4,873	99.9%	5.3%
Guatemala	4,835	4,689	97.0%	5.2%
Chile	3,388	0	0.0%	3.7%
Nicaragua	1,366	1,365	99.9%	1.5%
All Others	2,279	0	0.0%	2.4%
Total	92,268	53,687	58.2%	100.0%

US Fresh Fruit & Vegetable Imports- 1983

The fresh produce imports from ten countries represent approximately 98 percent, by weight, of the total fresh produce imported into the US in 1983. However, these countries, except for Mexico, Chile, and Canada, are principally exporters of bananas. Banana imports represent approximately 58 percent, by weight, of the total fresh produce imports in 1983. Banana imports will not be included in succeeding discussions and data as the volumes imported are so great that other trends are not apparent.

1.10 .1

US Fresh Produce Imports from Central America, the Western Caribbean, Mexico, and All Other Countries

The volumes of US fresh fruit and vegetable imports for 1980 through 1983 from the Bahamas, Central America, Mexico, the West Indies, Puerto Rico, and all other countries are presented in Table 4. through Table 7. Data are presented for thirty-eight different fruits and vegetables and four general classifications as follows:

Asparagus	Grapes. Table	Peoper Other
Avocado	Honeydew	Pineapole
Banana	Lettuce/Endive	Radish
Bean	Lime	Spinach
Broccoli	Mango	Squash
Brussels Sprouts	Melon, Mixed	Strawberry
Cabbage	Okra	Tangerine
Cantaloupe	Onion, Dry	Tomato
Carrot	Onion, Green	Tomato, Cherry
Cauliflower	Orange	Watermelon
Cucumber	Papaya	Vegs Others
Eggplant	Peas, Green	Misc Herbs
Garlic	Peas, Other	Misc Trop F&V
Grapefruit	Peppers, Bell	All Others

Imported Fresh Fruits and Vegetables

US Fresh Produce Imports from Different Regions

The amounts of fresh produce exported to the US from Central America, the Western Caribbean, Mexico, Puerto Rico, and all other countries for 1980 through 1983 were as follows:

Region	1980	1981	1 982	1983
Bahamas	135	192	170	
Central America	743	849	918	1.024
Mexico	22,716	18.596	22.304	24.520
West Indies	228	269	383	553
Puerto Rico	43	65	195	139
All Others	7,537	9,395	11,479	11,999
Total	31,402	29,366	35,449	38,522

16.

US Fresh Produce Imports from Different Regions (1,000 CWT)

These data would indicate that US fresh fruit and vegetable imports are increasing, the greatest volume of imports are from Mexico, and imports from the other regions are increasing. The average yearly percent and volume increases of US fresh produce imports for the different regions for the period 1980 to 1983 were as follows:

	Average Yearly	y Increase
Region	Volume (1,000 CWT)	Percer'
Bahamas	17.3	12.8
Central America	93.7	12.6
Mexico	634.7	2.8
West Indies	108.3	47.5
Puerto Rico	32.0	74.4
All Others	1,487.3	19.7
Total	2,373.3	7.6

US Fresh Produce Imports

Although there are more than thirty-eight different fresh fruits and vegetables imported into the US, the commodities with the largest volumes for the period from 1980 through 1983 were as follows:

		Imports (1,000 CWT)		
Commodity	1980	1981	1982	1983
Cantaloupe Cucumber Grapes Onion, all Pepper, all Pineapple Squash Tomato, all Watermelon	1,801 3,245 971 1,290 1,893 1,515 1,002 6,889 2,168	1,493 3,085 1,270 1,315 1,319 1,394 789 5,602 1,328	1,566 2,837 2,096 1,683 1,850 1,325 1,165 6,419 2,372	1,682 3,445 2,869 2,052 1,263 1,516 1,263 7,799 2,056
Total	20,774	17,595	21,713	23,950

US Fresh Fruit and Vegetable Import Volumes

Prior to 1983, fresh produce imports from different countries in Central America and the Western Caribbean were reported regionally and it was not possible to identify exports of individual countries. In 1983, the US fresh fruit and vegetable imports from Central America and Caribbean countries were reported individually by the USDA/AMS/F&V. US fresh produce imports were, and are, reported as follows:

	Regions and Countries	
	Re	gion
Prior to 1983	Central America	West Indies
1983 and After	Belize Costa Rica El Salvador Guatemala Honduras Nicaragua Panama	Dominican Republic Haiti Jamaica

US Fresh Fruit and Vegetable Imports from Central America and the West Indies in 1993

The fresh produce imports from the different countries in Central America and the West Indies are presented in Table 8. The number of commodities exported to the US in 1983 from those countries were as follows:

Number of Different US Imported Commodities- 1983

Central Ameri	ca	West Indies
Belize El Salvador Costa Rica Guatemala Honduras Nicaragua Panama	1 1 3 7 6 2 3	Dominican Republic 15 Jamaica 5 Haiti 3

, VJ

The numbers of different commodities imported by the US from Central American and West Indian countries are twelve and seventeen, respectively. The diversity of exports from the West Indies is greater than those of Central America at present; however, the total volume of fresh produce imported by the the US from Central American countries is greater. If we examine the list and volumes of imported commodities from both regions and exclude bananas and pineapples, the volume of fresh produce imported from Central American countries is about half of that imported from the West Indies countries; also, the data indicates that imports from the West Indies have been rapidly increasing since 1980.

US Fresh Fruit and Vegetable Imports from Mexico

In 1983, US fresh produce imports from Mexico ranged from asparagus to watermelon and were valued in billions of dollars. The 1983 US imports from Mexico by month are presented in Table 9. Annual totals of major imported commodities were as follows:

Commodity	Volume (1 000 CUT)	7 of Total
Tomato	6.,933	27.2%
Cucumber	3,235	12.7%
Cantaloupe	1,557	6.1%
Onion, Dry	1,144	4.5%
Pepper, Bell	1,059	4.2%
Total	13,928	54.7%

US Fresh Fruit and Vegetable Imports from Mexico- 1983

Mexico's major area of fresh vegetable production for export to the US is concentrated around Culican, Sinaloa; the development of Sinaloa as the center for export vegetable production started about thirty-five years ago. A major stimulus in the development of Sinaloa for export vegetable production occurred in the early sixties when winter vegetable production in Cuba was discontinued. Today, we find large, sophisticated farming operations in Sinaloa; however, as in all agricultural endeavors, vegetable production in Mexico is not without its social, economic, climatological, and other problems. For example, in Sinaloa, it will take 12-13 weeks to get field grown slicing cucumbers to harvest; while in Comayagua, Honduras, the same cucumber will require six weeks to first harvest. Also, be assured

that costs for transporting fresh produce from Sinaloa, Mexico to the nearest US port of entry, crossing fees, tariff, and other charges will be so high that any labor or production cost reduction benefit derived from producing vegetables in Mexico will be insignificant. Examples of these costs for imported Mexican produce were studied by 6.A. Zepp and R.L. Simmons in 1979 and 1980. The total of these costs per pound of tomato and cucumber in 1979 were \$0.045 and \$0.054, respectively. (Please see Table 10.)

US Winter Market for Fresh Produce

Due to the reduced capability of producing many vegetables during the winter months in the US, there exist lucrative markets in the US for many fresh fruits and vegetables from December through May. In 1983, fresh produce imports from Mexico during these months were as follows:

Month January	(1,000 CWT) 2,683	Total 10.5%	
January	2,683	10.5%	
January	2,683	10.5%	
•			
eoruary	2,757	10.8%	
1arch	4,441	17.5%	
April	3,996	15.7%	
lay	3,654	14.4%	
)ecember	2,178	8.6%	
	farch April Jay December Total	farch 4,441 April 3,996 fay 3,654 December 2,178 Total 19,709	farch 4,441 17.5% April 3,996 15.7% May 3,654 14.4% December 2,178 8.6% Total 19,709 77.5%

US Fresh Produce Imports from Mexico by Month in 1983

Allowable US Fresh Fruit and Vegetable Imports

To be able to import fresh fruit and vegetables into the US, an import permit from the Plant Pest Quarantine Division, Animal/Plant Health Inspection Service, of the USDA (USDA/APHIS/PPQ) is required. A US importer can readily obtain an import permit, if the commodity to be imported has had prior approval by APHIS/PPQ. If a permit is requested for a commodity which has not had prior approval then a rather complicated procedure must be followed by APHIS/PPQ to determine whether the commodity can be imported and whether an approved quarantine treatment would be required. APHIS/PPQ also determines allowable ports of entry for each commodity. The APHIS/PPQ list of allowable imports from all countries is under constant scrutiny and is subject to periodic revision. A selected list of allowable US imports, by country, is presented in Table 11. and indicates the following:

- 1. Allowable imports vary by country.
- 2. Allowable imports vary by geographical region.
- 3. More imports are allowable from Caribbean countries than from Central American countries, except for Belize.

Estimated Production Areas for US Imported Fresh Produce

Expected good yields in the US for selected vegetables for the fresh market were obtained from Knott's Handbook for Vegetable Growers. These data were expressed as hundred-weight (CWT) per hectare (ha) were used to estimate the production areas required to produce the reported imported volumes of selected produce in 1983. Only the production areas of a few commodities were calculated due to the lack of yield data. The results of these calculations are presented in Table 12. Those fresh vegetables with the largest estimated production acreages were as follows:

Estimated Produ Vegetables	iction Areas for Sele Imported by the US	ected Fresh in 1983
	Good US	Production
	Yield	Area
Commodity	(CWT/ha)	(ha)
Cantaloupe	494	3,401
Cucumber	618	5,534
Pepper, Bell	494	2,283
Tomato	494	14,101
Watermelon	494	4,162

Estimated Wholesale Dollar Value for US Imported Fresh Produce

The average weekly New York wholesale prices for imported fresh produce for 1982 and 1983 were obtained from the Market News Branch of the USDA/AMS/F&V; the data included weekly price, origin of the produce, and type of package. The average weekly wholesale price was calculated for the weeks that the produce was available in the wholesale market. The average price per pound was calculated by dividing the average weekly price per package by the average weight of each package. The average weekly wholesale price per package and the average weekly price per pound for selected fresh produce in New York

 $\langle \cdot \rangle_{\xi}$

for 1982 and 1983 are presented in Table 13. and Table 14., respectively. The calculated average weekly New York wholesale price per pound for 1982 and 1983 and the average of these two years are presented in Table 15. and are summarized as follows:

Average New York Wholesale Prices						
		Per P	ound (US	Dollars)		
Commodity	Origin	1982	1 983	Average		
Cantaloupe	Mexico	0.38	0.56	0.47		
Cucumber	Mexico	0.34	0.34	0.34		
Snow Peas	Guatemala	-	2.10	2.10		
Tomato	Mexico	0.53	0.53	0.53		
Watermelon	Mexico	0.24	0.31	0.28		
Average	*****	0.55	0.62	0.61		

Estimated Value of US Imported Fresh Produce Using Average New York Wholesale Prices

The reported US fresh produce import volumes and the calculated New York average weekly wholesale price per pound were employed to estimate the total value of these imports for 1982 and 1983. The results of these calculations are presented in Table 16; the total value, using average New York wholesale prices, for US imported produce in 1982 and 1983 was \$3.1 and \$3.6 billion, respectively.

At times, the US fresh produce import volumes might be considered small but the total dollar value of fresh produce imports is considerable. Care must be taken and expertise is required to properly analyze data related to this agroindustry.

Ocean Freight Costs for Cucumbers and Melons from Certain Countries

In existing vegetable export operations in the Caribbean and Central American regions, transportation is the major concern and cost. Reliable, efficient, economic, and timely refrigerated container service is the key to success for most fresh fruit and vegetable export operations. It is not unusual to find that freight and distribution costs will be two too three times greater than farm gate cost.

 (J_{I})

At present, the principal method of transporting fresh produce from Central America and the Western Caribbean to the continental US is with refrigerated container service. Although some commodities exported from these regions require air transportation due to an extremely short shelf-life, most exports are transported in refrigerated trailers. Refrigerated trailers are utilized because of the large volumes involved or because economics preclude the use of air transportation. Air freight costs can vary from \$0.12 to \$0.25 per pound; thus, air transport is limited to a specific selection of commodities of high value, low weight, and limited volumes. Usually, refrigerated trailers are thirty-five or forty feet long and will hold 40,000 pounds. This weight limit has been established due to JS highway maximum load restrictions (weight of cargo plus weight of truck and trailer).

The ocean freight costs for some commodities and certain countries were obtained from Sea-Land Service, Inc. in January, 1985. The costs presented in Table 17. and Table 18. should be representative of transportation costs from that specific country as ocean freight rates are usually established, maintained, and controlled by conference. A conference is composed of representatives of the different marine shipping companies serving a country, or countries; the conference establishes and constantly monitors freight rates for specific commodities, countries, and destinations. Ocean freight costs from some Central American and Western Caribbean countries and two commodities are summarized as follows:

Commodity	Origin	Destination	US Dollars	
			Carton	Pound
Cucumber	Honduras	Florida	3.80	0.069
	Guatemala	Florida	3.72	0.068
	Dom. Rep.	Florida	3.29	0.060
	Dom. Rep.	New Jersey	3.96	0.072
	Haiti	Florida	2.95	0.054
	Haiti	New Jersey	3.60	0.066
Melon	Honduras	Florida	2.04	0.054
	Guatemala	Florida	1.85	0.049
	El Salvador	Florida	2.29	0.061
	Dom. Rep.	Florida	2.21	0.059
	Dom. Rep.	New Jersey	2.64	0.070
	Haiti	Florida	1.97	0.052
	Haiti	New Jersey	2.40	0.064

Estimated Ocean Freight Costs

-13-
In general, ocean freight rates (expressed as cost per pound) for cucumbers are slightly higher than for melons. As the value of melons (cantaloupe, honeydew, and mixed-melons) can be expected to be greater than the value of cucumber (see Table 15.), there is no logical reason why ocean freight rates for cucumber are greater than for melon. One should also note that there is ocean freight service from some ports of origin directly to Port Elizabeth, New Jersey. As a large market for imported fresh fruit and vegetables exists in the Northeastern US, the availability of a delivery point in this geographical area could provide considerable advantage.

Foreign and Domestic Inland Freight Rates

Fresh fruit and vegetable production areas in Central America and the Western Caribbean countries can be located considerable distances from the port(s) where refrigerated trailers are loaded on ocean vessels. Transportation charges for moving refrigerated trailers from the production area to the port of embarkation and from the port of entry to the receiving point are usually made by or through the marine shipping company. These transportation charges are determined by domestic and foreign prices for fuel, labor, repair and maintenance costs, and the availability of equipment. These charges will vary by country and will largely depend upon the distances from the production area to the port and from the port to the receiving point. Inland transportation charges in 'several countries and in the US for cucumbers and melons, are presented in Table 19. Average inland freight costs, domestic and foreign, were as follows:

		US Dollars Cost					
Commodity	Location	Trailer	Carton	Pound			
Cucumber	Central America	200	0.294	0.005			
0404	Dominican Rep.	65	0.096	0.002			
	Florida	175	0.257	0.005			
	New Jersey	100	0.139	0.003			
Melon	Central America	338	0.331	0.009			
	Dominican Rep.	65	0.054	0.002			
	Florida	200	0.196	0.005			
	New Jersey	100	0.098	0.003			

Average Domestic and Foreign Inland Freight Charges

Truck Rates for Specific Markets and Commodities in the US

If fresh produce from Central American or Caribbean production areas can not be delivered directly to Northeastern ports, then this imported produce will be ocean freighted to Florida, refrigerated trailers will be off-loaded, the cargo is subject to inspection by USDA/APHIS/PPQ, customs, and the Food and Drug Administration (FDA), and the trailer is then delivered to a receiving point where the cargo of fresh produce can be unloaded. Often, the produce is placed in cold rooms for a short period or immediately reloaded onto other refrigerated trucks for delivery to wholesalers. If the wholesalers are located in the Northeastern US, produce has to be trucked North and unloaded.

During the US winter vegetable market season, a large proportion of fresh produce is imported from Mexico, most through Nogales, Arizona. Once fresh produce from Culican, Sinaloa is packed, shipped, and crossed, further distribution costs have to be considered. If the cost of produce from Central America and the Caribbean, delivered to Miami, Florida, is equal to, or less than, the cost of Mexican produce at Nogales, then Central American and Caribbean produce can compete in markets in the Eastern US where over half of the US population, with more than half of the purchasing power in the US, resides. Assuming equal quality and price at the different ports of entry, Nogales and Miami, the delivered cost to the wholesaler will be determined by the cost of freight from the port or receiving point to the wholesale facility. Refrigerated truck rates in the US in December, 1984, as reported by the Federal-State Market News, are presented in Table 20. and are summarized as follows:

			Average C	ost US \$
Commodity	Origin	Destination	Trailer	Pound
Vegetables	Arizora	Chicago New York	2,000 2,450	0.051 0.061
Tomato	Florida	Chicago New York	1,720 1,750	0.043 0.044

US Refrigerated Truck Rates (December, 1984)

These data indicate that refrigerated truck rates would be more favorable for produce shipped from Florida to New York, and as far West as Chicago, than for produce shipped from Nogales, Arizona to Chicago (and probably any location East of St. Louis, Missouri). Produce that could be directly delivered to a Northeastern US port for distribution would have considerable advantage.

Comparative Freight Costs for Fresh Produce from Central America and the Western Caribbean

At present, reliable refrigerated container service is available from most Western Caribbean countries to Miami; in some countries there is also direct service available to New Jersey. In Central America, however, only service to Miami is available. (Apparently, there may be refrigerated container service from Panama direct to New York but details about this service are not fully known at this time.) As previously stated, there is a large market for fresh produce in the Northeastern US. If Honduras and the Dominican Republic were able to produce fresh vegetables of equal quality and at similar cost and obtain the same selling price, then the cost of transporting their exported produce to market would determine the expected profit margin. A comparison of the estimated freight costs for cucumbers and melons from Honduras and the Dominican Republic is presented in Table 21. We assume that fresh produce from Honduras would be shipped to Florida, unloaded, sold to a wholesaler, reloaded, trucked to New York, and unloaded. Costs for transporting and handling produce from other Central American countries would be similar to those of Honduras except for slightly different ocean freight rates. Two cases are considered for the fresh produce originating in the Dominican Republic. In the first case fruit is shipped from the Dominican Republic to Florida and handled in a manner similar to the produce from Central America. In the second case, the fruit is shipped directly to the Northeastern US, sold to a wholesaler, and unloaded. Freight costs for commodities from Central America (Honduras) and the Western Caribbean (Dominican Republic) using these different options are estimated as follows:

				Cost US D	ollars
Commodity	Origin	Port	Destination	Carton	Pound
Cucumber	Honduras	 Miami	New York	7.29	0.133
	Dom. Rep.	Miami	New York	6.80	0.124
	Dom. Rep.	N.J.	New York	4.70	0.085
Melon	Honduras	Miami	New York	4.85	0.121
	Dom. Rep.	Miami	New York	4.69	0.117
	Dom. Rep.	N.J.	New York	2.87	0.072

Freight Costs for Fresh Produce

The estimated cost of shipping produce directly from the Western Caribbean to the New York area, rather than having to ship to Florida and truck produce overland to New York, is financially advantageous. Also, one must consider other factors, such as the additional dr which will result from extra handling. One must always remember that fresh produce is perishable and extremely delicate, excessive handling will increase postharvest losses and will reduce value and returns.

Projected Profit and Loss Statements for Cucumber and Melon Production in Honduras and the Dominican Republic

Export cucumbers and melons, primarily cantaloupe, have been produced on a small, commercial scale in Honduras since 1977. In the Dominican Republic, the production of melons, primarily cantaloupe, for export started in 1980 and the volume exported in 1983 exceeded the volume exported from Honduras. Also, minor quantities of cucumbers have been exported from the Dominican Republic. In both countries, the costs of production, harvesting, and packing would be expected to be similar; also, we would expect to obtain similar export sales revenues because produce would be sold in the same markets. In this case 1983 New York average wholesale prices have been used. The basic difference between the two operations is found in the distribution costs, mainly the cost of freight. The results of these calculations are presented in Table 22. and are summarized as follows:

	Cucum	bers	Melons				
	Dom. Rep.	Honduras	Dom. Rep.	Honduras			
Revenue	\$18.70	\$19.70	\$18.80	\$18.80			
Costs							
Production	\$ 1.20	\$ 1.20	\$ 1.90	\$ 1.90			
Harvesting .	.10	.10	.15	.15			
Packing	1.75	1.75	1.50	1.50			
Distribution	9.86	10.35	7.73	7.89			
Administration	n .75	.75	1.00	1.00			
Total	\$13.66	\$14.15	\$12.28	\$12.44			
Various (10%)	1.36	1.41	1.23	1.24			
Total	\$15.02	\$15.56	\$13.51	\$13.68			
Return to	339652		제 바 며 유 대 회	建筑新生产系			
Cap. & Mgmt.	\$ 3.86	\$ 3.14	\$ 5.29	\$ 5.12			

Profit and Loss Statement- Fresh Produce Exports

These calculations indicate that melons are more profitable than cucumbers and fresh produce exports are more profitable in the Dominican Republic than in Honduras due to greater distribution costs.

Conclusions and Indications

Countries in Central America and the Western Caribbean have increased 'their interest in the development, expansion, and promotion of agricultural exports, especially non-traditional commodities.

Western Caribbean countries include the Bahamas, Jamaica, Haiti, and the Dominican Rebublic. Some fresh produce shipment data for Puerto Rico are presented.

The market of choice for Central American and Caribbean countries is the US.

US fresh fruit and vegetable consumption, total and per capita, has increased since 1965.

Total US fresh fruit and vegetable imports have increased. The largest single fresh produce import is banana which represented 58 percent, by weight, of total US fresh imports in 1983. The primary producers of banana are the Central American countries. Ecuador, and Colombia.

In 1983, fresh produce from ten countries represented approximately 98 percent, by weight, of the total amount of fresh produce imported into the US. Mexico supplied the largest volume and fifty-one kinds and classifications of fruits and vegetables were imported.

US fresh produce imports are obtained from different regions- the Bahamas, Central America, the West Indies, Puerto Rico, and all other countries. Volumes of US fresh produce imports from these regions are increasing at different rates and the fresh produce imports of greatest volume are:

1.	Banana	6.	Watermelon
2.	Tomato, all	7.	Cantaloupe
3.	Cucumber	8.	Pepper, all
4.	Grapes	9.	Pineapple
5.	Onion, all	10.	Squash

The USDA/AMS/F&V Division reporting system was changed in 1983 and now information on imports from individual countries in Central America and the West Indies is available. The number of different kinds of commodities exported from the West Indies countries is greater than from Central American countries.

