DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D.C. 20523

PROJECT PAPER

Proposal and Recommendations
For the Review of the
Development Loan Committee

JAMAICA - INTEGRATED RURAL DEVELOPMENT

BEST AVAILABLE

AID-DLC/P-2256

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

UNCLASSIFIED

AID-DLC/P-2256

September 14, 1977

MEMORANDUM FOR THE DEVELOPMENT LOAN COMMITTEE

SUBJECT: Jamaica - Integrated Rural Development

Attached for your review are recommendations for authorization of a loan to the Government of Jamaica ("Borrower") in an amount not to exceed Thirteen Million United States Dollars ($13,000,000) to assist in financing United States dollar and local currency costs of an Integrated Rural Development Program ("Program"). The Program will carry out activities in soil conservation, erosion control, forestation, engineering works such as road building and stream control in the Two Meetings and Pindars River watershed areas; develop local and national institutions in order to increase agricultural production and increase opportunities for employment in agriculture.

This loan is scheduled for consideration by the Development Loan Staff Committee on Wednesday, September 21, 1977, at 2:30 p.m., in Room 5951 New State. If you are a voting member a poll sheet has been enclosed for your response.

Development Loan Committee
Office of Development Program
Review and Evaluation

Attachments:
Summary and Recommendations
Program Analysis
Annexes A - V

UNCLASSIFIED

PROJECT PAPER FACESHEET

1 TRANSACTION CODE: A (A ADD, C CHANGE, D DELETE)

PP

2 DOCUMENT CODE: 3

3 COUNTRY ENTITY: Jamaica

4 DOCUMENT REVISION NUMBER:

5 PROJECT NUMBER (7 digits): 532-0046

6 BUREAU OFFICE: A SYMBOL LA; B CODE 5

7 PROJECT TITLE (Maximum 40 characters): Integrated Rural Development I

8 ESTIMATED FY OF PROJECT COMPLETION: 82

9 ESTIMATED DATE OF OBLIGATION: A INITIAL FY 77; B QUARTER 3 (Enter 1, 2, 3, or 4); C FINAL FY 79

10 ESTIMATED COSTS $000 OR EQUIVALENT $1 -

A FUNDING SOURCE	FIRST FY B FX	FIRST FY C L/C	FIRST FY D TOTAL	LIFE OF PROJECT E FX	LIFE OF PROJECT F L/C	LIFE OF PROJECT G TOTAL
AID APPROPRIATED TOTAL						
GRANT				2,000	0	2,000
LOAN	1,950	11,050	13,000	1,950	11,050	13,000
OTHER U.S. 1						
OTHER U.S. 2						
HOST COUNTRY						11,200
OTHER DONORS						
TOTALS	1,950	11,050	13,000	3,950	11,050	26,200

11 PROPOSED BUDGET APPROPRIATED FUNDS ($000)

A APPROPRIATION	B PRIMARY PURPOSE CODE	PRIMARY TECH CODE C GRANT	PRIMARY TECH CODE D LOAN	E 1ST FY 77 F GRANT	E 1ST FY 77 G LOAN	H 2ND FY 78 I GRANT	H 2ND FY 78 J LOAN	K 3RD FY 79 L GRANT	K 3RD FY 79 M LOAN
1 FN	213	210	210	700	13,000			1,300	
2		220	220						
3									
4									
TOTALS				700	13,000			1,300	

A APPROPRIATION	N 4TH FY ___ O LOAN	N 4TH FY ___ P GRANT	Q 5TH FY ___ R GRANT	Q 5TH FY ___ S LOAN	LIFE OF PROJECT T GRANT	LIFE OF PROJECT U LOAN
1 FN					2,000	13,000
2						
3						
4						
TOTALS					2,000	13,000

12 IN-DEPTH EVALUATION SCHEDULED: MM 07 YY 79

13 DATA CHANGE INDICATOR. WERE CHANGES MADE IN THE PID FACESHEET DATA BLOCKS 12, 13, 14, OR 15 OR IN PRP FACESHEET DATA BLOCK 12? IF YES, ATTACH CHANGED PID FACESHEET: 2 (1 YES, 2 NO)