- 1. Tomato
- 2. Cucumber
- 3. Cantaloupe
- 4. Onion, Dry
- 5. Pepper, Bell

Mexico, the largest exporter of fresh produce to the US in 1983, exported 77.5 per cent of the total import volume in the months from December through May; this period is referred to as the US winter vegetable market season.

The USDA/APHIS/PPQ issues import permits and determines plant pest quarantine and treatment requirements for specific crops from individual countries. The lists of allowable US fresh fruit and vegetable imports are greater for Western Caribbean countries than for Central American countries, except Belize. USDA/APHIS/PPQ requlations are subject to constant revision and possible change.

Using US good yields and import data, the area required to produce the US fresh fruit and vegetable imports for 1983 was calculated. Production areas were estimated to range from 22 to 14,101 ha for fresh broccoli and tomato, respectively.

New York wholesale prices were obtained for 1982 and 1983, and the average weekly price was calculated. Prices for imported produce were used when available. The average weekly price per pound was calculated.

Using New York average wholesale prices for 1982 and 1983, the total dollar value of US imported fresh produce was calculated and was approximately \$ 3.1 and \$ 3.6 billion, respectively.

In early 1984, ocean freight costs for cucumbers and melons were obtained from a company supplying refrigerated container service for most Caribbean and Central American countries. Ocean freight for cucumbers was slightly higher than for melons and ocean freight rates to the US are less from the Caribbean than from the Central American countries.

Other freight costs are incurred and involve the costs of transporting the refrigerated trailers from the production or packing area to the port of embarkation and the transport of the trailer from the port of entry to the receiving point in the US. These costs depend upon local prices, location, and competition.

X)

Preliminary data indicate that US refrigerated truck rates would be more favorable for produce shipped from Florida to the Northeast and to Chicago, than produce trucked from Nogales, Arizona to Chicago.

Comparison of freight costs for fresh produce from Central America (Honduras) and the Western Caribbean (Dominican Republic) indicate that produce can be delivered cheaper to the Northeast from the Caribbean than from Central America.

Projected profit and loss statements for cucumber and melon produced and exported from Honduras and the Dominican Republic indicate that cucumbers are less profitable than melons and both commodities are more profitable from the Dominican Republic than from Honduras.

11/



APPENDIX

TABLE 3. US FRESH FRUIT AND VEGETABLE IMPORTS BY COUNTRY AND YEAR. +

			1,000 CWT			7 05
COUNTRY	1980	1981	1982	1983	AVE	TOTAL
.ARGENTINA	2	12	11	77	26	0.03%
AUSTRALIA	99	1 39	48	98	96	0.11%
BAHAMAS	135	192	170	187	171	0.19%
BELGIUM	15	14	22	33	21	0.02%
BRAZIL	Ø	2	55	1 39	-49	·0.06%
CANADA	5,408	6,901	7,931	7,291	6,883	7.85%
CENTRAL AMERICA	35,750	35,939	35,504	35,765	35,740	40.74%
CHILE	1,252	1,596	2,299	3,388	2,134	2.43%
COLOMBIA	4,652	6,774	8,604	8,282	7,078	8.07%
ECUADOR	11,564	11,677	13,250	9,851	11,586	13.21%
FRANCE	66	81	86	191	106	0.12%
GREECE	0	Ø	1	2	1	.00%
ISRAEL	6	14	40	49	27	0.03%
INDIA	Ø	0	0	2	1	.00%
ITALY	5	3	13	20	10	0.01%
IVORY COAST	Ø	3	Ø	Ø	1	.002
JAPAN	25	21	26	39	28	0.03%
MEXICO	23,134	18,795	22,583	25,448	22,490	25.63%
MOROCCO	1	4	4	15	6	0.01%
NETHERLANDS	84	3	84	35	52	0.06%
NEW ZEALAND	299 🤆	332	279	398	327	0.37%
PERU	11	4	3	1	5	0.01%
SOUTH AFRICA	Z 1 Ø	189	318	269	247	0.28%
SPAIN	21	26	Z17	60	81	0.09%
TAIWAN	Ø	12	24	Ø	9	0.01%
VENEZUELA	8	4	18	32	16	0.02%
WEST INDIES	436	602	548	596	546	0.62%
TOTAL	83,183	83,339	92,138	92,268	87,732	100.002

+FROM: USDA/AMS/F&V

.

DAB:04/22/85 (FILE: CP85)

13

1. V

TABLE 4. US FRESH FRUIT & VEGETABLE IMPORTS FROM DIFFERENT REGIONS- 1980.*

		1,000 CWT									
1380	*********	CENTRAL		UEST	PUERTO	AL I		PER CENT			
COMMODITY	BAHAMAS	AMERICA	MEXICO	INDIES	RICO	OTHERS	TOTAL	OF TOTAL			
ASPARAGUS	Ø	Ø	81	0	0	Ø	81	0.10%			
AVOCADO	Ō	Ō	Ø	47	0	Ø	47	0.06%			
BANANA	Ø	35.007	418	208	Ø	16,191	51,824	62.27%			
BEAN	Ø	. 0	262	3	Ø	11	276	0.33%			
BROCCOLI	Ō	Ø	25	0	. o	Ø	25	0.03%			
BRUS, SPROUTS	Ø	Ø	61	0	Ø	Ø	61	0.07%			
CABBAGE	Ø	Ø	19	0	Ø	256	275	0.33%			
CANTALOUPE	Ő	36	1.764	0	1	Ø	1,801	2.16%			
CARROT	Ō	Ø	48	0	Ø	1,041	1,089	1.31%			
CAULIFLOWER	0	Ø	47	0	Ø	42	89	0.112			
CUCUMBER	135	<u>1</u>	3.072	1	7	19	3,245	3.90%			
EGGPLANT	0	Ø	407	5	Ø	Ø	412	0.50%			
GARLIC	Ø	- vo	212	Ø	Ø	32	244	0.29%			
GRAPEFRUIT	Ø	Ø	96	0	Ø	Ø	96	0.12%			
GRAPES, TABLE	0	Ø	163	Ø	Ø	808	·971	1.17%			
HONEYDEW	Ø	Ø	261	3	13	Ø	274	0.33%			
LETTUCE/ENDIVE	0	Ø	85	0	Ø	66	151	0.18%			
LIME	Ō	1	377	1	Ø	4	383	0.46%			
MANGO	Ø	19	354	84	Ø	Ø	457	0.55%			
MELON, MIXED	Ō	70	33	0	arphi	79	182	0.22%			
OKRA	Ø	17	200	1	Ø	Ø	218	0.26%			
ONION, DRY	Ø	1	829	0	Q,	32	862	1.04%			
ONION, GREEN	0	Ø	428	Q	Ø	Ø	428	0.51%			
ORANGE	0	Ø	207	1	Ø	10	218	0.26%			
PAPAYA	Ø	Ø	18	0	Q	Ø	18	0.02%			
PEAS, GREEN	Ø	Ø	79	Ø	Ø	Ø	79	0.09%			
PEAS, OTHER	0	Ø	27	0	0	Ø	27	0.03%			
PEPPER. BELL	Ø	Ø	1.501	67	Z	4	1,574	1.89%			
PEPPER, OTHER	0	Ø	319	0	Ø	Ø	319	0.38%			
PINEAPPLE	Ø	587	928	0	Ø	Ø	1,515	1.82%			
RADISH	Ø	Ø	94	6	Z	52	154	0.19%			
SPINACH	Ø	Ø	15	0	Ø	Ø	15	0.02%			
SQUASH	Ø	Ø	997	0	Ø	5	1,002	1.20%			
STRAWBERRY	Ø	Ø	114	Ø	Ø	15	129	0.15%			
TANGERINE	0	Ø	328	Ø	Ø	Ø	328	0.39%			
TOMAT	Ø	Ø	5,953	12	18	8	5,991	7.20%			
TCMATO, CHERRY	0	Ø	898	0	Ø	Ø	898	1.28%			
WATERMELON	Ø	1	2,167	Ø	Ø	0	Z,168	2.60%			
VEGS. OTHERS	0	Ø	141	Ø	Ø	Ø	141	0.17%			
MISC HERBS	Ø	0	37	Ø	Ø	Ø	37	0.04%			
MISC TROP F&V	Ø	0	41	0	0	Ø	41	0.05%			
ALL OTHERS	0	0	28	0	0	5,053	5,081	6.11%			
TOTAL	1 35	35,750	23,134	436	4 3	23,728	83,226	100.00%			
PER CENT	0.27	43.0%	27.8%	Ø.5%	0.1%	28.5%	100.02				
化化学学会 化化学学会 化化学					********	******					

. From: USDA/AMS/F&VEG DIV

DAB:04/10/85 (FILE: FFIMP80)

()/

				1,000 CW	 T			
1981						 Διι		DED CENT
	DOLLOMAC	CENTRAL	MEVICO		PUERIO		TOTAL	OF TOTAL
	BHHHMHS	AMERICA	HEXICO					
ASPARAGUS	0	0	92	Ø	Ø	1	93	0.11%
	o o	Ø	0	17	ō	Ø	17	0.02%
BANANA	Ő	35.090	199	3,33	Ø	18,416	54,038	64.79%
REAN	ō	Ø	188	11	1	2	202	0.24%
BROCCOLT	ø	ø	9	Ø	0	0	9	0.01%
BRUS, SPROUTS	Ō	ō	92	0	0	0	92	0.112
CABBAGE	Ū	0	15	ତ	Ø	43	58	0.07%
	Ó	23	1,468	0	2	0	1,493	1.79%
CARROT	Ø	0	24	0	0	855	879	1.05%
CAULIFLOWER	0	0	58	0	Ø	67	125	0.15%
CUCUMBER	187	11	2.855	0	5	27	3,085	3.70%
EGGPLANT	0	0	337	4	0	0	341	0.41%
GARLIC	Ø	3	156	0	0	34	193	0.23%
GRAPEFRUIT	0	Ø	49	0	Ø	Ø	49	0.05%
GRAPES, TABLE	Ø	Ø	164	0	0	1,106	1,270	1.52%
HONEYDEW	0	0	288	0	46	Ø	334	0.40%
LETTUCE/ENDIVE	0	0	45	0	Ø	76	121	0.15%
LIME	0	0	460	8	Ø	5	473	0.57%
MANGO	Ø	Ø	346	97	Ø	1.	444	0.53%
MELON. MIXED	0	120	29	Ø	2	80	231	0.28%
OKRA	0	24	223	Ø	Ø	Ø	247	0.30%
ONION, DRY	0	Z	710	0	Ø	205	917	1.10%
ONION, GREEN	0	0	398	0	Ø	Ø	398	¢.48%
ORANGE	Ø	Ø	126	2	Ø	27	155	0.19%
PAPAYA	Ø	0	15	Ø	Ø	1	16	0.02%
PEAS, GREEN	0	0	54	Ø	Ø	Ø	54	0.06%
PEAS, OTHER	Ø	0	26	Ø	Ø	0	26	0.03%
PEPPER, BELL	0	0	905	50	Ø	5	961	1.15%
PEPPER, OTHER	Ø	Ø	358	0	Ø	0	358	0.43%
PINEAPPLE	0	663	675	53	Ø	3	1,394	1.67%
RADISH	0	Ø	51	3	0	7	61	0.07%
SPINACH	Ø	Ø	13	0	Ø	0	13	0.02%
SQUASH	0	2	784	1	Ø	2	789	0.95%
STRAWBERRY	0	0	50	Ø	0	21	71	0.09%
TANGERINE	0	Ø	385	0	0	0	385	0.46%
TOMATO	5	Ø	4,761	23	7	10	4,806	5.76%
TOMATO, CHERRY	(0	Ø	796	0	0	0	795	0.95%
WATERMELON	Ø	1	1,326	0	1	0	1,328	1.59%
VEGS. OTHERS	Ø	0	179	0	0	0	179	0.21%
MISC HERBS	0	0	0	0	<i>\overline{\cov}</i>	0	۷ در	0.00%
MISC TROP F&V	0	0	81	0	1		8Z	0.10%
ALL OTHERS	0	0	5	ø 	0 	d18,d 	b,821	8.184
TOTAL	192	35,939	18,795	602	65	27,811	83,404	100.00%
PER CENT	0.2	43.1 %	22.5	0.7	x 0.1%	33.3%	100.0	2
	********	**********	*******	********	* > * 4 8 9 8 7 8			*******

TABLE 5. US FRESH FRUIT & VEGETABLE IMPORTS FROM DIFFERENT REGIONS- 1981.*

• From: USDA/AMS/F&VEG D1V

CAB:04/10/85 (FILE: FFIMP81)

 β_{f}

TABLE 6.	US FRES	H FRUIT	8	VEGETABLE	IMPORTS	FROM	DIFFERENT	REGIONS-	1982.	, +
----------	---------	---------	---	-----------	---------	------	-----------	----------	-------	-----

10.02				1,000 CW	IT			
1982		CENTRAL		UFST	PUERTO	ALL		PER CENT
	RAHAMAS	AMERICA	MEXICO	INDIES	RICO	OTHERS	TOTAL	OF TOTAL
ASPARAGUS	Ø	Ø	162	0	Ø	3	165	0.18%
AVOCADO	2	ō	0	12	ø	Ø	14	0.02%
BANANA	ō	34.586	279	165	1	21.854	56,885	61.61%
BEAN	ø	0	156	12	Ø	. 2	170	0.18%
BROCCOLI	ø	ō	0	0	Ø	1	1	.00%
BRUS, SPROUTS	Ō	Ō	85	Ø	0	Ø	85	0.09%
CABBAGE	Ø	Z	110	0	Ø	134	246	0.27%
CANTALOUPE	0	25	1,926	13	Ø	2	1,966	2.13%
CARROT	Ø	Ø	11	0	Ø	1,029	1,040	1.13%
CAULIFLOWER	Ø	Ø	26	0	Ø	90	116	0.13%
CUCUMBER	148	14	2,642	7	2	24	2,837	3.07%
EGGPLANT	0	Ø	354	4	Ø	Ø	358	0.39%
GARLIC	Ø	13	165	0	Ø	62	240	0.25%
GRAPEFRUIT	Ø	0	52	0	Ø	Ø	52	0.06%
GRAPES, TABLE	0	0	358	0	Ø	1,738	2,096	2.27%
HONEYDEW	0	Ø	291	Ø	144	0	435	0.47%
LETTUCE/ENDIVE	Ø	0	75	Ø	Ø	103	178	0.19%
LIME	13	4	199	7	Ø	4	227	0.25%
MANGO	Ø	0	595	109	Ø	Ø	704	0.76%
MELON, MIXED	Ø	113	40	11	7	101	272	0.29%
CKRA	Ø	30	351	5	Ø	Ø	386	0.42%
ONION, DRY	0	2	1,041	0	Ø	ZØ3	1,246	1.35%
ONION, GREEN	Ø	Ø	437	0	Ø	Ø	437	0.47%
ORANGE	Ø	5	252	Ø	Ø	53	310	0.34%
PAPAYA	Ø	Ø	27	0	Ø	2	29	0.03%
PEAS, GREEN	Ø	0	66	Ø	Ø	Ø	66	0.07%
PEAS, OTHER	0	0	38	0	Ø	Ø	38	0.04%
PEPPER, BELL	0	Ø	1,287	61	Ø	14	1,362	1.48%
PEPPER, OTHER	Ø	Ø	476	0	12	0	488	0.53%
PINEAPPLE	0	709	489	127	Ø	0	1,325	1.44%
RADISH	0	0	63	5	1	14	83	0.09%
SPINACH	Ø	0	1	Ø	Ø	Ø	1	.00%
SQUASH	0	0	1,164	1	Ø	0	1,165	1.26%
STRAWBERRY	つ	Ø	23	Ø	Ø	26	49	0.05%
TANGERINE	0	Ø	283	Ø	0	58	339	2.37%
TOMATO	7	0	5,579	9	11	17	5,623	6.09%
TOMATO, CHERRY	Ø	0	796	· Ø	Ø	0	796	0.86%
WATERMELON	Ø	1	2,353	0	18	Ø	2,372	2.57%
VEGS. OTHERS	Ø	0	214	Ø	0	0	214	0.23%
MISC HERBS	0	0	0	0	0	()	0	0.007
MISC TROP F&V	Ø	0	86	0	0	0	86	0.09%
ALL OTHERS	0	Ø	31	Ø	Ø	7,801	7,832	5.48%
		75 50/					03 774	100 00
	170	35,504	22,583	548	196	33,333	32,334	100.00%
PER CENI	v.27	. 38.5%	24.5%	Ø.67	. V.27	JD.17		

• From: USDA/AMS/F&VEG DIV.

DAB:04/10/85 (FILE: FFIMP82)

TABLE 7. US	FRESH I	FRUIT &	VEGETABLE	IMPORTS	FROM	IFFERENT	REGIONS-	• 1983.*
				1,000 CW	T			
1983	*******	CENTRAL		UEST	PUERTO	ALL		PER CENT
COMMODITY	BAHAMAS	AMERICA	MEXICO	INDIES	RICO	OTHERS	TOTAL	OF TOTAL
			173	ананан О	0		187	0.20%
	3	0	0	25	0	,) Ø	28	0.032
RANANA	a a	34 741	828	43	ą	18.273	53.885	58.31%
BEAN	ō	0	197	14	Q) 10	221	0.24%
BROCCOLI	ø	Q	6	Ø	Q) 1	7	0.01%
BRUS. SPROUTS	Ø	Q	71	0	Q	> 2	73	0.08%
CABBAGE	Ø	Q	119	0	Q) 156	275	0.30X
CANTALOUPE	Ø	43	1,557	80	Q	> 2	1,682	1.82%
CARROT	Ø	Q	51	Ø	Q	0 1,210	1,261	1.36%
CAULIFLOWER	Ø	2	24	0	Q) 103	129	0.14%
CUCUMBER	132	15	3,235	17	2 1	25	3,445	3.73%
EGGPLANT	Ø	Q	406	10	Q) 1	417	0.45%
GARLIC	0	Q	194	Ø	Q	81	275	0.30%
GRAPEFRUIT	1	Q) 15	ن	Q) 25	41	0.04%
GRAPES, TABLE	Ø	Q	368	0	Q	2,501	2,869	3.10%
HONEYDEW	Ø	Q	234	0	90) 0	324	0.35%
LETTUCE/ENDIVE	. 0	Q	123	0	Q	128	251	0.27%
JLIME	48	E	322	4	Q	b 1	381	0.41%
MANGO	0	15	i 793.	140	Q	0 1	949	1.03%
MELON, MIXED	0	141	32	6	Q Q	0 144	323	0.35%
OKRA	0	11	408	0	(າ ບ ເ	419	0.45%
ONION, DRY	0	1	1,144	0	Q.	y 286	1,431	1.55%
ONION, GREEN	0		621	0	4	າ ບ ນີ້ 70	621	0.57%
ORANGE	0	e e	90 90	11	Q Q	0 38 N 0	139	0.154
PAPAYA	1	Ý.) 52	9 0	Y C		50	0.00%
PEAS, GREEN	0	70	· 89	20	Y C	0 U	110	0.10%
PEAS, UTHER	0	35		20	v.	ש ש	1 1 5 7	1 7/4
PEPPER, BELL	2	V.	1,055	00	ſ	· 22	UCI, I UCI	0 E74
PEPPER, UIHER	0 0	2 75		170		שי ב ר א	1 516	1 547
	v 0	(34	· [2]	7	×.	2 2 2	1,010	0 172
	v 0		17	Д	× c	י א ה	17	0.122
	v 0	х 0	1 2 5 7	1		5 U 3 0	1 263	1 372
SQUASA	v 0	0	ין, גטג א זא	י ס	0	יי אר אי	53	0.05%
TANGERINE	ч С	0	, <u>55</u> N 785	0 0	6	20 20 35	420	0.45%
TOMATO	0	0) E 977	25	ş	3 4	Б <u>9</u> 70	7.54%
TOMATO CHERRY	/ 0	. 0	879			5 0	879	0.902
UATERME! ON	, v A	1	7 043	7	10	. U) Ø	2.056	2.221
VEGS. ATHERS	0 0	. 0	2,0≕0) 707	- 0) Ø	202	0.22%
MISC HERRS	0 0	. 0) 0	Ø	, i	5 0	0	0.002
MISC TROP FAV	0	. 0	, 101	Ø		3 0	104	0.11%
	U			-				

119

0 0 7,180 7 299

0.6% 0.2% 32.8% 100.0%

596 135 2,272 92,407 100.00%

* From: USDA/AMS/F&VEG DIV

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

ALL OTHERS

TOTAL

DAB:04/12/85 (FILE: FFIMP831)

PER CENT 0.2% 38.7% 27.5%

Ø

0 0

187 35,765 25,448

7.90%

TRBLE 8. US FRESH FRUIT & VEGETABLE IMPORTS FROM DIFFERENT REGIONS- 1983.*

Pg. 809

 $\sqrt{2^{\sqrt{2}}}$

1007		1,009 CUT										
1753				CENTRAL	. AMERICA	}				uest 1	INDIES	
CONTROLLY	BELIZE	EL SAL.	C. R.	SURT.	HON.	NICAR.	PANANA	TOTRL	D. R.	HAITI	JPHAICA	TOTAL
ASPARAGUS	0	0	0	0	0	0	0	0	0	0	0	0
RUOCAOO	0	0	0	0	0	0	0	0	25	0	0	25
Brhana	0	0	12,806	1,689	11,008	1,365	4,873	34,741	42	0	1	43
BEAN	0	0	0	0	0	0	0	0	14	0	0	14
BROCCOLI	0	0	0	0	0	0	0	0	Û	0	0	0
BRUS. SPROUTS	0	0	0	0	0	0	0	0	0	0	0	0
CABBAGE	0	0	0	0	0	0	0	0	0	0	0	0
CANTALCUPE	0	0	Z	0	11	0	0	13	80	0	0	80
CHRRUI	0	0	0	0	0	0	0	0	0	0	0	0
CHULIFLOUER	0	0	0	2	0	Q	0	2	0	C	0	0
CUCUMBER	0	0	0	0	15	0	0	15	12	0	5	17
EGGPLANI	0	0	0	0	0	0	0	0	10	0	0	10
SHRLIC	Ű	Ű	0	0	0	0	0	0	0	0	0	0
	U O	U	U O	U	U	U	U	U	U	U	U	U
UNNEVOCI	U n	U n	U	U N	U	U	U	U	U	U	U	U O
I STTUCE / SKATUS	U N	U N	0	U N	u n	U	U 0	0	U	U	U 0	U
	0	U A	U O	0	U C	U n	U 0	U C	U 0	U A	0	U A
MANEO	10	U N	0	U N	o n	U A	0	15	U 7	127	U N	140
MET ON MEYER	13	21	u q	04 04	U 1.4	บ ถ	U 7	13 141	3	131	U N	110
NECOL, MANLE	0 0		r n	11	רו ה	1	۰ د	11	0	0	0	0
ONTON CRY	ດ ເ		0	10	0	י ק	0	1	0	0	0	U N
ONTON SPEEN	n N	n	ນ ມ	'n	v A	0	ů Ú	'n	0	U N	n N	0
ORANGE	n N	n n	ů N	n	ง ก	n	0	n	11	n N	n n	11
PRPRYR	ß	Ő	n N	n	0		ů N	ถ	יי ח	n n	้ถ	, , , , , , , , , , , , , , , , , , ,
PEAS, GREEN	0	0	Ō	ů	0	0	ů.	0	0 0	0 0	0	n n
PEAS, OTHER	Ō	0	0	35	n n	0	Ô	35	20	ů l	0 0	20
PEPPER, SELL	0	0 0	0	0	Ċ	0	Ō	0	61	0	5	66
PEPPER, UTHER	Ō	Û	0	Ŭ	0	Ō	0	ů O	0	0 0	0	0
PINERPPIE	0	0	84	4	665	Û	Ō	754	129	0	0	129
RADISH	9	Ĵ	3	Q	Û	0	0	0	2	1	Ū	3
SPINACH	Q	0	0	0	0	0	Û	0	0	0	0	C
SQURSH	U	0	3	0	ຄ	C	0	0	1	0	0	1
STRRUBERRY	0	Û	0	0	0	9	0	0	0	0	0	ũ
TANGERINE	0	C	0	0	0	0	9	0	U	0	0	0
TOMATO	0	0	0	Q	0	9	0	0	16	0	ġ	25
TOMATO, CHERRY	G	0	3	0	0	0	0	Û	Û	0	0	0
UATERMELON	0	C	0]	0	9	1	1	0	0	2	2
VESS. OTHERS	0	0	C	ť	0	9	9	0	0	C	0	0
MISC HERBS	C	0	0	C	ũ	3	Û	Û	C	0	0	0
MISC TROP FRU	Û	0	Û	0	0	0	0	0	9	0	0	0
ALL OTHERS	0	0	0	Ŋ 	0	U 	0	<u> </u>	0	0	0	0
TOTAL	15	21	12,901	4,835	11,750	1,366	4,277	35,755	432	142	22	596

• From: USDA/HIS/FAUES DIV

OA8:05/24/85 (FILE: FFIMP832)

16

	,		جہ جب ہے اور اور سے میں پند وہ خو تو تو تو ہو ہے ہے ہے اور	US DOL	 _LARS
YEAR COM		ACKAGE	EXPENSE	PACKAGE	POUND
1978-79 CUCUN	IBERS 4	47-LB	TRANSPORT TO NOGALES		\$0.022
	10 L. 1.0	BUSHEL	CROSSING CHARGES	\$0.09	\$0.002
			TARIFF	\$1.35	\$0.029
			FEES	\$0.09	\$0.002
			TOTAL	\$2.56	\$0.054
1978-79 PEPP	RS 2	28-LB	TRANSPORT TO NOGALES	\$0.85	\$0,030
	1	BUSHEL	CROSSING CHARGES	\$0.09	\$0.003
			TARIFF	\$0. 70	\$0.025
			PRODUCTION TAXES	\$0.03	\$0.001
			TOTAL	\$1.67	\$0.060
1978-79 TOMA	то	30-18	TRANSPORT TO NOGALES	\$0.60	\$0.020
		CARTON	CROSSING CHARGES	\$0.07	\$0.002
			TARIFF	\$0.55	\$0.019
			PRODUCTION TAXES	\$0.13	\$0.004
			TOTAL	\$1.35	\$0.045
1978-79 TOMA	то	20-LB	TRANSPORT TO TIJUANA	\$0.31	\$0.016
		CARTON	CROSSING CHARGES	\$0.08	\$0.004
			TARIFF	\$0.42	\$0.021
			TOTAL	\$0.81	\$0.041

TABLE 10. DISTRIBUTION COSTS FOR SOME FRESH PRODUCE IMPORTED FROM MEXICO.+

FROM: ZEPP, G.A. AND R.L. SIMMONS. 1979 AND 1980. DAB;06/07/85 (FILE: FVMEX1)

1983	600D US	BAHAMAS	CENTRAL	MEXICO	WEST INDIES	PUERTO RICO	тот	AL
COMMODITY	(CMI/HA)	AMOUNT .	AMOUNT+	AMOUNT +	AMOUNT +	AMOUNT .	AMOUNT .	HA
ASPARAGUS	99	0	0	173	0	0	173	1,747
BROCCOLI	272	0	0	6	0	0	6	22
BRUS. SPROUTS	346	0	0	71	0	0	71	205
CABBAGE	618	0	0	119	0	0	119	193
CANTALOUPE	494	0	43	1,557	80	Ø	1,680	3,401
CARROT	865	0	0	51	0	Ø	51	59
CAULIFLOWER	371	0	2	24	0	Ø	26	70
CUCUMBER	618	132	15	3,235	17	21	3,420	5,534
EGGPLANT	618	0	0	406	10	0	415	673
GARLIC	395	0	0	194	0	Ø	194	491
HONEYDEW	618	0	Ø	234	0	90	324	524
MELON, MIXED	371	Ø	141	32	6	Ø	179	482
OKRA	247	Ø	11	408	0	Ø	419	1,696
ONION, DRY	988	0	1	1,144	0	0	1,145	1,159
PEPPER, BELL	494	2	0	1,059	66	1	1,128	2,283
SPINACH	371	0	0	12	0	Ø	12	32
SQUASH	741	Ø	0	1,252	1	0	1,263	1,704
TOMATO	494	Ø	0	6,933	25	8	6,966	14,101
WATERMELON	494	0	1	2,043	2	10	2,056	4,162
TOTAL		134	214	18,963	207	130	19,648	38,541

TABLE 12. SELECTED US IMPORTS FROM DIFFERENT REGIONS AND THE CALCULATED PRODUCTION AREAS FOR EACH COMMODITY.

1,000 CWT; From: USDA/AMS/F&V DIV.

** "GOOD YIELDS IN THE US"; From: KNOTT'S HANDBOOK FOR VEGETABLE GROWERS. DAB;05/31/85 (FILE: FFIMP838)

		PACKAGE		AVERAGE	PRICE PE	ER POUND
COMMODITY	ORIGIN	TYPE	LBS	1982	1 983	AVERAGE
	MEXICO	1/2 CARTON	14	\$1.81	\$2.02	\$1.97
RANANA	FCUADOR	CARTON	40	\$0.25	\$0.29	\$0.27
BROCCOL I	CALE	14-16 CARTONS	23	\$0.47	\$0.51	\$0.49
BRUS, SPROUTS	MEXICO	10 OZ CUPS	6.63	\$1.14	\$1.29	\$1.22
CABBAGE	NEW JER	CARTON	50	\$0.09	\$0,12	\$0.11
CANTALOUPE	MEXICO	1/2 CRATES	40	\$0.38	\$0.56	\$0.47
CARROT	TX & FLA	SACKS	50	\$0.17	\$0.16	\$0.17
CAULIFLOWER	FLA	CARTON- 12'S	22	\$0.61	\$0.54	\$0.58
CUCUMBER	MEXICO	1&1/9	55	\$0.34	\$0.34	\$0.34
EGGPLANT	MEXICO	1&1/9	33	\$0.28	\$0.31	\$0.30
IONEYDEW	PR & MEX	CARTON	30	\$0.33	\$0.47	\$0.40
IME	MEXICO	36-72 CARTON	10	\$0.79	\$0.48	\$0.64
1ANG0	MEXICO	CARTON 8-14	10	\$0.69	\$0.66	\$0.68
MELON, MIXED	MEXICO	CARTON	30	\$0.72	\$0,65	\$0.69
OKRA	MEXICO	1/2 BU CRATE	15	\$0.74	\$0.84	\$0.79
DNION, DRY	MEXICO	BOILER/RED	25	\$0.52	\$0.54	\$0.53
DNION, GREEN	MEXICO	CARTON- 48'S	13	\$0.67	\$0.56	\$0.62
PAPAYA	HAWAII	9-12 CARTONS	10	\$1.06	\$1.05	\$1.06
PEAS, GREEN	MEXICO	1&1/9 BU	30	\$0.63	\$0.50	\$0.62
PEAS OTHER	GUAT.	(CHINA TYPE)	1	-	\$2.10	\$2.10
PEPPER BELL	MEXICO	1&1/9 BU	28	\$0.54	\$0.58	\$0.58
PINEAPPLE	HON	TWO-LAYER	40	\$0.29	\$0.30	\$0.30
RADISH	FLA	BUNCH- 24'S	15	\$0.40	\$0.44	\$0.42
SPINACH	TX & FLA	BUSHEL	25	\$0.37	\$0.37	\$0.37
SQUASH- ZUCC	MEXICO	LUGS	26	\$0.34	\$0.56	\$0.45
SQUASH- YSNECK	MEXICO	LUGS	26	\$0.60	\$0.63	\$0.62
TOMATO	MEXICO	Z- LYR FLAT	20	\$0.53	\$0.53	\$0.53
TOMATO, CHERRY	MEXICO	12 PT TRAY	15	\$0.73	\$0.56	\$0.65
WATERMELON- CG	MEXICO	3-4 CARTONS	1	\$0.24	\$0.31	\$0.28
WATERMELON- JU	MEXICO	3-4 CARTONS	1	\$0.23	\$0.31	\$0.27
	AVERAGE P	RICE PER POUND		\$0.55	\$0.62	\$0.6

TABLE 15. AVERAGE NEW YORK WHOLESALE PRICES PER POUND FOR FRESH

+ From: USDA/AMS/F&VEG DIV/MARKET NEWS BRANCH.

DAB:04/15/85 (FILE: FFIMP836)

IMPURIS USING AVERAGE NEW TURK WHULESHLE FRIDED."										
		1982			1983					
	AVE	 Cwt	VALUE	AVE	CWT	VALUE				
COMMODITY	\$/LBS	(000'S)	(MM \$)	\$/LBS	(000'5)	(MM \$)				
				•2 02						
	\$1,81 •0.75		\$23.803	€0.02		₽2/.//4				
	90.25	20,003	DI,422.120	90.23	22,003	al,302.003				
BRUGGULI BRUG CBROUTE			30.047 69.000	30.JI #1 70	י דרי	50.337 ¢0.417				
DRUS. SPRUUIS	⇒1,14 ¢0,00	245	33.030	01.43	() 275	93.41/ e7 700				
		240	94.214 #74 700	90.12 CO EE	1 5 9 3	\$3.300 #04 107				
	50.35	1,300	\$74.705 #17.407	₽V.30 ¢0 16	1,004	934.134 e20 175				
	90.17 ¢0.71	1,025	917.433 #7 076		1,481	920.170 #C 0CC				
	50.01 CO 74		37,070 C 450		7 445	30.300 et17 170				
	50.34 +0.30	2,857	\$30.430 ¢:0.074	50.34	3,443	#17 077				
LOUFLANI	30.28	338	510.024	50.01 en 47	417	DIZ.J21				
MUNETUEW		435	\$14.355 #0.716		324	PIJ.240				
	30.73 +0.65	4	30.315 #40 575		201	\$10.200 #C7 C74				
MANGU	90.03	704	\$48.570	90.00 TA CC	343	\$04.034 \$20 00C				
MELUN, MIXED	\$0.72	272	\$19.584	\$0.65	525	\$20.333 ¢75 195				
	50.74	386	\$28.504	50.84	413	303.130 077 774				
UNIUN, DRY	\$0.52	1,246	\$64.752	50.54	1,431	₽//.८/4 #7/ 775				
UNIUN, GREEN	\$0.67	437	\$29.279	\$0.55	621	\$34.//D				
	\$1.05	29	\$5.074	\$1.05	50	\$3.303				
PEAS, GREEN	\$0.53	66	\$4.158	\$0.60	89	33.340				
PEAS, OTHER	\$2.00	38	\$7.600	\$2.10	118	\$24.780				
PEPPER, BELL	50.54	1,362	573.548	\$0.58	1,150	\$66.700				
PINEAPPLE	50.29	1,325	\$38.425	50.30	1,516	\$45.480				
RADISH	\$0.40	83	\$3.320	\$0.44	110	54.840				
SPINACH	\$0.37	1	\$0.037	\$0.37	12	50.444				
SQUASH	\$0.47	1,165	\$54.755	\$0.60	1,263	\$75.780				
TOMATO	\$0.53	5,623	\$298.019	\$0.53	6,970	\$369.410				
TOMATO, CHERRY	\$0.73	796	\$58.108	\$0.56	829	\$46.424				
WATERMELON	\$0.24	2,372	\$56.928	\$0.31	2,056	\$63.736				
SUB-TOTAL		80,032	\$2,473.138		79,975	\$2,837.794				
ALL OTHERS	\$0.55	12,302	\$676.510	\$0.52	12,432	\$770.784				
TOTAL		92,334	\$3,149.748		92 , 407	\$3,608.578				

TABLE 16. CALCULATED TOTAL DOLLAR VALUE OF US FRESH PRODUCE IMPORTS USING AVERAGE NEW YORK WHOLESALE PRICES.+

+ From: USDA/AMS/F&VEG DIV/MARKET NEWS BRANCH.

DAB:04/15/85 (FILE: FFIMP837)

Opy /

TABLE 17. ESTIMATED OCEAN FREIGHT COSTS FOR FRESH CUCUMBER FROM DIFFERENT COUNTRIES AND REGIONS...

ہ ہے کے خلی نے کر کر کر ہے ہے	CENTRAL	AMERICA		CARIBBE	N REGION	
COUNTRY	HONDURAS	GUATEMALA	DOM. REP.	DOM. REP.	HAITI	HAITI
CONFERENCE: COMMODITY: COMPANY: CARTONS: POUNDS: SIZE: DATE: FROM:	SA & GULF CUCUMBERS SEA-LAND 720 40,000 40 FEET 1JAN85 P. CORTEZ	SA & GULF CUCUMBERS SEA-LAND 720 40,000 40 FEET 1 JAN85 STO. TOMAS	USA&G-JHIS CUCUMBERS SEA-LAND 580 35 FEET 1 JAN85 STD. DGO.	USA&G-JHIS CUCUMBERS SEA-LAND 36,000 35 FEET 1JAN85 STO. DGO.	FRT&VE6 SEA-LAND 680 36,000 35 FEET 1JAN85 P au P	FRT&VEG SEA-LAND 680 36,000 35 FEET 1 JAN85 P au P
TO:	FLORIDA	FLORIDA	FLORIDA	NEW JERSEY	FLURIDA	NEW JERSET
COSTS						
OCEAN WHARFAGE HANDLING TERMINAL ARRIMO DOCUMENTS REEFER USE ASSESSMENT LANDING	\$2,440.00 \$0.00 \$144.00 \$136.00 \$0.00 \$12.50 \$0.00 \$0.00 \$0.00	\$2,440.00 \$85.00 \$144.00 \$0.00 \$0.00 \$12.50 \$0.00 \$0.00 \$0.00 \$0.00	\$1,750.00 \$0.00 \$200.00 \$40.91 \$12.50 \$100.00 \$0.00 \$0.00	\$2,175.00 \$0.00 \$200.00 \$40.91 \$12.50 \$100.00 \$0.00 - \$0.00	\$1,440.00 \$92.70 \$220.00 \$0.00 \$0.00 \$12.50 \$0.00 \$0.00 \$240.00	\$1,840.00 \$92.70 \$250.00 \$0.00 \$12.50 \$0.00 \$255.00
SUB-TOTAL	\$2,732.50	\$2,681.50	\$2,103.41	\$2,528.41	\$2,005.20 \$0.00	\$2,450.20 \$0.00
SUKCHARGE	50.00 	00.0¢	4، مار ا حد 	00.401¢ 	90.00 	+0.00
TOTAL	\$2,732.50	\$2,681.50	\$2,240.13	\$2,692.76	\$2,005.20	\$2,450.20
PER POUND PER CARTON	\$0.069 \$3.80	\$0.068 \$3.72	\$0.060 \$3.29	\$0.072 \$3.96	\$0.054 \$2.95	\$0.066 \$3.60

• SA & GULF- SOUTH ATLANTIC AND GULF- EL SALVADOR/GUATEMALA/HONDURAS RATES. USA&G-JHIS- US ATLANTIC & GULF-JAMAICA & HISPANDLA STEAMSHIP FREIGHT ASSOC. DAB:04/17/85 (FILE: TRATE056)

(l).

TABLE 18. ESTIMATED OCEAN FREIGHT COSTS FOR MELON FROM DIFFERENT COUNTRIES AND REGIONS. +

	CE1	NTRAL AMERI			CARIBBEAN	REGION	
COUNTRY	HONDURAS	GUATEMALA	FI SAL.	DOM. REP.	DOM. REP.	HAITI	HAITT
CONFERENCE: COMMODITY: COMPANY: CARTONS: POUNDS: SIZE: DATE: FROM: TO:	SA & GULF MELON SEA-LAND 1,020 38,250 35 FEET 1JAN85 P. CORTEZ FLORIDA	SA & GULF MELON SEA-LAND 1,020 38,250 35 FEET 1JAN85 ST. TOMAS FLORIDA	SA & GULF MELON SEA-LAND 1,020 38,250 35 FEET 1JAN85 6. PALMER FLORIDA	USA&G-JHIS MELON SEA-LAND 1,020 38,250 35 FEET 1JAN85 STO. DGO. FLORIDA	USA&G-JHIS MELON SEA-LAND 1,020 38,250 35 FEET 1JAN85 STO. DGO. NEW JER.	FRT&VEG SEA-LAND 1,020 38,250 35 FEET 1JAN85 P au P FLORIDA	FRT&VE6 SEA-LAN 1,020 38,250 35 FEET 1JAN85 P au P NEW JER
COSTS							
OCEAN	\$1,727	\$1,584	\$1,914	\$1,760	\$2,175	\$1,440	\$1,840
WHARFAGE	Ø	85	85	Ø	0	93	93
HANDLING	204	204	204	200	200	220	250
TERMINAL	136	0	124	0	0	0	Ø
ARRIMO	0	0	0	41	41	0	0
DUCUMENIS	13	13	13	10	13	13	10
ACCECCMENT	0 0	0	0	100	001	0	0
LANDING	ø	0	ø	Ø	ø	240	255
SUB-TOTAL SURCHARGE	\$2,080 \$2	\$1,885 Ø	\$2,340 0	\$2,113 137	\$2,528 164	\$2,005 0	\$2,450 Ø
TOTAL	\$2,080	\$1,886	\$2,340	\$2,251	\$2,693	\$2,005	\$2,450
PER POUND PER CARTON	\$0.054 \$2.04	\$0.049 \$1.85	\$0.061 \$2.29	\$0.05 9 \$2. 21	\$0.070 \$2.64	\$0.052 \$1.97	\$0.064 \$2.40

• SA & GULF- SOUTH ATLANTIC & GULF, EL SALVADOR/GUATEMALA/HONDURAS RATES.

USA&G-JHIS- US ATLANTIC & GULF-JAMAICA & HISPANOLA STEAMSHIP FREIGHT ASSOC. DAB:04/18/85 (FILE: TRATE857)

	FREI	GHT COSTS.+			001120110		
94¥694¥84		RIGIN) 및 및 및 대 및 및 및 및 및 및 및 및 및 및 및 및 및 및 및	• « = = # 1	COS	T (US S)
COMMODITY	REGION	LOCATION	DESTINATION	CTNS	TRAILER	CTN	LB
CUCUMBER	CA	COMAYAGUA ZACAPA	P. CORTEZ STO. TOMAS	680 680	200 94	0.294 0.138	0.005 0.003
			AVERAGE	680	147	0.216	0.004
CUCUMBER	CAR	AZUA AZUA	STO. DGO. P. VIEJO	680 680	100 30	0.147 0.044	0.003 0.001
			AVERAGE	680	65	0.096	0.002
CUCUMBER	US	EVERGLADES EVERGLADES	IMMOKOLEE MIAMI	680 680	250 100	0.368	0.007 0.003
			AVERAGE	680	175	0.257	0.005
CUCUMBER	US	NEW JERSEY	NEW YORK	720	100	0.139	0.003
MELON	CA	CHOLUTECA NACOME G. PALMER ESQUINTLA RESTALHULEU ZACAPA	P. CORTEZ P. CORTEZ STO. TOMAS STO. TOMAS STO. TOMAS STO. TOMAS	1020 1020 1020 1020 1020 1020	405 380 210 290 530 210	0.397 0.373 0.206 0.284 0.520 0.206	0.011 0.010 0.005 0.008 0.014 0.005
			AVERAGE	1020	338	0.331	0.009
MELON	CAR	AZUA AZUA	STO. DGO. P. VIEJO	1020 1020	100 30	0.098 0.029	0.003 0.001
			AVERAGE	1020	65	0.054	0.002
MELON	US	JACKSONVILLE EVERGLADES	MIAMI MIAMI	1020 1020	300 100	0.294	0.008
			AVERAGE	1020	200	0.196	0.005
MELON	US	NEW JERSEY	NEW YORK	1020	100	0.098	0.003
•DATA FRO FEDERAL-	M SEA-L STATE M	AND AND FRUI ARKET NEWS.	T & VEGETABLE	TRUC	K RATE RE	PORT.	