14 ORIGINATING OFFICE CLEARANCE

SIGNATURE: Charles P. Campbell

TITLE

DATE SIGNED: MM 07 DD 29 YY 77

15 DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION: MM 08 DD 01 YY 77

PROPOSED PROJECT FOR PINDARS RIVER
AND TWO MEETINGS WATERSHEDS
Integrated Rural Development

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Supplemental Annex (on file in LA/DR and USAID/J): UNDP/FAO report Forestry Development and Watershed Management in the Upland Regions, Jamaica. Project for the Rehabilitation and Development of the Pindars River and Two Meetings Watersheds. FAO:DP/JAM/67/505 Technical Report 13/II. 1977.

ACRONYMS

ACB	Agricultural Credit Board
ADC	Agricultural Development Corporation
AMC	Agricultural Marketing Corporation
CDB	Caribbean Development Bank
FAO	Food Agriculture Organization
GOJ	Government of Jamaica
IBRD	International Bank for Reconstruction and Development
IDB	Interamerican Development Bank
JAS	Jamaican Agricultural Society
JDB	Jamaica Development Bank
JSA	Jamaica School of Agriculture
LLP	Land Lease Project
Min Ag	Ministry of Agriculture
Min PW	Ministry of Public Works
PC Banks	People's Cooperative Banks
SSFDP	Self Supporting Farmer Development Program
UNDP	United Nations Development Program

I SUMMARY AND RECOMMENDATIONS

RECOMMENDATIONS

Grant	US$	2,000,000
Loan		13,000,000
TOTAL	US$	15,000,000

Loan terms

Repayment in US dollars over 20 years, including a 7-year grace period. Interest in US dollars at 2% during the grace period and 3% thereafter.

PROGRAM DESCRIPTION

Borrower and Implementing Agencies

The borrower will be the Government of Jamaica (GOJ). The implementing agencies will be the Ministry of Agriculture (Min Ag), the Ministry of Public Works (Min PW), the Jamaica Agricultural Society (JAS), and the People's Cooperative Banks (PC Banks).

Goal, Subgoal, Purposes

The overall goal of the program is to improve the standard of living of small hillside farmers in rural Jamaica.

The subgoal is to establish an agricultural production model that can be replicated on small hillside farms throughout Jamaica. This model will be based on continuous, multiple-cropping techniques suitable for land that has been terraced and otherwise treated with appropriate soil conservation measures.

The specific purposes are (a) to increase agricultural production on small hillside farms in the Pindars River and Two Meetings watersheds; (b) to control soil erosion in the watersheds, thereby establishing an agricultural base for the future and increasing the supply of water for both household and agricultural purposes; and (c) to strengthen the capability of the human resources in the Min Ag.

Program Components

This five-year program will establish erosion control measures as a vehicle to introduce improved agricultural practices for increased production in the Pindars River and Two Meetings watersheds, comprising almost 30,000 acres and occupied by 25,000 persons. The project will be implemented principally by the Southern Region of the Min Ag in conjunction with the Forestry Department and the Min PW. The Agricultural Extension Service, JAS, and PC Banks will play a major role in educating farmers and providing inputs credit, and marketing assistance. Substantial long-term technical assistance and training will be provided to carry out the major components summarized below.

Erosion control

Erosion control activities are subdivided into three major categories: (a) soil conservation, including terracing, ditching, waterways, and pastureland on about 17,700 acres; (b) forestation on about 5,000 acres; and (c) engineering works, including 22 miles of road construction/rehabilitation, and river and stream control (check dams and embankment protection).

Demonstration and training centers

Five demonstration and training centers and 50 small-farm subcenters will be established at the beginning of the program to promote the benefits of land terracing and of multiple and continuous cropping techniques.

Farmer Organizations and services

JAS organizations, PC Banks, and cooperatives in the project area will be provided with training and seed capital to insure that key credit, inputs, and marketing services are made more generally available and economically beneficial.