TABLE 19 ESTIMATED CUCUMBER & MELON INLAND (DOMESTIC & FOREIGN)

DAB:04/18/85 (FILE: TRATE855)

1

19c]

ی نے لیے جاتے ہے وہ میں اور			COST (US \$)						
			RA	NGE					
COMMODITY	ORIGIN	DESTINATION	LOW	HIGH	AVE	LB			
VEGETABLES AND CITRUS	S. CALIFORNIA	ATLANTA CHICAGO DALLAS DENVER NEW YORK	\$1,800 \$1,600 \$1,300 \$1,100 \$2,300	\$2,200 \$1,900 \$1,500 \$1,300 \$1,300 \$2,600	\$2,000 \$1,750 \$1,400 \$1,200 \$2,450	\$0.050 \$0.044 \$0.035 \$0.030 \$0.051			
VEGETABLES	NOGALES, ARIZONA	CHICAGO DALLAS DENVER LOS ANGELES NEW YORK	\$2,000 \$1,000 \$2,800	\$2,100 \$1,200 \$2,900	\$2,050 \$1,100 \$1,100 \$850 \$2,850	\$0.051 \$0.028 \$0.028 \$0.021 \$0.071			
SPINACH	RIO GRANDE, TEXAS	CHICAGO DALLAS Los Angeles New York	\$1,450 \$700 \$1,500 \$2,100	\$1,700 \$850 \$1,650 \$2,500	\$1,575 \$775 \$1,575 \$2,300	\$0.039 \$0.019 \$0.039 \$0.058			
TOMATO	FLORIDA	ATLANTA Chicago 'New York	\$750 \$1,600 \$1,600	\$900 \$1,840 \$1,920	\$825 \$1,720 \$1,750	\$0.021 \$0.043 \$0.044			
VEGETABLES	WEST & CENTRAL NEW YORK	NEW YORK	\$520	\$720	\$620	\$0.016			
<pre>**FRUIT AND VEGETABLE TRUCK RATE REPORT.* FEDERAL-STATE MARKET NEWS DECEMBER 27, 1984. DAB:04/18/85 (FILE: TRATE858)</pre>									

TABLE 20. TRUCK RATES, PER LOAD, TO SELECTED MARKETS IN THE US.+

TABLE 21. ESTIMATED FREIGHT COSTS FOR CUCUMBER AND MELON FROM CENTRAL AMERICA AND THE CARIBBEAN.

		DOMINICA	N REPUB	_IC	HO	NDURAS
CUCUMBER	FROM:	AZUA MTAMT	FROM:	AZUA NEW JERSEY	FROM:	COMAYAGUA MIAMI
FREIGHT	то:	NEW YORK	TO:	NEW YORK	TO:	NEW YORK

COSTS	\$/CTN	\$/LB	\$/CTN	\$/LB	\$/CTN	\$/LB
INLAND- FOREIGN	0.10	0.002	0.10	0.002	0.29	0.005
OCEAN	3.50	0.064	4.21	0.077	3.80	0.069
INLAND- US	0.25	0.005	0.00	0.000	0.26	0.005
HANDLING	0.25	0.005	0.00	0.000	0.25	0.005
INLAND- NY	2.44	0.044	0.14	0.003	2.44	0.044
HANDLING	0.25	0.005	0.25	0.005	0.25	0.005
TOTAL	6.80	0.124	4.70	0.085	7.29	0.133
		DOMINIC	_IC	10H		
MELON	FROM:	AZUA	FROM:	AZUA	FROM	CHOLUTECA
	т0:	MIAMI	TO:	NEW JERSEY	то:	MIAMI
FREIGHT	то:	NEW YORK	то:	NEW YORK	T0:	NEW YORK
COSTS	\$/CTN	\$/LB	\$/CTN	\$/LB	\$/CTN	\$/LB
INLAND- FOREIGN	0,05	0.002	0.05	0.002	0.39	0.010
OCEAN	2.21	0.055	2.61	0.065	2.04	0.051
INLAND- US	0.26	0.007	0.00	0.000	0.25	0.007
HANDLING	0.20	0.005	0.00	0.000	0.20	0.005
INLAND- NY	1.76	0.044	0.00	0.000	1.76	0.044
HANDLING	0.20	0.005	. 0.20	0.005	0.20	0.005
TOTAL	4.69	0.117	2.87	0.072	4.85	0.121

DAB:04/19/85 (FILE: PLSMT851)

'as

		CUCUM	BERS			ME	LON	
	DOM.	REP.	HOND	JRAS	DOM.	REP.	HONDU	JRAS
REVENUES	\$/CTN	\$/L8	\$/CTN	\$/LB	\$/CTN	\$/LB	\$/CTN	\$/LB
EXPORT SALES	18.70	0.340	18.70	0.340	18.80	0.470	18.80	0.470
COSTS								
PRODUCTION								
MECHANIZATION	0.09	0.002	0.09	0.002	0.10	0.003	0.10	0.003
CHEMICALS	0.88	0.016	0.88	0.016	1.25	0.031	1.25	0.031
SEED	0.03	0.001	0.03	0.001	0.25	0.006	0.25	0.006
LABOR	0.20	0.004	0.20	0.004	0.30	0.003	0.30	0.008
SUB-TOTAL	1.20	0.022	1.20	0.022	1.90	0.048	1.90	0.048
HARVESTING	0.10	0.002	0.10	0.002	0.15	0.004	0.15	0 .004
PACKING	1.75	0.032	1.75	0.032	1.50	0.038	1.50	0.038
DISTRIBUTION								
COMMISSION	2.81	0.051	2.81	0.051	2.82	0.071	2.82	0.071
FREIGHT	5.80	0.124	7.29	0.133	4.69	0.117	,4.85	0.121
INSPECTIONS	0.15	0.003	0.15	0.003	0.12	0.003	0.12	0.003
MISCELLANY	0.10	0.002	0.10	0.002	0.10	0.003	0.10	0.003
SUB-TOTAL	9.86	0.179	10.35	0.188	7.73	0.193	7.89	0.197
ADMINISTRATION	0.75	0.014	0.75	0.014	1.00	0.025	1.00	0.025
TOTAL	13.66	0.248	14.15	0.257	12.28	0.307	12.44	0.311
VARIOUS (10%)	1.37	0.025	1.41	0.026	1.23	0.031	1.24	0.031
TOTAL COSTS	15.02	0.273	15.56	0.283	13.51	0.338	13.68	0.342
RETURN TO		···••••••						
CAF & MGMT	3.68	0.067	3.14	0.057	5.29	0.132	5.12	0.128

TABLE 22. PROFIT AND LOSS STATEMENTS FOR CUCUMBER AND MELON PRODUCED IN CENTRAL AMERICA AND THE CARIBBEAN.

DAB:04/22/85 (FILE: PLSMT85)

2°.40

BIBLIOGRAPHY

Anonymous. 1980. "Fresh Fruit and Vegetable Shipments." FVUS-7. USDA. Agricultural Marketing Service. Fruit and Vegetable Division. Washington, D.C.

Anonymous. 1981. "Fresh Fruit and Vegetable Shipments." FVUS-7. USDA. Agricultural Marketing Service. Fruit and Vegetable Division. Washington, D.C.

Anonymous. 1982. Agricultural Statistics. USDA. Statistical Reporting Service. Washington, D.C.

Anonymous. 1982. "Fresh Fruit and Vegetable Shipments." FVAS-7. USDA. Agricultural Marketing Service. Fruit and Vegetable Division. Washington, D.C.

Anonymous. 1982. "New York City Fresh Fruit and Vegetable Wholesale Market Prices." USDA. Agricultural Marketing Service. Market News Branch. Washington, D.C.

Anonymous. 1983. "Fresh Fruit and Vegetable Shipments." FVAS-7. USDA. Agricultural Marketing Service. Fruit and Vegetable Division. Washington, D.C.

Anonymous. 1983. "New York City Fresh Fruit and Vegetable Wholesale Market Prices." USDA. Agricultural Marketing Service. Market News Branch. Washington, D.C.

Annonymous. 1984. "Fruit and Vegetable Truck Rate Report." Vol. VI. No. 52. Federal-State Market News. San Francisco, California 94111.

Lorenz, O.A. and D.N. Maynard. 1980. Knott's Handbook for Vegetable Growers. 2nd Edition. Wiley-Interscience. New York, New York.

Zepp, G.A. and R.L. Simmons. 1979. Producing Fresh Winter Vegetables in Florida and Mexico: Costs and Competition. USDA. ESCS-72. Economics, Statistics, and Cooperatives Service. Washington, DC.

Zepp, G.A. and R.L. Simmons. 1980. Producing Fresh Tomatoes in California and Baja California: Costs and Competition. USDA. ESCS-78. Economics, Statistics, and Cooperatives Service. Washington, DC.

ANNEX 2.C.: SOCIAL SOUNDNESS ANALYSIS

The social context for the introduction and implementation of the Government's land diversification program is characterized by a complex interplay of social and economic issues. General economic indicators show a reduction in the living standard of most Jamaicans as inflation (36.7 percent), currency devaluation (60 percent) and the rising consumer price index (27 percent) means, in effect, a reduction in real disposable income. While unemployment declined somewhat during the year, the general rate is estimated to be 25.5 percent. Unemployment is differentially distributed among the work force and those capable of working. For example, joblessness for those less than 25 years of age is 46.4 percent in contrast to a rate of 16.4 percent among workers over 25 years. Unemployment among women is 36.5 percent, twice that of males (15.7 percent). Women's employment tends to be concentrated within the private sector (other services 34 percent), commerce (20.6 percent), public administration (15.9) and agriculture, forestry and fishing (15.7). Yet in these and other sectors of the economy, female rates of unemployment are two to three times that of males.

An additional factor influencing the employment picture is the loss of jobs of some 15,500 heads of households generating what is termed an "additional worker effect." This refers to the attempt of family members not previously in the labor force to find work to offset the job loss of the head of the household. This along with high rates of unemployment among younger age groups and the fact that about two-thirds of the unemployed have been jobless for more than a year, suggests that employment creation is a critical issue facing the government.

The Government has a strategy for economic growth which focuses on the private sector, with great reliance being placed on the potential of foreign and local investors to provide requisite capital, technical and managerial inputs. Agro 21 has been established as the catalytic agent to spearhead activities in the private sector in agriculture. The thrust of government policy is to enhance the productivity of under and unutilized areas among previously controlled government sugar lands. The first area chosen for the diversification project is an area of some 20,000 acres in St. Catherine Parish.

This section of the report analyzes the social issues and implications of the Agro 21 approach related to the short and long term consequences of project activity. While the first few subactivities of the project concentrate on 2,000 cultivable acres on the estates of Caymanas and Bernard Lodge, the social analysis incorporates some data on the larger St. Catherine Parish in order to present general conditions such as employment, sources of labor, cropping patterns and an assessment of expected returns to the rural population likely to be involved and/or affected by the diversification scheme. Specific attention to the small farmer is addressed.

General Overview of St. Catherine Parish Area

The area which comprises the parish of St. Catherine lies to the west and south of Kingston. It is serviced by major roads and is about 15 miles from Kingston. St. Catherine is about 483 square miles in area or approximately 309,312 total acres. According to land use reports, of the total area of the parish, 7.47 percent is used for residential, commercial, or industrial purposes; approximately 38.88 percent is used for agricultural cultivation including unimproved pasture lands; and the remaining 53.64 percent of the area is covered with brush and deciduous forest (CRIES, Jamaica Resource Assessment, 1982).

Demographic Characteristics

St. Catherine holds the distinction of experiencing the largest growth in population of any parish in Jamaica. In 1970, about 10 percent of the total population lived in St. Catherine. By 1982 this proportion had increased to slightly over 15 percent. This represents an overall percentage increase of about 82 percent, representative of an annual growth rate of roughly 5 percent. Population increases have changed the population density from 389 persons per square mile in 1970 to 723 persons in 1982 (Population Census 1982, ix).

From the above data, the following issues are apparent:

- i. Growing urbanization has placed a strain on the physical resources i.e. water, sanitary facilities, and land. The idle and underutilized land in the parish has been taken out of sugar production for some time and if left underdeveloped could become a target for abuse i.e. housing and urban development, squatter settlements, etc.
- ii. The high unemployment in the parish of St. Catherine is problematic and can only increase as sugar production becomes less efficient forcing the industry to die a natural death. It is therefore absolutely necessary to address long term strategies to replace employment opportunities lost from this inevitable decline.
- iii. The political pressure from unions active in the sugar belt and the social pressure of unemployed on the political representatives will create social unrest if some solution to rebuilding the economy of the area is not developed.

Occupational Structure

Of the total work force of 205,228 people in St. Catherine, a total of 150,007 or 73 percent hold occupations for which no training was

required. Given that no separate category is noted for agriculture labor, or unskilled work in other areas, one assumes this category includes all unskilled labour. The table below indicates the general occupational structure of St. Catherine Parish.

Table 1 Population 14 Years and Over by Occupation for which Trained or Being Trained by Sex^{*} St. Catherine Parish

	Male		Female		Both Sexes
Occupation	No.	ક	No.	90	No &
Professional, Technical & Related	8,203	64	4,647	36	12,850 100
Stenographic, Bookeep- ing, Data Entry, Computer Operating	639	10	5,530	90	6,169 100
Service	1,807	58	51,337	42	3,139 100
Not Elsewhere Specified	1,851	46	2,177	54	4,028 100
No Training Acquired	71,585	48	78,419	52	150,007 100
Not Stated	<u>14,001</u>	48	15,034	52	29,035 100
Total	98,089		107,139		205,220

* Data taken from Table 15.8, p. 219, Population Census, 1982,Volume 1, Statistical Institute of Jamaica, Kingston, Jamaica 1985.

The table indicates that of the total work force in the St. Catherine area 52 percent are females and 48 percent are males. Professional fields employ about twice as many men as women, while women predominate in stenographic and data management positions (90 percent) and in unskilled categories (52 percent).

Employment

The census gives only minimal information regarding employment statistics. As summarized in table II below about 33 percent of the total population is employed. Among the employed, men comprise 64 percent of the work force and women 46 percent.

Table II

Main Actitivy of Population 14 Years and Over From Selected Household During Past Year, by Sex, St. Catherine Parish

Main Activity	Both Sexes	Male	Female	
Worked	67,303	42,822	24,481	
Non-working: Seeking		•		
First Job	12,329	6,276	v ,053	
Others Seeking Work Wanted Work and	6,369	3,587	2,782	
Available	11,848	6,230	5,618	
Home Duties	33,062	1,659	31,403	
Student	26,731	12,489	14,242	
Retired and Disabled	9,840	4,745	5,096	
Other	4,317	2,982	1,335	
Not Stated	33,429	17,280	16,141	
Total	205,228	98,078	107,150	

Source: Population Census 1982, Vol. 1, Table 15.10, p 220

Government publications such as <u>The Census</u> and the <u>Economic and</u> <u>Social Survey</u>, use a broad definition of unemployment to include those looking for work, those seeking first job, and those wanting work and available. From the census data a general figure of some 30,546 persons would be considered unemployed in the parish. This represents about 15 percent of the total population 14 years and over based on their reported activities during the past year.

What is unclear from the table is how the many persons currently defining their main activity as home duties would work if the opportunity presented itself. About 16 percent or 33,429 persons did not provide any information as to economic activity and while one may assume this indicates an indefinite employment status, it is impossible to classify them or know what their response would be to an employment option. It is possible, in other words, that comprehensive unemployment figures are masked in the table and may be higher than reported.

Data reported in the 1982 Labor Survey provide a slightly different analysis of the unemployed in the St. Catherine area. As noted below the numbers of unemployed are noted by town or area and comprise some 35,661 persons. Given the same total of 205,228, this estimate of the unemployed places unemployment at 17 percent.

Table III:

Unemployed Labor By Sex and Town/Area St. Catherine Parish

	Unemployed Labor			
Town/Area	Male	Female	Total	
Portmore	3,874	10,821	14,695	
Twickenham Park/ Central Village	340	918	1,258	
Spanish Town	4,792	12,098	16,890	
Old Harbour	798	2,020	2,818	

This data gives some indication of the geographic distribution of potential laborers spread throughout the parish. It is clear that the labor pool available in the parish is large. Given the excellent transportation system between that area and Kingston, the unemployed labor from Kingston would also be a potential source of workers for the project area.

Current Land Tenure, Distribution and Cropping Patterns

According to the Farmer's Register of 1982, in comparison with other parishes, St. Catherine has the largest amount of acreage owned by any parish and the largest amount operated by any parish. Of the total of 923,846 acres operated in Jamaica, 133,003 acres or 14 percent are in operation in St. Catherine. Of this total amount, 21,609 (16 percent) are owned, 8,742 are leased from others (6 percent), 7,356 acres are used rent free (9.3 percent), 3,431 are leased out (13 percent) and some 1,448 (1.08 percent) acres are given rent free.

The total number of farmers in the parish of St. Catherine is 16,317, which represents 11 percent of the total number of farmers in Jamaica. However, it should be kept in mind that "farmer" is defined as a single individual, government agency, private company or any such corporation or institution which is financially responsible for the business, takes the risks and bears the costs. Defined in this way it is difficult to know the type of operation involved in different farming enterprises.

In addition, the farm register offers information on number of farmers and number of acres in cultivation by crop. From this it is possible to know the overall involvement of farmers and acreage per

Nog

crop, but specific breakdown by size and type of holding is not provided. Moreover, the crop basis of reporting masks the combinations of crops grown by type or size of farm. This makes it difficult to distinguish among different types of farm operation, e.g. subsistence, mixed, i.e. both cash and household production, and various levels of commercial enterprise.

Crops grown in the parish are quite extensive and a representative number of them are noted by total number of farmers and number of acres under cultivation as of 1982. Percentages are noted in relation to totals for each crop grown in the country, not just the parish.

Table IV:

Crops Grown in St. Catherine by Total Number of Farmers and Total Number Acres

	F	armer	A	cres	
Crop	Number	Percent	Number	Percent	
Sugar Cane	2,446	11	26,153	22	
Bananas	9,897	12	6,550	12	
Coffee	6,551	17	8,174	23	
Cocoa	5,437	24	4,868	23	
Pimento	1,821	12	3,770	4	
Coconut	1,764	8	1,847	4	
Orange	2,797	17	5,764	31	
Grapefruit	1,068	14	1,745	18	
Legume (pure stand. equiv).	4,804	9	2,143	9	
Vegetables	3,559	11	1,975	13	
Condiments	430	5	192	7	
Cereal	1,719	8	634	8	
Fruit	2,710	19	1,043	l	
Plantain	3,945	13	1,354	9	
Potatoes	3,256	9	985	8	
Yams	8,838	9	4,158	11	
Cassava	3,414	12	1,158	13	
Dairy Cattle	803	14	4,113	15	
Pig	3,458	10	19,283	15	
Broilers	1,290	15	1,781,937	49	

Data abstracted from Tables in Farmers' Register (1982), Data Collection and Statistics Branch, Ministry of Agriculture, 1985.

As this list indicates, both export and domestic crops are already grown in the parish. However, the proposed crops, e.g. winter vegetables (for export) and ornamental horticulture are absent from the list. Vegetables for the domestic market are grown by 11% of farmers in the parish. There should be limited competition for markets between domestic producers and new investors, in other than the 3 to 5 vegetables grown for export during a limited period when second grades may get into the market system. However, this will benefit the consumer and will be a force to improve local quality.

Agricultural production in the parish is primarily livestock, traditional export crops, oranges, and root crops. Inland fish farms also exist within the project area. While there is extensive large-scale commercial farming in St. Catherine, there is no prior example of winter vegetables on a scale comparable with that of the Agro 21 scheme.

Project Beneficaries

The direct beneficiaries of this project are intended to be:

- -- local and foreign investors;
- -- agricultural labor
- -- unskilled labor
- -- small and medium sized farmers
- -- rural and semi-urban poor households.

Indirect beneficiaries are:

-- skilled artisans and service workers.

Local and Foreign Investors

The main focus on the Agro 21 initiative is to attract investors and facilitate their participation in the redevelopment program by means of providing a long term lease to which is appended an approved farm plan. Investors will be required to operate their businesses within the limitations of Jamaican law and will not be bound to undertake the responsibilities of small farmer development operations. They will however, be encouraged to undertake activities to benefit small farmers.

The benefits accuring to investors, will be:

- -- profitable enterprise opportunities.
- -- protection of rights with respect to security of investment and production from interference in the operations of the enterprise. The leases are binding to both the investor and the GOJ, regardless of changes in the political climate of the country.
- -- basic infrastructure such as access roads and irrigation will be in place so that only on-site land improvements will be a cost.
- -- marketing and technical information.

We do not envisage any socio-cultural constraints to local investors participating in the project. However, suitable incentives of access to capital and on-going credit will be necessary to stimulate a significant response from local enterprenuers.

Foreign investment in Jamaican agriculture has traditionally been in sugar and bananas. More recently there has been Japanese involvement in coffee and Israeli investment in winter vegetables.

The experiences of the coffee and vegetable ventures do not suggest that the arrangements are in anyway deliterious to the social fabric of the communities in which they are located. While management practices may be culture specific, both workers and foreign managers have demonstrated the ability to make adjustments.

Within the particular project area where labor-management relations in sugar cane have traditionally been confrontational, foreign managers will likely have to obtain local expertise to deal with the more sensitive issues which will arise.

The constraints to this project from the point of view of the foreign investors are likely to be their perception of the political stability of the country, and of the risk exposure which they will face. The project proposes to overcome this constraint by incorporating protective rights in the terms of the lease agreement.

Agricultural Labor

The socio-economic characteristics of agricultural labor in the project area itself, are not presently known, i.e. age and sex structure, household size, etc. Existing information suggests that agricultural labor is available throughout the parish, although there is a labor shortage (probably related to pay) in the project area.

The parish is undergoing rapid urbanization primarily by means of migration from Kingston to Portmore, Spanish Town and its environs, and to some extent from the uplands to the urban centers. The latter groups would have agricultural experience, but are likely to be seeking urban-type employment. The former group are probably not interested in agricultural work.

The agricultural labor force for the proposed project is therefore likely to be those persons living on subsistence plots or small farms within a 5 - 10 mile radius of the project area. Labor previously employed in sugar during the operations of the cooperatives are also possible targets.

Employment Demand

With cultivation of idle lands and more intensive production will come an increased demand for labor. If the entire proposed area (approximately 20,000 acres) is ultimately developed as projected there will be the following acreage under cultivation:

Winter Vegetables	9,000
Ornamental Horticulture	400
Grains (corn, rice, sorghum)	10,500

Additionally, the winter vegetable lands will be used to produce grains and/or soybeans during the off season and two crops of some winter vegetables can be produced during one season. Also, the grain lands will be double cropped to make an effective crop area of 39,000 crop acres.