Agricultural extension

Agricultural extension agents will assist participating farmers individually and as groups, developing farm plans, selecting appropriate crops and cultivation techniques, and optimizing the use of inputs and services. These agents will promote the services of the JAS, PC Banks, AMC, and other institutions of potential benefit to the farmers.

Rural infrastructure

The GOJ will be providing rural electricity, potable water, and housing to a portion of the farmers in the project area to improve the quality of rural life.

Financial Summary

AID and GOJ resources will be allocated as follows: (all US$000):

	GOJ	AID	Total
Erosion control	3,840	9,600	13,440
Demonstration centers	30	450	480
Farmer organizations and services		400	400
Agricultural credit	1,280		1,280
Min Ag operating expenses	4,400		4,400
Evaluation and replication		320	320
Rural infrastructure	1,380		1,380
Equipment and vehicles		1,750	1,750
Technical assistance		1,530	1,530
Training		470	470
Contingency	270	480	750
TOTAL PROGRAM	11,200	15,000	26,200

SUMMARY FINDINGS

The project committee has reviewed the technical, economic, social, and financial aspects of the project and concludes that the program is feasible and relevant to Jamaica's rural development needs.

The project meets all statutory criteria (see Annex C). The AID Affairs Officer's FAA 611(e) certification is included as Annex B.

ISSUES

The DAEC cable on the results of the PRP review is included as Annex F. Major issues addressed in that cable are listed on the next page.

Issue	PP Reference
(1) Existing farm systems, technology level, and crop mixes	Part III: Farmer organizations and services Annexes J, O, P, and Q
(2) Availability and demand for agricultural credit	Part III: Farmer organizations and services Annexes J and O
(3) Agricultural marketing--the problem, constraints, pricing, and availability of storage and processing facilities	Part III: Farmer organizations and services Annex P
(4) Rationale for region-specific approach	Part III: Rationale
(5) Beneficiaries--the spread effect, replicability, employment generation	Part III: Rationale, Strategy, Goal Annex R
(6) Project design--refined objectives and need for TA and training for institutional development	Part III: Project, Goal, Subgoal, Purpose; Technical Assistance and Training components
(7) Ministry of Agriculture--institutional and financial capacity and the status of the reorganization	Part IV: Program organization
(8) Agribusiness potential	Same as (1), (2), and (3) above
(9) Use of fixed-amount reimbursement approach	Part III: Erosion control: soil conservation Annex K
(10) Agricultural education needs and coordination	Part III: Technical assistance and training components

PROJECT COMMITTEE

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AID/W

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William Baucom, Agricultural Economist
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Experience Incorporated

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II PROGRAM BACKGROUND

GENERAL ECONOMIC OVERVIEW

The Jamaican economy has long been oriented towards the export market. The "rum and molasses" trade with the United Kingdom in the 18th and 19th centuries became more diversified in the 20th century, both in products and purchasers, but until the 1950s, Jamaica relied almost exclusively on the export earnings from its agricultural production (sugar, bananas, copra, cocoa, coffee, etc.). In the 1950s two new industries were discovered--minerals and tourism--and the decade of the 1960s saw massive investments in bauxite, alumina, and tourist facilities. The mainstays of the economy in the late 1960s and early 1970s became (1) bauxite mining for export and local processing of bauxite for alumina, gypsum mining, quarrying, and cement production, and (2) the rapidly expanding tourist complexes on the North Coast.

The development of these new industries and ancillary services caused major dislocations in Jamaica's economy. A major rural-urban migration pattern was established, and as the urban areas became more crowded--accompanied by social problems, given the lack of urban facilities--the agricultural sector began declining in importance. With inflation and new social welfare measures designed to provide minimum wages to farm laborers, the traditional plantation economy in the rural sector became increasingly noneconomic, and large landholders began to abandon their lands.

When major investments in mining and tourism were completed in 1972-73, the country's balance of payments position began to nosedive, while unemployment increased sharply as a result of declining construction activities. To stem the rise in unemployment, the GOJ resorted to an expansionary fiscal policy, creating various youth and agricultural work programs. Excess liquidity in the economy, however, created a high import demand, which, left relatively unchecked until 1976, contributed to an already rapidly deteriorating balance of payments position. Moreover, foreign exchange "leaks"--Jamaican travel abroad, foreign remittances, royalties and trademark payments--sharply increased, causing an estimated $100 million a year outflow.