Without knowing specifically how many acres of each kind or sequence of vegetables, grains and soybeans will be grown, the total labor demand cannot be accurately projected. However, studies from Central America and Mexico indicate that with hand harvesting of vegetables and the other operations such as tillage, spraying and irrigation being mechanized, the labor for various vegetables are as follows:

Crops	Person Days/Acre
Okra	139
Tomatoes	116
Cucumbers	42
Peppers	46
Squash	38
Melons	36
Mechanized corn (large operations)	8
Mechanized sorghum (large operations	5) 7
Irrigated rice (large operations)	12

NON

Since it appears that the major vegetable crops will be squash, melons, cucumbers, peppers and tomatoes and no estimates are available as to the level of each, an average labor demand would be 56 person days per crop. Some vegetables can be produced twice during the five months winter season but assuming a single crop, the total labor needs for 9,000 acres would be 504,000 person days. In addition, there is a significant quantity of additional labor required in the sorting, grading and packaging, as well as related transportation. More labor needs will develop if the seconds and culls are utilized in processing industries or are marketed The same lands would provide approximately 70,000 person locally. days of employment during the off-season when planted in corn, sorghum or soybeans, assuming the operations are totally mechanized with the latest equipment. Since the most up-to-date and larger types of machinery are not commonly imported or used in Jamaica, the probability is that the labor demand will be greater than would occur with the same crops in a developed area.

As to the lands for grains, assuming that at least two crops per year are produced and the average labor requirement is 9 days/acre, the 10,500 acres represent 21,000 crop acres and 189,000 person days of work. It is possible however to produce 2.5 crops of rice/year or 2 crops plus another short season crop such as soybeans if fully mechanized and short season varieties are utilized which would represent a potential increase in labor demand. Again there are significant levels of ancillary tasks such as transportation, maintenance and milling associated with these crops.

As to the ornamentals no accurate labor requirements are available but references indicate that labor represents about one-third of the total cost of production in developed countries. Previous estimates prepared by the Ministry of Agriculture indicate an average of 5 people/acre on a year around basis, not including the work of constructing shade houses, storage, etc. This would represent full time employment for 2,000 or 600,000 person days on a 300 day year if the plantings did not include roses which are much more labor intensive.

The total estimated labor requirements for the full acreage (approximately 20,000 acres single cropped) would then represent 1,363,000 person days or 52,423 person months per year. This would represent a very significant level of employment, excluding the ancillary employment that would be generated. These figures are even more impressive when one considers that about 5,000 acres of the land to be used has been idle for 3 to 5 years, offering zero employment.

In addition to the farm labor generated on a recurring annual basis there will be substantial levels of one time employment for those engaged in rehabilitation of the canals, wells and other
Annex 2 C. SOCIAL SOUNDNESS ANALYSIS Page 12

1,261

infrastructure and some additional full time employment for a limited number engaged in the operation and maintenance of the irrigation system.

From the analysis of labor demand, it appears that much of the employment will be seasonal. This does not conflict with traditional patterns of employment in the area and therefore should not be disruptive. There will also be employment opportunities for women which is usual and desirable since women are heads of one-third of Jamaican households and female unemployment in the parish is much greeater than for males.

The level of wages paid will be a critical factor. Present wage levels are low and many not provide incentive for participation and may also result in an unreliable labor supply as workers seek alternative opportunities to supplement income. If current wage levels of J\$10 to J\$12 per day are applied there is not likely to be any significant improvement in living standards of the workers. The poverty line in Jamaica, according to the World Bank is just under J\$2,000 per year. It is not possible to predict accurately the total impact on wages in the area, but given the current unemployment levels and the minimal contribution the idle and underutilized land currently contributes to income, the project will be a positive contribution.

From the analysis of labor demand, it appears that much of the agricultural employment will be seasonal and part-time. This does not conflict with traditional patterns of hiring in the area and therefore should not be disruptive.

Annex 2 D. Environmental Assessment

CROP DIVERSIFICATION/IRRIGATION PROJECT

TABLE OF CONTENTS

	Page
List of Acronyms	
ENVIRONMENTAL ANALYSIS: SUMMARY AND RECOMMENDATIONS	1
Recommendations	2
PURPOSE OF ENVIRONMENTAL ASSESSMENT	. 4
MET CODOLOGY	4
PROJECT DESCRIPTION	5
Alternative Scenarios	б
NATURAL RESOURCE CONSTRAINTS	8
Water Availability	8
Surface Water: The Rio Cobre	8
Groundwater: Limestone and Alluvial Aquifers	10
Water Quality	11
Surface Water: The Rio Cobre	11
Groundwater: Limestone and Alluvial Aquifers	12
Soil Salinity	13
AFFECTED ENVIRONMENT AND CONSEQUENCES	14
Physical Impacts	15
Short-term Impacts	15
Long-term Impacts	16

N

..

TABLE OF CONTENTS (cont'd)

Public Health

Sanitation a	and Water Pollu	tion	•••••	18
Pesticides:	short-term and	long-term	use	18
	APPEND	ICES		

Page

4

vir

Title

Α.	Preparers	21
в.	References	22
с.	List of People Contacted	25

MAPS

Number	Title	Page
1	Map of Jamaica	
2	St. Catherine Parish: Southern Section	
3	Project Site: Proposed Land Use	
4	Location of Fish Farming Areas in South-Central St. Catherine Plains	
5	Salinity and Water Pollution Hazards Map	
б	Advances of the Saline Front into Limestone Aquifer	
	LIST OF ACPONYMS	

GQJ	-	Government of Jamaica
MOA	-	Ministry of Agriculture
MLG	-	Ministry of Local Governments
NCRD	-	National Resources and Conservation Department of (MOA)
RCIS	-	Rio Cobre Irrigation System
WRD	-	Water Resource Division (MLG)
UWA	-	Underground Water Authority

H. ENVIRONMENTAL ANALYSIS (SUMMARY AND RECOMMENDATIONS)

Ectential adverse environmental impacts can be minimized by Agro 21's ability to coordinate interagency resources for appropriate engineering designs, operational management, monitoring, evaluation and training programs. The upgrading of the present irrigation system, in terms of its engineering design and operational management has the potential to improve the environmental problems of the area.

4

However, factors which are required to minimize impacts include:

 soil conservation measures; proper erosion and salinization control.

 water conservation measures; monitoring ground water use, renovating and maintaining the irrigation systems; water quality control; and maintenance of Rio Cobre irrigation canals.

 instruction in the proper use and handling of pesticides.

RECOMMENDATIONS

- 1) As a reminder, USAID/Jamaica has the responsibility to monitor the potential environmental impacts of the project (ref: Environmental Procedures 22 CFR Part 216.3 (a) 8). Therefore, I recommend that the potential environmental impacts of crop diversification in the St. Catherine's Plains be monitored annually. The Mission Director should focus attention on proposed agricultural diversification development as it relates to problems of increasing soil salinity in southern St. Catherine's Plains, the effects of water pollution, the availability of water for different uses, and the equitable distribution of water on and off the project site. This assessment should be carried out prior to the planting of new areas of export crops.
- 2) a. The commercial farm lease should stipulate that:
 - 1) the lessor can only use pesticides that are registered in the U.S.
 - 2) the lessor is responsible for provideing protective clothing and training the in appropriate and safe use of pesticides for farm workers and associate growers.
 - 3) The lessor is responsible for the safe transportation, storage and disposal of pesticides.
 - 4) the mother farm will be subject to monitoring of pesticide use by the Ministry of Health.
 - b. The Caribbean Agricultural Research and Development Institute (CARDI) should be contracted to conduct a training program once the project is in place. Training mannuals and other techncial assistance can be provided by AID's Pesticide Management Specialist, Carroll Collyer, in the Office of Agriculture of the Science and Technology Bureau.

This program should be primarily but not exclusively for the small-scale farmer/commercial farm worker community. The program could be carried out through existing farmer organizations. For example, Gene McAvoy of Partnership for Productivity (see: Appendix C) should also be consulted in designing an appropriate and effective program to educate small-scale farmers. CARDI can work through the Crop Care Division of the Ministry of Agriculture to provide extension training services. Funding should be appropriated to contract a part-time person, to monitor the small-scale farmer's use of pesticides both on and off the commercial farm.

- 3) Funds should be made available for:
 - a. Maintaining the irrigation system; particularly to clear the canals of weeds and silt.
 - b. Testing water going onto and from the irrigation site for industrial and municipal effluents as well as pesticide and fertilizer contamination.
 - c. Monitoring the amount of ground water extracted from the aquifers.
 - d. Testing soil salinity.
- 4) The results of water and soil testing should be included in project reports to the Mission.

PURPOSE OF ENVIRONMENTAL ASSESSMENT

In accordance with "AID Environmental Procedures" 22 CFR 216, the size and scope of the proposed Crop Diversification Project in St. Catherine's Plains, Jamaica necessitates the investigation of potential significant environmental effects of this project.

The objectives of an environmental assessment are:

 To ensure that the environmental effects of AID-funded projects are identified and considered by AID and the host country. L

 To ensure that appropriate environmental precautions are encorporated into th project design before the project is implemented.

3. To assist developing countries in evaluating the environmental effects of proposed development projects and to select, implement, and manage effective environmental programs.

METHODOLOGY

This environmental analysis was conducted between August 11, 1985 and September 1, 1985. It is based upon a review of existing literature, interviews with host country officials and representatives in the environmental community and USAID staff.

1 - 4 -

PROJECT DESCRIPTION

- 5 -

The purpose of the Crop Diversification/Irrigation Project is to assist the Governemnt of Jamaica (GOJ) in its effort to alleviate current economic pressures (e.g. foreign exchange earnings, and savings, unemployment) by diversifiying its agricultural sector. The project will be managed by Agro 21, a corporation which was established to promote private investment in the Jamaican agricultural sector. The project consists of three components: institutional development, infrastructure rehabilitation and development, and a small-scale farmer linkage program.

> Institutional Development: To reinforce Agro 21's institutional ability to encourage agricultural investment in Jamaica by 1) identifying and providing support services for potential foreign and Jamaican investors, 2) planning and negotiating the redeployment of GOJ sugar land to diversified agriculture 3) procuring infrastructural rehabilitation and development services to prepare land for leasing, 4) promote and support small-scale farmer linkages with commercial farms.

Infrastructural Rehabilitation and Development: To rehabilitate existing irrigation system by constructing wells, canals, pumping stations, fencing, electricity and storage facilities by providing funding for 1) studies, 2) engineering 3) technical assistance, and 4) procurement and contracting for construction.

<u>Small-Scale Farmer Linkage Program</u>: To facilitate Jamaican small-scale producers access to technology, market outlets, land and supplementary employment.

711

Agro 21's initial site for crop diversification is located in the southern portion of St. Catherine's Parish (see: Maps 1 and 2). Current plans for crop diversification include cultivating winter vegetables (e.g. tomatoes, cucumbers, sweet peppers) on three underutilized government owned sugar cane estates: Caymanas Estates, MAP 1





×-

•



Bernard Lodge Estates and Innswood Estates. Winter vegetables for export will be rotated with grains (e.g. sorghum, soybeans, corn, rice) for local consumption. The time frame of this project is three years (FY 1985-88). AID's investment in this project will be US \$15 million (\$10 million loan and \$5 million grant).

The first phase is scheduled to start immediately so that crops can be planted in September-October 1985. This phase entails cultivating approximately 800 acres of winter vegetables and 400 acres of ornimental horticulture in Bernard Lodge Estates (see: Map 3). Subsequent phases involve growing winter vegetables and row crops on the remainder of estate land provided that it is feasible. Detailed plans for diversification will be defined as export and local market demands are identified and the feasibility for growing different crops given natural resource constraints is investigated .

ALTERNATIVE SCENARIOS

Alternative scenarios for development in the St. Catherine's Plains include (1) no development (2) urban development (3) continuation of sugar cultivation, (4) diversification to tropical fruits.

The Government of Jamaica (GOJ) has identified export agricultural development as the primary means of relieving economic pressures. Given the current economic situation in Jamaica, the option of no development or urban development are not viable alternatives. The benefits from conserving the natural environment

220

- 6 -



197

.

do not outweigh those that would be gained by the human environment (e.g. increased employment, foods and grains for local consumption and foreign exchange) from agricultural diversification. In the short-run, urban development is not a planned alternative given the comparative economic returns from agricultural development. However, because of existing urban sprawl from Kingston and Spanish Town, it is likely that this area will continue to become increasingly urbanized.

Continuing the level of sugar cane cultivation for world market demands is no longer a development alternative because the demands and price for sugar has decreased dramatically during the last 4 years. Consequently, diversifying the agricultural sector to grow other agricultural crops may be more profitable provided that natural resources are managed properly and there are secure export markets.

Growing tropical fruits such as mangoes and papayas, might be better from an environmental perspective if water from the Rio Cobre becomes more polluted with municipal waste from Spanish Town. Waste water should not be used on produce which is eaten raw (i.e. vegetables) but could be used on tropical fruits that have a skin. Economically, the export markets for tropical fruits may be more advantageous (i.e. stable) in terms of a long term agricultural investment.

 t^{t}

- 7 -

NATURAL RESOURCE CONSTRAINTS

The primary natural resource concerns associated with the project area at the present time include issues of sufficient water availability, water quality and soil salinity.

Water Availability

Quote from Water Resources Technical Analysis

"There is sufficient low saline water of fair to good quality to irrigate some 20,000 acres, with the present irrigation system refurbished and up-dated. This would be with water from the Rio Cobre river conveyed by the renewed irrigation canal, water from local wells, plus water from the new Rio Cobre pumping station. This should also be supplemented by a reservoir. (See Summary -Irrigation Infrastructure)."

"Theoretically from 23,266 acres to 24,235 acres can be irrigated from a revitalized canal and wells in an average year (28 in. of rain); and in a dry year (12 to 15 in. of rain) 19,045 to 19,972 acres. This includes anticipated losses plus a leaching factor of 10%. Increasing the irrigation efficiencies and minimizing losses would enhance these figures considerably, perhaps as much as 40% to 50%. Use of sprinkler or drip irrigation would also add to more total acreage".

- 8 -

Surface Water: The Rio Cobre

Increasing demands on the natural resource base in the Rio Cobre watershed have reduced the quantity and quality of water available in the southern St. Catherine's Plains. Deforestation in the Upper Rio Cobre Basin has caused increased erosion and has resulted in increased siltation in the Rio Cobre. USAID's Hillside Watershed Management Project should help to alleviate the problems of erosion and siltation in this area. In addition to these environmental problems in the upper Rio Cobre Basin, competing demands for domestic, industrial, aquacultural and agricultural purposes have also taxed the Rio Cobre's available water supply. Structural problems in the irrigation system have also caused a reduction in the amount of water available for irrigation. For example, a barrier was put up near the domestic water filtration plant to divert more water to Spanish Town for domestic use. This barrier has caused water to overflow from the canal above the filtration plant; thus water is wasted (Peterson, 1985).

The Rio Cobre Irrigation System is the means by which water is supplied from the river to meet the demands of the various sectors. This system is served by a gravity dam at Crecent Village which was to see build 110 years ago. Leakage in the canals of the Rio Cobre Irrigation System is another factor which is reducing the amount of available water.

- 9 -



Another source of demand for water from the Rio Cobre is aquaculture. Most of the commercial fish ponds in St. Catherine are located in the southern part of Bernard Lodge Estate and Salt Island Creek. Presently, there are 28 registered fish farmers holding a total of 231 acres of fish ponds in the Hill Run, Little Hartlands and Salt Island areas. The main source of water from these fish ponds comes from the Town Gully-Salt Island Creek River System, the headwaters of which are to the northwest of Spanish Town (see: Map 4). This water is also supplied under contract between the Hill Run Farmers Association and the Rio Cobre Irrigation Works (RCIW). However, during the dry period, November-July, the RCIW is often unable to meet its obligation due to seasonal reductions in the stream flow of the Rio Cobre (Water Resources Department, 1984). Moreover, the quality of water supplied to this area is severely contaminated (see: Section on Water Quality, pg. 11).

Ground Water: Limestone and Alluvial Aquifers

Although some groundwater is used for irrigation in the Innswood and Caymanas Estates, water from the limestone aquifer at the project site is severely limited primarily due to salt water intrusion. The Rio Cobre Basin was declared a "critical area" by the Underground Water Control Law in 1969 (Wallace Evans and Partners, 1985). Presently, underground aquifers in south St. Catherine's Plains are still threatened by overdraft. Therefore, the Underground Water Authority (UWA) still prohibits additional water to be abstracted from the limestone aquifer due to potential

- 10 -

salt water intrusion. Salinization of the aquifer is also a problem in Central and Western St. Catherine's Plains. However, there is the possibility for increased abstration from the aquifer in Eastern St. Catherine. (Tollenaar, 1984). Groundwater for irrigation is also limited due to demands for domestic use. Because water for irrigation from canals is scarce, some families pipe household water to irrigate crops in their yard.

Water Quality

Surface Water: Rio Cobre

The quality of water for different purposes is an important variable in determining the availability of water. Water from the Rio Cobre has a moderate to low salt content. Deterioration in the quality of Rio Cobre water is primarily the result of surface runoff and industrial effluents in the Upper Rio Cobre Basin (NRCD, nd). There has also been a significant eutrophication problem due to the build-up of nutrients released by decaying organic matter. Industrial effluents from Condensary, Citrus, Coffee and Milo Factories as well as the overflow from Alcan Works at Bog Walk pollute the Rio Cobre. Moreover waste from the IIC Chemical Factory has created severe toxicity problems at Turners Pen Branch Area (see: Map 5). There has also been an increase in the amount of water plants found downstream at Bog Walk. Most of the industrial and municipal effluents from Spanish Town goes into the Hill Run, Little Hartlands and Salt Island areas where there is fish farming. The deposition of these effluents and runoff from irrigation have

 $\eta^{\mathcal{A}}$

- 11 -



caused low water flows. During these low flow periods, water quality problems in this area are exacerbated. In addition, the water that will be pumped from the Rio Cobre at the proposed pumping station for irrigation at the Bernard Lodge project site may become increasingly polluted with waste from Spanish Town. Water quality tests have indicated that presently, the water is suitable for irrigating vegetables (Rampair, 1985). However, the quality of water from the Rio Cobre below Spanish town could potentially become too polluted to be used for irrigating raw vegetables.

Groundwater: Limestone and Alluvial Aquifers

The quality of groundwater particularly in the limestone aquifer is potentially affected by the hazard of salt intrusion resulting from over abstraction. The increase in demand for domestic water from the limestone aquifer could also cause overdraft and exacerbate the problem of salt intrusion. Map 6 shows the frontal advances of saline waters over the past 55 years. The first advance occured between 1930 and 1973 in the areas of Old Harbour, Innswood and Caymanas. The second advance which occured between 1972-1977 went as far as 1.5-2.0 miles to the east and west of Spanish Town. Water in the southern section of St. Catherine's Parish (e.g. Salt Island) has a medium to high salinity, particularly where irrigation water from cane fields runs off. The saline content of the groundwater in the northern part of the Caymanas Estates is high and Ferry Lake has a very high salinity.

. va

- 12 -



 $\gamma_{n'} \chi$

#+f+¥1+9- 4.414

Groundwater from the southern part of the Caymanas Estates is of good quality. However, abstraction from this area is limited due to the threat of salt intrusion. The saline content of the alluvial aquifer is not as severe as from the limestone aquifer.

Soil Salinity

Plans for crop diversification must consider the problem of soil salinity. Approximately 58% (i.e. 33,700 out of a total of 58,200 acres) of the soils in the St. Catherine's Plains appear to be affected by salt to some degree. As previously stated, the quality and availability of water in this area also varies. The Rural Physical Planning Division (RPPD) of the MOA estimated that with "a combination of good quality water and non-saline soils", only approximately 16,000 acres could be irrigated. The RPPD notes that the continual use of poor quality water on non-saline soils will increase the salinization of soils, which could make the land in St. Catherine's less suitable or useless for agricultural purposes. An increase in soil salinity on the Bernard Lodge Estate on non-saline soils with less than 2 tons salt per acre foot (2mmhos/cm (2EC) to medium soil salinity with 3-4 tons salt per acre foot (3-4 mmhos/cm (3 to 4 EC)) reduced sugar cane yields from 2.40 tons per acre per month to 2.14 tons (3.1 tons per year) over a 15 year period. (see: Table, 1 EC = one ton of salt per acre, 1980 Soil Salinity Report).

Year Salinity Class	1965	1966	1967	1968	1969	Mean	1970	1971	1972	1973	1974	Mean	1975	1976	1977	1978	1979	Hean	Grand Mean
Non-saline (<2 mmhos/cm)	2.95	2.60	2.70	2.28	2.24	2.55(100)	2.63	2.60	2.41	2.27	2.57	2.49(100)	2.83	2.36	1.92	1.77	1.86	2.15(100)	2.40(100)
Lou (2-3 mmhos/cm)	2.68	2.46	2.51	2.00	1.90	2.31(91)	2.06	2.03	1.82	2.23	2.38	2.10(84)	2.42	2.16	1.53	2.06	2.05	2.05(95)	2.15(89)
Medium (3-4 mmhos/cm)	2.54	2.30	2.18	1.85	1.45	2.05(80)	1.93	2.36	2.08	2.38	2.40	2.23(90)	2.23	2.20	1.79	2.34	2.16	2.14(100)	2.14(89)
High (74 mmhos/cm)	1.30	1.81	2.26	1.79	1.02	1.64(64)	1.71	2.21	1.69	-	1.67	1.82(73)	1.93	2.19	1.35	1.19	1.41	1.61(75)	1.69(70)
Rainfall (inches)	22	44	16	22	49	31	27	19	29	26	38	28	17	9	19	27	62	27	29

Table 17: Cane productivity (tons cane per acre per month) in Bernard Lodge areas, demarcated as non-saline, low, medium and high in soil salinity; and rainfall (inches) during the period 1965-1979

3/15

AFFECTED ENVIRONMENT AND CONSEQUENCES

Potential environmental effects of crop diversification in the St. Catherine Plain include:

- decreased water quality due to salt water intrusion
- decreased soil fertility due to increased salinization
- increased public health hazards due to pesticide
 use and potential irrigation with polluted water on fresh
 vegetables, pasture, or root crops.

Short-term environmental effects refer to Phase I of diversification. It has been determined that there will be no significant environmental impacts for the first phase of the project, as long as water from the aquifer is used for irrigating vegetables. Although water quality tests from the Rio Cobre indicate that the water is safe for irrigating winter vegetables, there is a potential for increased contamination.

Adverse environmental impacts of project development in the long-term (i.e. subsequent to Phase I) will depend on Agro 21's technical ability to plan further development of the St. Catherine Plain taking into consideration the natural resource contraints.

NP

- 14 -

- 15 -

Physical Impacts

Short-term Impacts

The design, site location and scale of Phase I is such that there are no significant physical environmental effects associated with the project. The plan for this phase is to cultivate 1,300 acres in the northeast section of Bernard Lodge Estates. The present irrigation system is being upgraded, so there will be sufficient water for irrigation. The Rural Physical Planning Division indicates that this area has relatively non-saline soils. Moreover, water for irrigation of this area will come from the alluvial aquifer and from the Rio Cobre. Neither the water in the aquifer nor from the Rio Cobre has a very high salt content. Therefore, irrigation in this area will not contribute significantly to the problem of soil salinity.

The potential over abstraction resulting in salt water intrusion of the alluvial aquifer is not likely to occur by implementing Phase I. The primary reason for this is because the alluvial aquifer is not connected to the contaminated limestone aquifer. Moreover, a system of "conjuntive use", whereby water from the aquifer will only be used during the dry months (December-April) and water from the Ric Cobre will be used during the remainder of the year will enable the aquifer to be recharged. Irrigating with water from the Rio Cobre is not likely to contaminate the aquifer

-210

because it has a low salt content. Thus, careful maintenance of the water resources in the aquifer has been planned and provided that the abstraction of water from the aquifer is monitored it will not be overabstracted.

According to testing done by Agro 21 (personal communication with Rampair), the quality of the Rio Cobre Irrigation water for Phase I is not highly polluted. Maps from the Rural Physical Planning Division also indicate that the quality of suface water in the area is not severely polluted from either chemical waste or sewage (see: Map 5). However, the water quality from the pumpin; station should continue to be tested.

Long-term Impacts

Diversification of this area will not adversly affect the environment in the long-term provided that good irrigation management practices are used to handle the problems of severe soil salinity and water pollution. Good irrigation management is provided by the project. It has been recommended that an engineer be hired to monitor the quality of the water and develop a management plan for more efficient use of water. A leaching factor has been included in the plans to irrigate so that salt build-up in the soils will be reduced. Leaching will require more water and therefore, the efficient use of water is imperative.

- 16 -

If care is not taken, potential problems of soil salinity, salt water intrusion, and public health hazards from polluted water could intensify with the diversification of the southwest portion of Bernard Lodge, where these problems are already acute if care is not taken. However, it is doubtful that a commercial agricultural company will invest in an area that has severe natural resource problems.

The environmental problems of the St. Catherine's Plains are not insurmountable. Agro 21, the RPPD, the Water Resources Division (WRD) and the Natural Resources Conservation Department (NRCD) are all aware of the problems in this area and have the technical expertise to deal with them. If fact, the design of the project may prevent an increased salitity problem on the well drained soils because they will be leached.

At present, the RPPD estimates that approximately 20,000 acres of non-saline soils that can be irrigated with good water. However, the RPPD stresses that poor quality water (i.e. salinized water from the limestone aquifers) should not be used on the non-saline soils, especially without proper leaching requirements. Irrigation with saline water or non-saline soils increases the salinization of soils and could make them completely unproductive. In addition, monitoring of groundwater use from limestone aquifers and water pollution levels from the Rio Cobre should be conducted to ensure protection of these resources and the productivity of the land.

7.16

- 17 -

- 18 -

PUBLIC HEALTH

Water-Bourne Diseases

Discussions with representatives from the Ministry of Health and the Ministry of Local Governments (see: Appendix C) indicate that water-bourne diseases such as schistosomiases, trypanosomiases, and malaria are not generally a problem in Jamaica. Malaria has almost completely been eradicated. Consequently, water-bourne diseases are not forseen to be a public health hazard in the St. Catherine Plain.

Sanitation and Water Pollution

In the long run , particularly as the urban population of Spanish Town increases, project planners will have to address sanitation problems (e.g. washing in the canals) and water pollution associated with the Rio Cobre and its canal system.

Pesticides: short-term and long-term use

The St. Catherine Plain is primarily an agricultural area where pesticides have been used on small farms and large sugar cane estates and where there has been a history of pesticide toxicity affecting the small farmers and estate workers. Thus, the Crop Diversification Project will not be introducing the use of pesticides into the project area; beneficiaries of the project will continue to use pesticides in farming. The potential for pesticide hazards will continue and may increase as part of crop diversification.

No project funds will be used for the direct procurement of pesticides and fertilizers. However, large commercial farmers will be purchasing pesticides with their own funding for use on the "mother farm". Since the U.S. will be the primary export market for crops grown under this project, large commercial farmers will beparticularly careful not to use pesticides which are restricted in the U.S. Jamaica has a full time official, Mr. Rubin Garcia of the Plant Inspection Office, USDA, who inspects all produce to be sure that it meets U.S requirements before it is shipped.

The large commercial farms will be responsible for supplying, storing and transporting their pesticides. They will also supply the equipment to apply pesticides on the commercial farm. The purchase of pesticides is a large investment for a commercial agricultural farm and therefore, will probably take adequate care for proper storage.

192

Jamaica continues to have problems related to the misuse of pesticides, particularly from small farmers who do not know how to use them and who are not aware of the risks in using them. Training seminars on dealing with the mismanagement of pesticides have been sponsored by the Caribbean Agricultural Research and Development Institue (CARDI) of Jamaica. Participants in these seminars have included farmers, retailers, wholesalers and doctors. Community educational pesticides programs for small scale farmers and commercial farm workers should be included within the project design to encourage their protection. CARDI could be contracted to conduct these programs.

າົງິ່

LIST OF PREPARERS

Judith T. Johnson

- B.A. Geography, Clark University M.A. Environmental Affairs, Clark University

VIC

APPENDIX B

REFERENCES

- Agro 21, "Implementation Strategy: Crop Diversification Programme for Sugar Lands "(Appendix II) Kingston, Jamaica, ND
- Agro 21, Proposed Development Part of Caymanas & Bernard Lodge, Kingston, Jamaica, ND.
- Adler, Joseph, "Terms of Reference for the Rio Cobre and South St. Catherine: Integrated Master Plan "National Water Commission, Kingston, Jamaica, February 1985.
- Aldridge, T.E., Mrs. Ellie Irons, "Pest and Pesticide Management (Health)". <u>Pest and Pesticide Management in the Caribbean:</u> <u>Proceedings of Seminar & Workshop, 3-7 Nov., 1980</u>. CICP/USAID, Vol. 3 Country Papers. Edited by E.G.B. Gooding.
- Avidan, Moshe, David Salik and Ilan Bar, "The St. Catherine Plain, the St. Dorothy Plain: Improvement and Recommendations: The water supply system. Efficient on farm water water use for the Water Resource Division and Agro 21, Kingstion, Jamaica. By the Center for International Agricultural Development Cooperation (CINADCO), Israel. August, 1985
- Braatz, Susan M., "Draft Environmental Profile on Jamaica". Under AID/S&T/FNR Contact No. RSSA SA/TOA 77-1 with U.S. Man and the Biosphere Secretariat. Department of State, Washington, D.C., October 1981.
- Cauble, James C, "Jamaica Paprika Pepper Project: Site Evaluation Report, "Mamagement Services Division, Ball Corporation, Alexandria, Virginia USA, 20 August, 1984, (Appendix 3, pg 36-60 in Proposed Development Part of Caymanas & Bernard Lodge by Agro 21).
- CRIES, Jamaica Resource Assessment. Prepared for the Jamaican Ministry of Agriculture by the Comprehensive Resource Inventory and Evaluation System (CRIES) Project in Cooperation with USAID, 1982.
- deKryuff, R. "Soil & Water Salinity Survey of the St. Catherine Plains" a letter to Mr. H. T. Ramdatt, acting Permanent Secretry, Ministry of Agriculture from R. deKryuff Rural Physical Planning Division, Ministry of Agriculture, July 2, 1985.
- deWitt, H.A. "Preliminary Renults of a Salinity Survey Carried out in the St. Catherine Plains." Rural Physical Planning Division, Ministry of Agriculture, Kingston Jamaica 1985.
- Framji, K.K. and I.K. Mahajan, "Jamaica" in <u>Irrigration and Drainage in</u> the World: A Global Review, 1969:542-549.

 $\mathcal{F}_{(l)}$

- Lawson, Humphrey and Gene McAvoy, "Irrigation Water Situation Report. "Partnership for Productivity/International, Kingston, Jamaica, June 1983.
- Ministry of Agriculture, "Quality of Irrigation Water "St. Catherine & Clarendon Plains" Rural Physical Planning Division. Kingston, Jamaica, May 1985.
- Ministry of Agriculture, "St. Catherine Plains Irrigation Potentials". Rural Physical Planning Division Kingston, Jamaica, May 1985.
- Ministry of Local Governments "Groundwater reports Caymanas & Bernard Lodge" Appendix 4 pg 61-71 in <u>Proposed Development</u>, <u>Part of Caymanas & Bernard Lodge</u> by Agro 21, 1985.
- Ministry of Local Governments, "The Pollution of Jamaica's Ground water Resources - An Islandwide overview by Basins," Water Resources Division, Kingston Jamaica, ND.
- Ministry of Local Governments, "Water Availability for Fish Farmers in the South-central St. Catherine Plains (Hill Run, Little Hartlands & Salt Island Creek). "Water Resources Division Kingston, Jamaica, Sept. 1984.
- McJunkin, Frederick Eugene, <u>Water</u>, Engineers, <u>Development and Disease in</u> <u>the Tropics</u>, Agency for International Development, July 1975.
- Natural Resources Conservation Department. "Rio Cobre Water Quality (an overview)" Aquatic Resource Division, Water Quality Branch, 21 October, 1985.
- Peterson, Glenn (Consultant, Winrock International, Personal communication 1985)
- Little, Derek Wesley, <u>Soil Salinity and Methods for its Control in the</u> <u>Irrigated Sugar Cane Region of Jamaica</u>, Masters Thesis. Professional Studies (Agriculture), May 1978
- The Sugar Industry Reclarch Institute, The Salinity Survey of Bernard Lodge Estate, St. Catherine, Jamaica.

 $\chi^{\bar{\chi} \bar{\chi}}$

- Rampair, Stanley, Agro 21, Director of Land Utilization (Personal Communication, 1985).
- Reid, Raymond, <u>Water Quality Control in Jamaica</u>. University of the West Indies case study for the completion of Diploma in Management studies, May 1980.
- Ross, Frank, "Proposed for development of 1,040 acres of fish ponds in Bernard Lodge/Innswood Area. "Agro 21, Kingston, Jamaica, 1985.
- Shalhevet, Joseph, and Josephine Kamburov, <u>Irrigation and Salinity: A</u> <u>World-Wide Survey</u>, edited by K.K. Framji, International Commission on Irrigation and Drainage, New Delhi, India, 1976.
- Tillman, Gus, Environmentally Sound Small-Scale Water Projects: Guidelines for Planning, Coordination in Development and Volunteers in Technical Assistance, 1981.
- Tillman, Robert, Environmental Guidelines for Irrigation, U.S. Man and the Biosphere Programme and USAID, June 1981.
- Tollenaar, P. "Water Resources and Irrigation in South St. Catherine." Rural Physical Planning Division, Ministry of Agriculture, March 1985.
- Tollenaar, P. Water Resources and Irrigation Requirements: South St. Catherine & Clarendon Rural Physical Planning Division Ministry of Agriculture, Kingston, Jamaica, 1984.
- Vernon, K.C. and T.A. Jones, "Soils and Land-Use Surveys #1 Jamaica Parish of St. Catherine". The Regional Research Center, The Imperial College of Tropical Agriculture, Trinidad, BWI., March 1985.
- Wallace Evans & Partners, by Tate Lyle Technical Services May 1985, for the Ministry of Agriculture, <u>Sugar Industry Studies: Irrigation</u> Phase 2 Review Volume II, No. Y, the Cockpit Canal:
- Watt, Eric, I., "Jamaica Pest and Pesticide Management (Agriculture)", <u>Pest and Pesticide Management in the Caribbean</u>. Proceedings of a Seminar and Workshop, 3-7 Nov., 1980, CICP/USAID, Vol. 3 Country Papers, edited by e.g.b. Gooding.

APPRENDIX C

LIST OF PEOPLE CONTACTED

JAMAICA

- I. Government of Jamaica (GOJ)
 - A. Ministry of Agriculture (MOA)
 - 1. <u>Rural Physical Planning Division (RPPU)</u> Hope Gardens, Kinston, Jamaica

Mr. Vincent Cambell, Tel: (809) 92-79828/9

2. Natural Resources and Conservation Department (NRCD) 53 1/2 Molynes Road Kinston, Jamaica

Mr. Paul Carroll, Deputy Director Tel: 92-35155, 92-35166. 92-35070

3. Rio Cobre Irrigation Works 17 Barrett St., Spanish Town Tel: 984-2334

Mr. Williams

B. Ministry of Health

1. <u>Pharmaceutical Division</u> 10 Celedonia Ave. Kingston 5, Jamaica

> Lester L. Wcolery, Director Tel: (809) 92-68894 (809) 92-69221

C. Ministry of Local Governments

 Underground Water Authority (UWP) Hope Gardens Box 91, Kingston 7, Jamaica
 Dr. Thorant Hardware, Director

Tel: 92-78378

N
II. Non-Governmental Organizations

A. Agro 21

Jamaica Conference Center 14-20 Port Royal Street P.O. Box 552, Kingston Jamaica, WI Tel: (809) 922-1470/9

Ralph Thompson, Executive Director

Stanley Rampair, Director Land Utilization

James Murphrey Director of Planning

Len Hutchinson Manager of Planning

Dr. Frank Ross Director of Aquaculture

Sonia French Civil Envineer/Land Utilization

Barbary Carby Technical Assistant

C. <u>Partnership for Productivity/Jamaica</u> l Vaz Drive Old Harbour P.O., St. Catherine Jamaica (809) 983-2342

Gene McAvoy, Project Director Small Farmer Production and Marketing Project

D. Spring Plains Estates Personnel and Public Relations (809) 986-4206

C. V. Bent, Agronomist

E. United Estates Bog Walk, Jamaica (809) 962-8278

Henry Bisasor

III. USAID/Jamaica

6B Oxford Road Kingston, Jamaica (809) 929-4850

Edward Kadunc Office of Project Support

Charles Mathews Mission Environmental Office

IV. Consulting Firms/Jamaica

A. Imeru 8 Roe Hampton Mews Kingston 19 Jamaica, WI (809) 92-50660

> Beverly A. Miller Managing Director

B. Caribbean Agricultural Research & Development Institute (CARDI)

University of the West Indies P.O. Box 113, University Campus Mona, Jamaica Tel: 92-76531, 92-76661, ext 372

Janice Reid , Ectomologist

- V. USAID/Washington
 - A. Latin America Bureau

Mr. Jim Hester, Environmental Officer Mr. Jaime Correa

B. Africa Bureau

Mr. Weston Fisher

C. Near East Bureau

Mr Stephen Lintner, Environmental Coordinator Mr Mike Philley, Natural Resource Coordinator

D. Science and Technology Bureau

Mr. Carroll Collyer, Pesticides Management Specialist Office of Agriculture

VI. Consulting Firms/Washington

A. International Institute for Environment and Development (IIED) 1717 Massachusetts Avenue, NW Washington, D.C. Suite 302 Tel: (202) 462-0900

Mr. Dennis MaCaffrey Mr. Ralph Fields, consultant Ms. Susan Bratz

141

ANNEX 2.E.: ECONOMIC ANALYSIS

1. INTRODUCTION:

Agricultural development holds a high priority in Jamaica. The effort, however, is to be investor driven as opposed to public sector led. Realistic hypotheses assumed are:

(1) there are sufficient incentives to entice private sector investment;

(2) there is adequate agricultural technical and management capability available to carry out private sector investment; and

(3) there is sufficient equity capital available from the private sector to act as the catalytic agent for agricultural development.

If these hypotheses are correct, then with a minimum of government intervention the market economy will choose areas of profitable investment in agriculture.

A major strategy of the Jamaican Government for agricultural development, and one that is supported by the U.S. Agency for International Development (USAID), is the Crop Diversification Program as carried out by Agro 21. The essence of this program is to stimulate private investment in areas where traditional crops showing low or negative returns to resources are replaced by crops with higher current and projected returns to resources.

The components of the current project proposed for partial funding by USAID are:

(1) Provide technical assistance and training to assist in stimulating private sector investment in crop diversification projects;

(2) Finance small capital infrastructure projects in the St. Catherine Plains region that are needed to rehabilitate government lands previously in sugar cane production and to increase the supply of water;

(3) Upgrade the GOJ's capability to operate and maintain the rehabilitated system, largely supported by water use charges; and

(4) Develop a small-scale farmer program linked to commercial production of crops in St. Catherine Plains diversification program.

-2-11's

The Economic Analysis as presented in this report provides the following:

(1) a general assessment of the crop diversification program;

(2) an analytical framework for viewing the economics of private sector investment in crop diversification projects;

(3) an economic evaluation of a proposed small capital infrastructure project at Bernard Lodge;

(4) an economic analysis of the aggregate crop diversification program in the St. Catherine Plains region;

(5) an economic evaluation of the proposed small-scale farmer development program.

2. GENERAL ASSESSMENT:

The Government's Crop Diversification Program is a country-wide program to restructure the agricultural sector by rehabilitating abandoned lands, diversifying the crop base, and putting more of the government lands into the hands of the private sector. An estimated 100,000 acres are available for this purpose of which approximately 60,000 acres have been identified for small free-hold lands and 40,000 acres are identified for commercial production under long-term lease agreements. The total Crop Diversification Program, both free-hold lands and commercial lease lands, is market (investor) led. There are some significant advantages to the investor and the country as a whole from the Crop Diversification Program but there are also some current and potential obstacles.

A. Advantages:

(1) Agricultural development and specifically crop diversification, is high priority with the current government and the strategy is to accomplish this by creating an environment in which market forces generate signals reflecting the potential profitability of investment in non-traditional agruculture, and private investors are able to respond to those signals.

(2) Abandoned and underutilized public lands are available for crop diversification with minimal disruption of current production systems. Land availability for productive use benefits the agricultural investor and benefits the country as a whole by permitting increases in aggregate output and employment.

J.U.J

(3) Markets are available and accessible for several domestic food crops and several non-traditional export crops.

(4) Current market prices are sufficient for the proposed domestic food crops and non-traditional export crops to show high profitability and high rates of return to resources.

(5) Adequate credit is available to agriculture at rates of interest that are: (a) sufficiently low to compensate for the considerable uncertainty and limited experience associated with the effort to penetrate competitive international markets, and (b) sufficiently high to dissuade investment in projects that cannot be viable under positive real long term interest rates.

(6) Agricultural profits enjoy a current tax advantage that is a significant incentive for commercial agricultural production.

(7) The total Crop Diversification Progam is designed to accommodate both large and small producers.

B. Obstacles:

Despite many apparent advantages to crop diversification in the country as a whole and the St. Catherine Parish in particular, the rate of implementation of crop diversification projects has been slow and little development of abandoned and underutilized lands has occured for commerical production. However, of the 60,000 acres of free-hold lands, 20,000 acres have been transferred to producers. The reasons for slow commercial production may be summed up in terms of institutional constraints related to land use, uncertainty relative to government policies, technical constraints related to rehabilitation of abandoned lands, and social instability in some areas. These factors are discussed in terms of how this project can reduce these obstacles and constraints.

(1) Institutional Land Use Constraint: Much of the abandoned and underutilized lands for commercial production, including the St. Catherine region, has been tied up in government owned and operated sugar cane estates. With the world price of sugar below historical costs of production, except for a few protected markets of limited volumes, marginal sugar lands have been taken out of production and certain related infrastructure has been allowed to deteriorate. It has only teen recently, however, that such lands have been made available by government to the private sector for production of alternative crops. Much of the government's Crop Diversification Program for commercial production is geared to

utilization of these former sugar estates. This project makes such lands available for commercial crop production, including the lands in St. Catherine region. It also provides for investments required to facilitate productive employment of the land.

(2) <u>Government Policies</u>: Government policies that intervene in the operation of a market economy are generally viewed with skepticism by private investors. Jamaica has a history of government controls, subsidies and market interventions. It has only been recently that government has given clear signals that, to the extent it is currently politically feasible, reliance will be placed upon private market forces to allocate resources among competing uses and users. Clear indications of this are the recent devaluation of the Jamaican dollar, establishment of a floating exchange rate, initial efforts aimed at deregulation (partial) of price and marketing boards, and a freeing of government held lands.

Even though the government has not granted outright sale of sugar estate lands for commercial production, a long-term bankable land lease of forty-nine years has been approved and conditions of the lease are well specified.

Although it can never be assured that government will not intervene, indications are that the current administration is seeking to assure investors that decisions should be based on results of a market driven economy. Thus, results of the investment analysis for crop diversification projects should be based as much as possible on expected conditions of a market economy. If the expected rate of return on such projects is high then the probability of success of the diversification program is high. To the extent that input and output prices reflect the opportunity cost of the resources consumed, the private profitability of individual investment projects coincides with their social value.

This USAID project is providing technical assistance to Agro 21 for purposes of evaluating crop diversification projects. However, there is a relatively short history of the current free market policies. Investors may still be skeptical. Even in the case of crops for which the rate of return on successful ventures is exceptionally high, uncertainty about the durability of present government policy may result in slower response from investors than could be expected on the basis of <u>pro forma</u> projections alone. Thus the government's expectations for 1985/85 performance under the project may be unduly optimistic. It is important therefore, to anticipate this possibility and to avoid premature judgement of the project's success or changes in approach.

2%

(3) Technical Constraints: Much of the abandoned land has been out of production for some years and infrastructure has been allowed to deteriorate. Apparent underutilization of lands, as measured by low yields and production of low value crops, has not been sufficiently analyzed as to the reasons for low productivity. Many of these lands are not accessible by private individuals, as usually occurs in a land or real estate market, to identify the factors contributing to low productivity or what it will take to rehabilitate the infrastructure. Hence, the investor is unsure of the cost of production and the potential for profit. In effect, therefore, there is a relatively high cost associated with the collection of the information upon which private investment decisions are made. This factor may be expected to slow investor response.

This USAID project provides Agro 21 with technical assistance resources to assess production constraints and to determine costs of land and water rehabilitation. It further provides financing for small infrastructure projects.

(4)Social Stability: Land is being divested from previous management (government) to new management (private sector); from previous land utilization (sugar cane production) to new utilization (market determined crops); and from previous management-labor relationships (government management and sugar workers union) to new management-labor relationships (private sector management and private labor markets). Any one of these factors can tear at the local social fabric. Agricultural investors are wary of any social instability and will be hesitant to make long term commitments until they are satisfied that they can reasonably accurately predict elements of social behavoir relevant to their investments. The social analysis of this project addresses these concerns and the proposed Agro 21 solutions to the problem. Choice of area in which to implement commercial production under the total Crop Diversification Program is highly important.

3. ECONOMIC CRITERIA:

The Crop Diversification Program is most likely to succeed if it can be shown that this program is a profitable use of Jamaica's scarce resources. That is, investments in crop diversification projects must show an expected economic rate of return equal to or greater than comparable opportunities without any direct or indirect subsidies from government. Investments in projects that are influenced by government subsidies and market interventions are less likely to succeed in the long-term because of the uncertainties government policies themselves interject into the market economy. This is because subsidies may be withdrawn or different market interventions may occur.

7,50

Agro 21 views investments in commercial production through the Crop Diversification Program on a project by project basis. The small capital projects component of the USAID project is a further verification of this project by project approach. Furthermore, each of the small infrastructure projects perceived in the St. Catherine area relates to the improvement of the resource (natural) base. Thus it would appear that the appropriate context would be a social-benefit cost analysis of a natural resource project. Investment should proceed up to the point at which the marginal social benefits are just equal to the marginal social costs.

The Agro 21 Crop Diversification Program component, however, deals with a series of individual producers or producer groups that are maximizing profits given a regime of output and input prices, rents on land and variable capital, and a set of fixed resources. The assumption is that the point of maximum profit for the individual producer is also the most beneficial use of all resources to society as long as resources are priced equal to their social opportunity cost.

Consider the example of a typical investor for a project in the Bernard Lodge estate of St. Catherine parish. The investor submits a proposal to Agro 21 including a farm plan stating his requirements for quantity of land, soil characteristics, quality and timing of water, location and any other specific needs. The proposal also states the cropping plan, the amount of equity capital contributed to the project, and the amount of additional financing needed. Agro 21 then tries to match the request of the investor with the available land resources much in the same way a broker would do with a real estate client.

The system then becomes one of negotiation and evaluation. If Agro 21 is able to locate a tract of land meeting the requirements of the investor the negotiation for a long-term land lease begins. The Land Commission determines the rental rate based on the market value of the unimproved land. Any improvements to the land requested by the investor are amortized over the expected life of the improvement and are added on to the base land rent. Other agreements may be entered in the land lease such as an agreement on the timing and volume of water to be delivered. On the basis of the base land rent, add-ons to rent from land improvements and other agreements, the investor determines whether or not he wants to commit to the forty-nine year lease (25 years subject to a 24 year renewal).

4. SMALL INFRASTRUCTURE PROJECTS:

The strategy for the small infrastructure projects component is linked to (1) on-site infrastructure project development for crop

production, and (2) phased development of off-site infrastructure projects for water delivery and area development. The procedure for carrying out the strategy is presented in this section. An example is then given for the Bernard Lodge project with a brief project description, identification of the infrastructure component and a financial and economic analysis of the project.

A. Procedure:

The demand for land drives the on-site infrastructure development component. This is the essence of the investor (market) driven model. On-site infrastructure development is only for purposes of stimulating the demand for land in the St. Catherine region. A potential investor approaches Agro 21 with a need for land that correlates well with the resource structure at St. Catherine. However, certain on-site infrastructure development is necessarv before the investor is willing to commit. Feasibility studies and on-site infrastructure financing can be met from project funds if requested by the investor.

The procedural steps for implementing on-site infrastructure development projects are a combination of the following:

(1) <u>Proposal solicitation</u> - an investor requesting land presents a proposal to Agro 21 containing a farm plan plus any requests for on-site infrastructure development.

(2) <u>Proposal review</u> - criteria developed by Agro 21 are used to select and/or prioritize proposals.

(3) Engineering study - if on-site infrastructure is requested, Agro 21 either completes the engineering study internally or contracts for study completion.

(4) <u>Economic evaluation</u> - if on-site infrastructure is requested, Agro 21 completes a project prefeasibility based on the farm plan and the engineering study.

(5) <u>Construction bids</u> - local cost financing procedures will be used to solicit construction bids for on-site infrastructure development based on the engineering study.

(6) <u>AID approval</u> - if USAID is requested to fund the on-site infrastructure development costs, approval is solicited and obtained.

(7) Lease agreement negotiated - Agro 21 negotiates the lease agreement with the investor.

(8) On-site infrastructure construction - once the contractor has been selected, AID approval obtained and the lease agreement negotiated, construction is commenced and completed.

(9) <u>Production start-up</u> - Agro 21 turns the land over to the investor to start production.

Although the procedural steps appear onerous, in reality the system should work in an expeditious manner. The system is investor driven but removes much of the uncertainty investors have concerning actual costs of putting land back into production.

Much of the Rio Cobre water delivery system has been allowed to deteriorate. The technical analysis shows the proposed phased development of the system in terms of where and how water is to be supplied to bring back into production the next unit of land. The proposed phased development is preliminary at this time and additional technical information will be developed as the proposed plan is constructed. However, the first 4,400 acre tract of land to be rehabilitated has been identified and the off-site common costs of development determined. There may also be off-site costs associated with area development such as improved access roads and electrical service. These off-site costs may also be financed through the project. Off-site infrastructure costs are recovered through service charges as in the case for water and electricity, or through capitalized add-ons to land rent as in the case for improved access roads.

The procedural steps for implementing off-site infrastructure projects are a combination of the following:

(1) Project identification - the first few off-site infrastructure projects have already been identified by Agro 21 and are contained in the technical analysis. Additional projects will be identified as the proposed water plan for the Rio Cobre basin is developed.

(2) Engineering study - Agro 21 will complete the engineering study in-house or will contract for study completion.

(3) Economic evaluation - Agro 21 will complete the economic evaluation of feasibility of the project based on engineering estimates and the estimated marginal value product of water supplied.

(4) <u>Construction bids</u> - local cost financing procedures will be used to obtain construction bids.

(5) <u>AID approval</u> - if USAID is requested to finance off-site infrastructure projects, plan is submitted to USAID for approval.

(6) <u>Contracting</u> - standard procedures will be used to contract for construction of off-site infrastructure projects.

(7) <u>Project construction</u> - Once contracting has been completed, monitoring and supervising project construction is turned over to the appropriate implementing agency.

It is not anticipated that this project will finance all off-site land and water infrastructure projects. Rather, the current project will fund about US\$9.3 million of small infrastructure projects as needed to serve investor proposals. As the water plan for the Rio Cobre watershed is further developed, Agro 21 will obtain additional funding from other sources to implement parts of the broader more extensive river basin development. However, this project is undently needed to start the process of rehabilitating canals and improving the water delivery system for high priority needs.

B. Application to Bernard Lodge:

(1) <u>Project Description</u>: Bernard Lodge is the proposed site for an investment company interested in producing winter vegetables for export in rotation with Soya and/or maize. The parcel selected has about 920 acres gross (800 acres net) and is located in close proximity to the Kingston/Spanish Town Highway. It is 12 miles from the City of Kingston, 10 miles from the AMC facility which houses cold rooms and packing facilities, 1 mile from the port, and 17 miles from the soya processing plant operated by Jamaica Soya Products Industries Ltd.

The investment company is made up of three parties: (1) A U.S. investor that is an experienced agricultural company and will provide management services, and (2) two Jamaican investors that have no agricultural experience. Organization of the investment company is contained in the proposal.

Financing of the project is from various sources. The three investors bring J\$3,000,000 equity capital. A five year loan is to be sought from the Trafalgar Development Bank for J\$3,750,000 at 20 percent annual interest with semi-annual repayments of principal. An overdraft facility of about J\$5,000,000 is proposed at 30 percent annual interest and deposits earn interest at 20 percent. Loan security for the overdraft facility is a pledge of new machinery and equipment totalling J\$6,895,350 as well as accounts receivable. The medium term loan is secured by the leased lands with a "capitalized" value of J\$3,733,000. The paid in equity of J\$3,000,000 and the Trafalgar five year loan of J\$3,750,000, totalling J\$6,750,000 is used to purchase farm and irrigation

25%

25)

equipment totalling some J\$6,895,350. The equipment has an expected life of 10 years.

The farm plan shows the following rotation:

Winter period:		Sweet peppers	240 acres
		Cucumber	240 acres
		Cantaloupe	80 acres
		Snap beans	120 acres
		Zucchini	120 acres
Summer	Period:	Maize	400 acres
		Soya beans	400 acres.

The winter vegetables are harvested manually whereas the row crops are highly mechanized. Employment will be provided for about 100 permanent employees and some 3,000 seasonal workers during the winter vegetable harvesting period.

(2) <u>Infrastructure</u>: Rehabilitation of six wells located on the site will take place as an on-site infrastructure project at an estimated cost of J\$1,300,000. This cost will be recovered from a rent add-on and is equal to the amortized cost at the market rate of interest and over the expected life of the capital equipment.

An additional off-site infrastructure project for canal clearing and road and drainage work is proposed at a cost of J\$1,300,000. This benefits more than the current parcel and these costs are recovered from water charges.

(3) Financial Analysis: Part of the financial analysis contained in the Bernard Lodge proposal is reproduced in Table 1 in the form of a three year profit/(loss) projections statement. It was assumed that an additional 800 acres were added in the third year of the project.

This had a dramatic effect on gross sales and net profit. Individual items in the profit (loss) projections are explained by footnotes to the table. Price of winter vegetables is the average for the last five years. Errors in the original proposal are corrected as much as the available data allow.

Table 1

Bernard Lodge Crop Diversification Project Three Year Profit/(Loss) Projections. (J\$)

I'TEM	YEAR 1	YEAR 2	YEAR 3
Gross Sales $\frac{a}{1}$	23,523,400	23,993,868	48,947,491
Commissions (12%)	2,636,568	2,689,299	5,486,171
Florida Charges (6.82%)	1,498,450	1,528,419	3,117,974
Sub-total	4,,135,018	4,217,718	8,604,145
<u>Net Sales</u>	19,388,382	19,776,150	40,343,346
Less Direct Costs <u>C</u> /			
Operational Production			
Costs $\underline{\alpha}$	4,392,000	4,511,600	9,684,360
Packing/Grading Cost	3,745,500	3,932,775	8,258,828
Ocean Freight	3,719,100	3,905,055	8,200,616
Local Transport	187,550	196,928	413,548
Depreciation <u>c</u> /	689,535	$\frac{689,535}{2,225,002}$	689,535
TOTAL DIFECT COSTS	12,/33,685	13,335,893	27,245,887
Gross Profit	6,654,697	6,440,257	13,096,459
Less Indirect Costs <u>f</u> /			
Management & Super-			
vision <u>9</u> /	318,000	333,900	525,893
U.S. Management Cost <u>h</u> /	749,100	764,082	1,558,727
Statutory Deductions <u>i</u> /	36,240	38,052	59,933
Overhead Expenses 1/	168,000	176,400	277 , 830
Land Rental <u>k</u> /	575,000	575 , 000	1,150,000
Interest Payments <u>l</u> /	687,500	637,500	487,500
Overdraft Interest <u>M</u>	873,372	436,663	0
Contingencies <u>n</u> /	672,347	711,998	1,454,508
Total Indirect Costs	4,079,559	3,673,595	5,514,391
Net Profit B/Interest Income	2.575.138	2.776.662	7.582.068
Interest Income	23,333	130,000	250,000
Net Profit A/Interest Income	2,598,471	2,896,662	7,832,068

n:~~~

Footnotes to Table 1

a/ Gross Sales

a, areas bares						
		Units/	lbs/	Price/	Gross Revenue	e (US\$)
<u>Crop (Winter)</u>	Acreage	Acre	Unit	Unit (US\$)	Per Acre	Total
Sweet peppers	240	500	28	16.50	8,250	1,980,000
Cucumbers	240	300	52	12.50	3,750	900,000
Cantaloupe	80	300	45	14.00	4,200	336,000
Snap beans	1.20	170	28	17.00	2,890	346,800
Zuccini	120	300	50	12.00	3,600	432,000
Total	800				,	3,994,800

	Tons	/ Price/	Gross Revenue	(J\$)
<u>Crop (Summer)</u>	<u>Acreage</u> Acre	<u>Ton</u> (J\$)	Per Acre	Total
Maize	400 2.8	820	2,296	918,400
Soya bean	400 1.1	1,440	1,584	633,600
	800			1,552,000

Sales were assumed to increase by 2% per annum. An additional 800 acres were assumed to be added in year three. Exchange rate: US\$1.00=J\$5.50. Price per unit of Winter Vegetables is U.S. Market News average over 5 years.

		<u>Year l</u>	Year 2	Year 3
Winter	crop (J\$)	21,971,400	22,410,828	45,718,089
Summer	Crop (J\$)	1,552,000	1,583,040	3,229,402
	Total	23,523,400	23,993,868	48,947,491

These results differ slightly from what is recorded in the profit/(loss) projections of the original proposal.

 \underline{b} / U.S. Deductions. Errors were corrected in the original proposal.

c/ Direct Cost. Assumed to increase by 5% per annum for all but the depreciation costs.

ζ^{(Λ}

Footnotes to Table 1 (cont.)

d/ Operational Production Costs.

_		Gross Revenue	Net Revenue
Crop	Cost/Acre (J\$)	Per Acre (J\$)	Per Acre (J\$)
Sweet pepper	5,500	45,375	39.875
Cucumber	4,675	20,625	15,950
Canteloupe	4,400	23,100	18,700
Snap heans	2,750	15,895	13,145
Zuccini	3,300	19,800	16,500
Soya beans	895	2,296	1,401
Maize	1,285	1,584	299
Source: Agro 21			
Operational			
Cost of Prod.	Year l	Year 2	Voar 3

COSC OL PIOU.	Year L	Year 2	Year 3
Winter crop (J\$)	3,520,000	3,696,000	7,761,600
Summer crop (J\$)	872,000	915,600	1,922,760
Total	4,392,000	4,611,600	9,684,360

Errors were corrected in the original proposal. Variable production costs are assumed to increase 5 percent annually for the first three years.

- e/ Depreciation. Capital expenditure on machinery and equipment is J\$6,895,350. Depreciation is assumed equal to 10 percent on a ten year life, and no salvage value.
- <u>f</u>/ Indirect Costs. Assumed to increase by 5% per annum except for U.S. Management Cost which is 2%, land rent which remains at the negotiated rate, and interest payments which are at fixed rates on outstanding balances.
- <u>q</u>/ Management Supervision. In year 3 it was assumed that the cost for 1,600 acres would be 1.5 times the cost for 800 acres.
- h/ U.S. Management Cost. Assumed to increase by 2% per annum and the third year is double the second year as additional land is used.
- <u>i</u>/ Statutory Deductions. Calculated at 7% of labor and management and supervisory cost.
- j/ Overhead Expenses. Calculated at J\$210 per acre, per annum and includes telephone/telex, office expenses, insurance, etc. Year 3 cost is 1.5 times year 2.

<u>k</u>/ Land Rental

Base rent - 10% of valuation (J\$3,733,000 valuation)

Additional Rent - based on cost of on-site infrastructure and prorated over the 920 acres, given a pay-back period of 25 years at 15%. (J\$1,300,000x 0.154699)

J\$219/acre/annum

J\$406/acre/annum

Total

J\$625/acre/annum

This was corrected from the original.

- <u>1</u>/ Interest Payments. Interest on medium term loan at 20% per annum, calculated on a reducing balance of principal.
- $\underline{m}/$. Overdraft Interest. Interest on overdraft is at 30% per annum.
- <u>n</u>/ Contingencies. A contingency of 5% on all inputs except interest and principal payments.

Gross sales are projected to increase at an annual rate of 2% for the first three years, reflecting yield and productivity increases and not changes in prices. Direct and indirect costs related to increased volume of output such as operational production cost, packing/grading cost, ocean freight, local transportation, management and supervision, statutory deductions, overhead expenses, and contingencies are projected to increase at a 5% rate for the first three yrars. The data thus are presented in constant prices and not current prices that may reflect changes in prices due to inflation.

Adding the additional 800 acres during the third year increases proportionally gross sales and variable costs associated with production. Depreciation remains the same since no additional capital expenditure on machinery and equipment is necessary for the additional 800 acres. Local management and supervision was assumed to increase by 1.5 times with the additional 800 acres but U.S. management cost was assumed to increase by a factor of 2.0. No rationale was given for the difference. Base rent and the add-on rent were assumed to increase proportionally on a per acre basis.

A summary of the financial analysis for the investment company can be interpreted from the following:

	Year l	Year 2	Year 3
Net Profit A/Interest Income (J\$)	2,598,471	2,896,662	7,832,068
Taxes	-	-	-
Net Profit A/Taxes (J\$)	2,598,471	2,896,662	7,832,068
Return on Sales	11%	12%	16%
Return on Total Capital Excluding Land	38%	42%	1148
Return on Investor Equity	87%	97%	2613

In summary, results of the proposal for the Bernard Lodge project appears very favorable to the private investment company. Return on total capital excluding land is projected at 38 percent or Return on investor equity is projected at 87 percent or more. more. Major reasons associated with the high return on equity are: (1) investors are contributing only about 44 percent of total investment in equipment and machinery, the rest coming from loan proceeds; (2) land is charged as an annual rent with the investors contributing none of the capitalized value; and (3) on-site infrastructure improvements are charged as an add-on to annual rent with the investors contributing none of the investment costs. The full investment and capitalized costs are the following:

		(,]\$)
Machinery & Equipment		6,895,350
Land Valuation		3,733,000
On-site Infrastructure		1,300,000
	Total	11,928,350
Investors Equity		3,000,000

Thus, investors are contributing only about 25 percent of the total capitalized costs of the project.

Winter vegetables show a very favorable net revenue per acre (see footnote d/ of Table 1). The return to management, land, capital, and risk ranges from J\$13,145 per acre for snap beans to J\$39,975 for sweet peppers. The total foreign exchange earnings range from J\$19,388,382 in year one to J\$40,343,346 for year three.

v"

(4) Economic Analysis: The financial analysis presents the viewpoint of the investment company and by any measurement the result is very favorable. The economic analysis views the Bernard Lodge project from society's viewpoint. However, current market output and input prices can generally be interpreted as the social opportunity costs of those outputs and inputs. Hence, much of the financial analysis also pertains to the economic analysis. Nevertheless, to reflect certain external costs (off-site infrastructure) and to correct for what appears to be below-maket pricing of publicly owned inputs (land), some modifications are made in determining the economic rate of return.

The net incremental benefit of the Bernard Lodge Crop Diversification Project is presented in Table 2 for a 25 year period. Most of the benefit and cost data are taken from the financial analysis in Table 1. Gross benefits are equal to gross sales less deductions for marketing commissions and charges in the U.S. The same assumptions of the financial analysis applies: (1) the project starts with 800 producing acres in year one and increases by an additional 800 acres in year three; (2) sales increase by 2 percent per year up to year three and then hold constant for the rest of the period; and (3) marketing commission and charges are a certain percent of winter vegetable sales.

Capital expenditures include equipment and machinery, on-site infrastructure and proportional off-site infrastructure. Equipment and machinery has a length of life of 10 years and hence it is replaced in years 11 and 21. On-site infrastructure of the rehabilitation of wells takes place in year one. Off-site infrastructure is assigned to Bernard Lodge in a proportional amount as shown in footnote d/ of Table 2 and is assumed to be committed in year 3. A pro rata share of off-site infrastructure costs are allocated directly as capital costs to the project. Finally, land rent is increased from 10 percent to 20 percent of its market value to reflect the opportunity cost to the government of holding wealth in the form of land rather than retiring debt. This land rent is taken as the alternative to the project.

Production and selling costs and management and overhead are taken from the financial analysis. Most of these costs are assumed to increase by 5 percent annualy from year one to year three and then hold constant for the remaining years.

v^r

Table 2

Net Incremental Benefit to the Bernard Lodge Crop Diversification Project (J\$000)

-	Yr 1	Yr 2	Yr 3	Yrs 4-10	Yr 11
		Inflow (G	ross Ber	nefit)	
Gross Annual Sales <u>a</u> / Winter Vegetables Domestic Crops	21,971 1,552	22,411 1,583	45,718 3,229	45,718 3,229	45,718 3,229
Less U.S. Deductions Commissions (12%) Florida Charges (6.8%)	2,637 1,498	2,689 1,528	5,486 3,118	5,486 3,118	5,486 3,118
Total Inflow	19,388	19,777	40,343	40,343	40,343
		Outflow (G	ross Cos	st)	
Capital Expenditures Equip. & Mach. <u>b</u> / On-site Infrast. <u>C</u> / Off-site Infrast. <u>d</u> /	6,895 1,300 1,300		1,983		6,895
Prod. & Selling Cost <u>e</u> / Production Packing/Grading Ocean Freight Local Transp.	4,392 3,746 3,719 188	4,612 3,933 3,905 197	9,684 8,259 8,201 413	9,684 8,259 8,201 413	9,684 8,259 8,201 413
Mgt. & Overhead <u>f</u> / Local Mgt. & Sup. U.S. Mgt. Statutory Deduct. Overhead Contingencies	318 749 36 168 672	334 764 38 176 712	526 1,559 60 278 1,455	526 1,559 60 278 1,455	526 1,559 60 278 1,455
Total Outflow	23,483	14,671	32,418	30,435	37,330
Alternative to Project 외	747	. 747	1,494	1,494	1,494
		Net Increm	ental Be	enefit	
Net Benefit <u>h</u> /	(4,842)	4,359	6,528	8,511	1,616

.

1.1³

Table 2 (Cont'd)

Net Incremental Benefit to the Bernard Lodge Crop Diversification Project (J\$000)

	<u>Yr 12-20</u>	Yr 21	Yrs 22-25	Yr 26
		Inflow	(Gross Ben	<u>efit</u>)
Gross Sales <u>a</u> / Winter Vegetables Domestic Crops	45,718 3,229	45,718 3,229	45,718 3,229	
Less U.S. Deductions Commissions (12%) Florida Charges (6.8%)	5,486 3,118	5,486 <u>3,118</u>	5,486 3,118	
Total Inflow	40,343	40,343	40,343	
	<u>Ou</u>	itflow (Gr	oss Cost)	
Capital Expend. Equip. & Mach. <u>b</u> / On-site Infrast. <u>c</u> / On-site Infrast. <u>d</u> /		6,895		(3,448)
Prod. & Selling Cost ≘/ Production Packing/Grading Ocean Freight Local Transp.	9,684 8,259 8,201 413	9,684 8,259 8,201 413	9,684 8,259 8,201 413	
Mgt. & Overhead <u>f</u> / Local Mgt. & Sup. U.S. Mgt. 2% Statutory Deduct. Overhead Contingencies	526 1,559 60 278 1,455	526 1,559 60 278 1,455	526 1,559 60 278 1,455	
Total Outflow	30,435	37,330	30,435	(3,448)
Alternative to Project 9/	1,397	1,397	1,397	
	Ne	t Increme	ntal Benef	it
Net Benefit <u>h</u> /	8,511	1,616	8,511	3,448

Footnotes to Table 2

- a/ Gross Sales. Sales for years one and two assume 800 acres and year three 1,600 acres of crops in production. Sales are assumed to increase 2% per annum up to year three and then hold constant.
- b/ Equipment and Machinery. Equipment and machinery life is 10 years. Hence, replacement occurs in years 11 and 21 with a salvage value for end of project at 25 years.
- <u>c</u>/ On-site Infrastructure. Instead of an add-on rent, on-site infrastructure is shown for year one and with a 25 year length of life. Leasee is responsible for maintenance.
- d/ Off-site Infrastructure. Off-site infrastructure is viewed as being recovered from services and water rates. However, it is assumed for the economic analysis that these charges will not be recaptured in increased rates but are more like subsidies to producers. This is consistent with information that water rates are greatly subsidized. Therefore, a prorata investment cost is charged to the Bernard Lodge project on the basis of common infrastructure:

Common	Road & Drainage Costs	J\$2,700,000
Common	Water Development Costs	5,700,000
	TOTAL	J\$8,400,000

Cost per acre is J\$1,909 for the total of 4,400 acres. Bernard LcJge project cost is equal to J\$3,283,480 for a total of 1,720 acres (920 plus 800). This is assumed to be paid out as J\$1,300,000 in the first year and J\$1,983,430 in the third year.

- e/ Production and Selling Cost. These costs are assumed to increase at an annual rate of 5% up to year 3 and then hold constant in real terms.
- <u>f</u>/ Management and Overhead. All costs are assumed to increase at an annual rate of 5% except U.S. management which is assumed to increase at 2% up to year three and then hold constant in real terms.

 γ^{γ}

Footnotes to Table 2 (cont)

g/ Alternative to Project. The alternative to the Bernard Lodge crop diversification project is assumed to be foregone base land rent equal to the captitalized value of unimproved land. At a 20% market rate of return this is equal to:

Year	Acres	Base Rent/Acre (J\$)	Total Base Rent (J\$)
1-2	920	812	747,040
3-25	1,720	812	1,396,640

h/ Net Benefit. The present value of net incremental benefit at 15% discount rate is the following:

Year	Net Incremental Benefit (J\$000)	D.F. 15%	Present Value 15% (J\$1,000)
1	(4,842)	0.86975	(4,211)
2	4,359	0.75614	3,296
3	6,528	0.65752	.4,292
4-10	8,511	2.73555	23,282
11	1,616	0.21494	347
12-20	8,511	1.02562	8,729
21	1,616	0.05313	86
22 - 25	8,511	0.15169	1,291
26	3,448	0.02642	91
		TOTAL	37,203

The economic rate of return of the net incremental benefit is over 50 percent indicating the Bernard Lodge project proposal should make a significant economic return to all resources used in the project. With the high value export crops shown in the current proposal it is not unrealistic to expect a very high economic rate of return.

C. Aggregate Program Effects:

The aggregate program effects are not possible to determine at this time. Full development of the land and water resources have not been totally specified nor have the necessary engineering studies been completed. As the demand for land increases in the St. Catherine region, additional increments of the project area will be analyzed for costs of rehabilitating the land and water resources. These costs will be first compared against cost of obtaining land on the private real estate market and once those sources are exhausted, then the costs of rehabilitating lands previously in sugar cane will be evaluated against the benefits gained from increased production.

7.4

Because of the incremental nature of the Agro 21 model, it is important that the water development plan be completed early in the stage of determining a land utilization plan. In fact, these processes are already well advanced within Agro 21 and the Ministry of Agriculture.

Table 3

Estimated Infrastructure Costs for Incremental Land and Water Resources, St. Catherine Plains

Incremental Land Base (Acres)	Infrastructure Cost Per Acre (J\$)	Cumulative Land Base (Acres)	Cumulative Infrastructure Costs (J\$1,000)
5,000	2,070	5,000	10,350
5,000	2,890	10,000	24,800
5,000	3,332	15,000	41,460
5,000	3,417	20,000	58,545
5,000	3,547	25,000	76,280
5,000	3,962	30,000	96,090
4,900	6,574	34,900	128,300

Source: Agro 21

The last 4,900 acres is developed at an infrastructure cost of J\$6,574 per acre. The total infrastructure cost to benefit 35,000 acres would J\$128,300,000 as estimated by Agro 21. (However, the immediate project does not envision developing infrastructure to service 35,000 acres).

The marginal benefit curve MB measurs the marginal revenue received from each unit (acre) of land in the project area. If it can be assumed that the total project area is small relative to the market being served then the MB curve is a horizontal line. However, if the size of the project area is sufficient to influence market price received for project output then the MB curve is downward sloping and the more area developed the lower is the marginal revenue received from each unit of land. The optimum level of project development is where the marginal benefit is equal to the marginal cost.

263

269

The above discussion is an analytical answer but with a real world solution in the Crop Diversification Program for the St. Catherine region. Each incremental project brought forward by a potential investor will be analyzed relative to its marginal benefit and marignal cost. If the present value of the marginal benefit is greater than the marginal cost at a discount rate equal to the opportunity cost of capital (say 15 percent) then Agro 21 should proceed with negotiating a lease agreement with the investor.

5. WATER RESOURCE DEVELOPMENT

The previous section on small infrastructure projects approaches the St. Catherine Plains development from the perspective of joint development of the land and water resources. This is the way Agro 21 has approached the problem and the way the original PID presented the problem. The assumption associated with this approach is that land and water are jointly the most scarce resource in the region. The strategy then is to search for land wit⁺ the lowest opportunity cost and then determine the least cost (time and cash outlay) way of bringing water to the land. In this case, abandoned government land has the lowest opportunity cost (zero) and the Bernard Lodge - Caymanas area represents the least cost land and water resource project.

The Israeli study (the Feasibility of Water Supply Extension in the Lower Rio Cobre System by Various Means) uses an alternative approach. Their analysis assumes water is the most scarce resource. This is a justifiable assumption since:

(1) unutilized and underutilized land is available and hence land can hardly be assumed scarce for the region and

(2) the current demand for water is greater than the supply of water at the price being charged for water or at the apparent cost of increasing the water supply.

Their analysis then proceeds to lay out alternative ways of increasing water supply. The study, however, does not provide ways for allocating the existing or new supplies of water among competing uses. In fact, one source of new supply is at a cost lower than the assumed marginal product value (MPV) of water applied to sugar cane production. It is thus conceivable that additional water could be allocated for expansion of sugar cane production which is diametrically opposite of the proposed Crop Diversification Program. The study does point out, however, that water currently used for sugar cane production represents the largest supply of water available at the second lowest cost for use in crops with a higher MPV for water than exists for sugar cane.

A third alternative to the development of the St. Catherine Plains region is based on another set of assumptions and the results appear to be consistent with the Agro 21 and early PID results. This alternative assumes the allocation of water in the short-run is fairly rigid because of the need to maintain political and social stability in the region and for the country as a whole. Social instability was identified earlier as a potential obstacle to increased commercial production of non-traditional export It is more realistic to consider divestment of currently crops. producing sugar lands after the benefits of higher value crops such as winter vegetables have been experienced in the region. Therefore, a search of the land and water resource combination that is least cost and least disruptive to the current social and political system appears to be closer to the Agro 21 model. is, early stages of development of the region focuses on bringing water to the abandoned and unused lands first.

The following analysis tries to reconcile apparent differences between the Agro 21 approach and the proposed Israeli approach. First, a brief reiteration on the MPV of water applied to various crops in the St. Catherine region is given. Second, the marginal cost of supplying increments of water are presented as per the Israeli report and, third, application is made to the Agro 21 alternative.

A. Marginal Product Value (MPV) of Water:

The Israeli report presents data on the MPV of water for a number of crops. The MPV of water is interpreted as the amount that can be paid for water in application to a particular crop and just break even. This data is presented in table 4 in descending order of MPV. The source of the data is the RPPD (Rural Physical Planning Division of the Ministry of Agriculture) and is dated November, 1984 with updates to March 25, 1985. The relative magnitudes of the data are of most importance.

Ornamental horticulture crops have the highest expected MPV of water. High value vegetable crops such as peppers have an MPV of US0.63 to US0.82 per cubic meter (m³) of water. Tomato and cucumber have MPV's of US0.37 and US0.32, respectively. Vegetables as an aggregate have an MPV of about US0.25.

Domestic food and feed crops have the following MPV's: red peas, US\$0.28; maize, US\$0.14; sorghum, US\$0.08; cassava, US\$0.05; and rice, US\$0.02. Sugar cane and fish ponds have an MPV of US\$0.03.

In summary, high value vegetable crops can pay a considerable amount to assure an adequate supply of water. Vegetables in rotation with most food and feed crops could pay US0.10 to US0.24 per m³ or more for water and s'ill show a profit. Sugar cane, fish ponds and rice need lots of water at very low prices to break even.

Table 4

Marginal Product Value of Water

by Crop, Jamaica, November 1984

	Crops	Cost of prod. per acre per crop (J\$) b	Yield per acre/crop (lbs) c	Farm gate price -J\$/lb. d	Net Income per acre per crop e (c*d)-b	Number of crops per year f	Net Income per ha per year(J\$) g e*f*2.47	Gross irri consump. m ³ /ha/yr h	g. MPV J\$/m ³ i g/h	MPV US\$/m ³ j i/4	

1.	Horticulture	99,218	222,843	1.00	123,625	1.0	305,354	1,192	256.17	64.04	
2.	Carrot	2,386	8,000	0.80	4,014	3.0	29,744	8,430	3.53	0.88	
З.	Sweet Pepper	2,761	10,000	1.40	11,239	1.0	27,760	8,430	3.29	0.82	
4.	Hot Pepper	2,457	10,000	1.10	8,543	1.0	21,100	8,430	2.50	0.63	
5.	Pak Choi	2,763	8,000	0.65	2,437	3.0	18,057	8,430	2.14	0.54	
6.	Sweet Potato	2,105	10,000	0.46	2,495	2.0	12,323	6,100	2.02	0.51	
7.	Tomato	3,718	10,000	0.54	1,682	3.0	12,463	8,430	1.48	0.37	
8.	Pumkin	1,592	8,000	0.50	2,408	2.0	11,897	8,170	1.46	0.36	
9.	Cucumber	1,724	9,000	0.35	1,426	3.0	10,569	8,170	1.29	0.32	
10.	Red Pea	1,404	800	3.55	1,436	2.0	7,096	6,300	1.13	0.28	
11.	Callaloo	2,369	10,000	0.35	1,130	3.0	8,378	8,430	0.99	0.25	
12.	Vegetables	2,858	8,333	0.45	892	2.0	4,406	4,540	0.97	0.24	
13.	Tobacco	3,051	1,400	2.67	687	1.5	2,545	3,430	0.74	0.19	
14.	Corn	1,341	2,500	0.70	409	2.0	2,021	3,700	0.55	0.14	
15.	Sorghum	616	3,000	0.30	284	2.0	1,403	4,600	0.30	0.08	5
16. 17a	Cassava (tons) Fish Ponds	300	375	4.25	1,294	1.0	3,196 6,005	15,690	0.20	0.05	(
17b	Sugar (tons)	1.000	30	68.00	1.040	1.0	2,569	21 990	0.10	0.03	-
18.	Rice	1,068	3,000	0.50	432	2.0	2,134	33,820	0.06	0.02	

Source: RPPD

Annex 2 E. ECONOMIC ANALYSIS Page 24

B. Marginal Cost of Water Supply Increments:

The Israeli report estimates that about 11,500 hectares (28,405 acres) are irrigated with a demand for about 200 mcm/vr (average year) of which about 173 mcm/yr represents Rio Cobre system demand and the rest is from local underground aquifers. During a drv year the Rio cobre system demand increases to 221 mcm/vr. The current canal system is able to supply less than 75 percent of the system demand because of deterioration of capacity.

The increments to water supply and the corresponding marginal costs contained in the Israeli report are presented in table 5. These results indicate a cost of less than US\$0.007 for expanding supply of water by 36 mcm/vr. An additional 10 mcm/yr can be added for about US\$0.031 and another 5 mcm/vr for US\$0.061.

This compares with a cost of US\$0.063 from supplying water from additional wells. The current amount of water supplied from wells is estimated at 26 mcm/yr with an estimated safe yield for the region of about 80 mcm/yr.

12

	for Rio Cobre System							
	Water Contributionper mean yearTotal Cost ofSupply Additionmcm/yrWater US\$ per m3_							
1.	Canal capacity extended from 10 mcm/m to 12 mcm/m	20	0.0053					
2.	Canal capacity extended from 12 mcm/m to 14 mcm/m	16	0.0067					
3.	Canal capacity extended from 14 mcm/m to 16 mcm/m	10	0.0314					
4.	Canal capacity extended from 16 mcm/m to 18 mcm/m	đ 5	0.0607					
5.	Canal capacity extended from 18 mcm/m to 20 mcm/m	d 1	0.3034					
6.	Surface diversion	2	0.3662					
7.	Additional wells	0.12	0.0634					
8.	Cumberland Pen relift	12	0.0233					

Table 5 Cost of Water Supply Increments for Rio Cobre System

Source: Israeli report.

The proposed short-term solution by Agro 21 to part of the water deficit problem is the relift station at Cumberland Pen. This alternative as estimated in the Israeli report adds about 12 mcm/yr at a cost of US0.0233 per m³.

C. Application to Agro 21:

Although the Cumberland Pen relift is not the least cost alternative it is perhaps the best strategy for the short-run for the following reasons:

- (1) It provides water at the site where some 4, of land is immediately available for crop diversification.
- (2) It potentially can provide the water a year or more sooner than if the Bernard Lodge - Caymanas region must wait for extension of the canal capacity.
- (3) The fact that the relift station makes 12 mcm/yr of water available down the canal means more water is available for distribution up the canal in areas such as Bushy Park and others.
- (4) The cost of the water at US\$0.0233 is well within the range of what can be paid for from the production of vegetables and domestic food and feed crops.
- (5) The major cost is for power and once the canal system has been extended in capacity to meet all demands, the relift station can be closed with minimal loss.
- (6) The limited area identified for water distribution reduces the problem of maintenance and management by the Rio Cobre Irrigation System.

The Cumberland Pen relift of 12 mcm/yr should provide sufficient water for 4,000 to 6,000 acres depending on the crop rotation. The water supply additions of 46 mcm/yr from extending the canal capacities from 10 mcm/yr to 16 mcm/yr should provide the equivalent of 13,000 to 25,000 acres of additional crop land assuming the more moderate water consumption rates of vegetables and some domestic food and feed crops. This range is consistent with the analysis given on infrecture in section 4 above. As additional land is taken out of sugar cane production and put into less water intensive crops, even more land may be brought into production.

6. INVESTMENT CLIMATE

The advantages of agricultural and related investments have been discussed in general terms in other parts of the technical analysis. In the final analysis, however, an assessment of the business climate should be reflected in what investors are currently doing. It is this result that appears discouraging to the overall effort of Agro 21. It must be remembered, however, that agricultural development is a long-term process and gaining investor confidence is a long-term effort.

Agro 21 itself is an institution set up by the Government to assist investors and to improve the agricultural investment climate. Few Caribbean and Central American countries have a

74

comparable institution that is able to provide such a broad base of technical, financial and market assistance as Agro 21. This is why this AID institution building project is important to further assist Agro 21 in supplying the needed expertise in assisting agricultural investors.

The Jamaica National Investment Promotion Limited (JNIP) was launched in July 1981 and was given the responsibility for the execution of the national investment strategy. Agro 21 was launched in the last half of 1983 as the agency JNIP looked to "for the country to begin to capitalize in its enormous potential in the agribusiness sector". Data from the JNIP Annual Reports show the following results for agriculture:

	1981	1982	1983	1984*	1985 (30	<u>June)</u> *
Investment projects implemented	7	31	41	39	13	
Capital investment (J\$million)	17.4	75.9	27.5			
Employment Actual Potential	403	925 7,063	641 1,264			

* Unpublished data

The JNIP Annual Report for 1984 is not yet available but unpublished results would indicate no substantial change from 1983. The results for the first half of 1985 indicate a decrease in investment projects implemented from the years 1983-84. However, JNIP authorities indicated substantial interest from investors during the last two months.

An encouraging result of the JNIP data is the steady growth in local ownership of implemented projects. For the 1981-83 period, the percent of implemented projects with local ownership has increased whereas the percent of foreign and joint venture projects have decreased. This result is in terms only of number of projects and is not weighted by capital investment nor employment. It does point out, however, a potential latent demand among Jamaican firms and individuals for investment opportunities in agriculture and related industries.

7. <u>SMALL-SCALE FARMER PROGRAM</u>:

The social and small-scale farmer linkage analyses of this report presents several alternative models for the small-scale farmer program. These alternative models have been well thought out and represent similar farmer organizations in other countries. The persistence of the small-scale farmer has withstood the test of time much better than any other land tenure structure. It would be well for society to recognize the economic, social and political contributions of this population segment and to reciprocate in contributing to their well-being.

Many small-scale farm units in Jamaica represent viable economic units in contributing to family income in part or in total. The Small-Scale Farmer Program in Agro 21 recognizes the contribution small-scale farmers can play in rejuvenating the agricultural sector, more fully utilizing land resources and contributing to the country's income and employment objectives. The Small Scale Farmer Program Director facilitates the process of linking the small-scale farmer investor with land, credit, technology and markets in the same way Agro 21 has facilitated large investors.

The division of responsibility between the Ministry of Agriculture and Agro 21 in assisting small-scale farmer groups has tended to fall along lines of the "mother farm" model and "all other". Agro 21 has accepted the "mother farm" model and assumes the Ministry of Agriculture handles the rest. This appears to be a very limited and perhaps a too restrictive role for Agro 21. The same dynamics of the private sector, market (investor) driven model used by Agro 21 in dealing with large commercial producers applies in dealing with small producers and producer groups. The important element is not size but private market incentives. Ιt has been repeatedly shown in the literature that small farmers respond to the same price and profit incentives as large farmers. Agro 21 should use this private market incentive in distinguishing their responsibility relative to that of the Ministry of Agriculture rather than limited to a "mother farm" model.

The economics of small-scale production has not been studied in depth by this author for the St. Catherine region. However, there is sufficient evidence to indicate there is a target group of small-scale farmers already in the region and that production constraints which might be removed by Agro 21 are limiting income and employment for the region. The following are examples of this evidence:

(1) The Small-Scale Farmer Linkage Analysis shows many farmers in the Parish of St. Catherine, of which a majority would be classified as small-scale farms. The Bushy Park area alone reportedly has 2,000 farmers on 6,000 acres of which the majority could be part of a small-scale farmer target group.

> 2 ~ V

277

- (2) A large number of farmers in the region have experience in the production of crops for which Agro 21 is assisting in market studies and providing other services (pimento, coconut, orange, grapefruit, vegetables, condiments, cereals, fruit and dairy).
- (3) Many of the small-scale farmers already have land which is not utilized because of water scarcity.

Annex 2 F. OTHER DONORS Page l

ANNEX F: OTHER DONORS

			•	
Name	L/G	Date	Amount	Description
CIDA Agricultural Credit Bank Hydrographic Surveys	Loan			
EEC (Water Resource for Crop Diversificati	on)*			
FAO Strengthening of the Rural Farm Family		1984-87	745,000	Rural Farm Family oriented activities including crop production, focd production, household decision
Formultion of Irrigation Water Policy		9/85		management, income generation Recommendtions concerning formulation of irrigation pricing policies
IBRD ACB Export Crops	Loan	1983	15m	Sugar, bananas, Blue Mountain coffee, citrus,
(Sugar Rahabilitation II)*	Loan	up to 30.() m	spices. Factory and field rehabilitation to restore viability of public sugar sector and increase exports to fill export quotas.
IDB				
ACB Small Farmer Rural Farm Credit (&I	FAD)		10M IDB 10M IFAD 5M GOJ	Funds provided to ACB for on-lending to small (2-10 acre) farmers through the PC system. Loans are for intrastruction, production, and soil conservation,
(Sugar/Crop Diversification				Feasibility studies for the upgrading of the Clarendon Irrigation Scheme funded from pre-investment funds. (Project may be eventually funded by Saudi Dev Fund.)
(Land titling for small farmers)* Agro Business		1986-88		Provides credit for medium size farmers through the ACB and the NIBJ. Funds are for traditional agriculture, diversification, and agro processing factories

*Planned

Annex 2 F• OTHER DONORS Page 1

				F. OTHER DONORS Page 2
Name	L/G	Date	Amount	Description
IICA (Crop Diversification of Sugar Lands)*			Sugar Cane Lands marnignal for or in excess of that required to meet the national demand for non-traditional and traditional export oriented crops; food import substitution, applying imporved bushedry prosticous
Farming Systems REsearch Programme				imporving human nutrition. Using an adaptive research strategy for implementation on farmets' holdings as a means of encourageing adoption for producing crops and livestock capable of improving and increasing food production
(Development of High Value Export Cr	ops)*			
Israel				
NETH Land Resource Assessment(& USAID) Agricultural Credit	Grant		25,000	
OECF Black River Lower Morass				
Saudi Development Fund Clarendon Plains Irrigation				

Annex 2

*Planned

1/1



Map 1. Crop Diversification/Irrigation Project Area Infrastructure

र हु।
Map 2. Crop Diversification/Trrigation Project Location of Estates



13/

Map 3. Crop Diversification/Irrigation Project Land Use and Sub-activities



121