At the end of 1976, the economy was generally characterized by the following conditions:

(1) Deteriorating balance of payment position;
(2) Large fiscal deficits, offset by an inflationary monetary policy;
(3) An unemployment rate estimated at between 22% and 24%;
(4) Overconstruction of the tourist industry;
(5) Underutilized agricultural capacity, caused by land abandonment and lack of investment;
(6) Declining productivity, caused by labor problems and world commodity prices.

Jamaica is currently undergoing a severe economic crisis, and short-run (two to three years) prospects for recovery are not bright despite a strong package of economic austerity measures instituted since January 1977 by the GOJ. The major problems include (1) a worsening balance of payments situation, accompanied by a rapidly growing negative net reserve position (currently estimated at -J$175 to -$200 million); (2) large fiscal deficits that have mostly been masked by following an inflationary monetary policy, which, in turn, has brought about excess liquidity in the economy, causing a high demand for imported goods, thereby aggravating the balance of payments situation; (3) lowered agricultural and industrial production, which has led some experts to estimate that GDP may have dropped by as much as 5% to 10% in 1976; and (4) sharp rises in unemployment, currently estimated to be as high as 24% of the labor force.

RURAL JAMAICA

Role of Agriculture

Agricultural Sector Performance

The performance of the agricultural sector has been disappointing in recent years. Basic infrastructure has largely been ignored; credit channels are cumbersome and not effective in reaching small farmers on a timely basis; and the marketing system rests largely upon a disjointed system of "higglers," commercial middlemen who reap much of the profit. Few incentives have been provided for the farmer, with the result that rural-urban migration has been accelerated (especially among the younger rural inhabitants newly entering the labor force), and idle land has been increasing to the point that an estimated one-third of potentially productive agricultural land is not under cultivation.

The GOJ is attempting to revive the economy by an immediate stimulus in the form of an Emergency Production Plan. A key element in the plan is the revitalization of the agricultural sector, through the provision of credit and reorganization of the marketing system. The plan calls for a 30% increase in basic food production during 1977. While it appears doubtful that this goal can be reached in the time frame originally established, given capital and manpower limitations at the planning level, its ambitiousness is nonetheless indicative of the growing belief among GOJ officials that Jamaica must act quickly to reverse the declining trends in the agricultural sector.

Contribution to the Economy

Since 1966, Jamaica has been a net importer of agricultural goods. In 1974, food related imports were valued at J$193.3 million, compared to exports of J$121.7 million. A deteriorating balance of trade for agricultural commodities over the period 1966 to 1973, which reflected to some extent changes in the relative prices of imported and exported goods, was partially redressed by the rise in prices for export crops in 1974/75. However, production of the major export crops--sugar, banana, coffee and citrus--has stagnated.

Agriculture remains the principal employer in Jamaica. About 30% of the labor force is principally dependent on agriculture and related industries for a living. However, because of the low productivity of the agriculture sector, the average annual GDP per person employed in agriculture in 1974 was as low as J$670, compared to an average of J$3,400 for the country as a whole.

The People

About 65% of Jamaica's population lives in rural areas. Of the total number of farm families, the rural poor of Jamaica make up at least 80%. The 1968 census indicated that there were 193,400 total farms, with 151,700 in the 0-5 acre category. AID's target group in Jamaica is the 150,000 smallest farmers. Some of the farmers in the 5-10 acre group, based upon their per capita income, also fall into the target group. The 1968 census gave the GDP per farm as $287. It is estimated that with 1976 prices the target group has a per capita income of less than $200.

The traditional farmer owns 2 to 3 acres of land, usually on a moderate to steep slope. He will grow food for his family both from annual crops--yams, red peas, sweet potatoes, cassava, Irish potatoes, dasheen, pumpkins--and from food trees such as breadfruit, plantain, ackee, mango, and citrus. He will plant a cash crop either as a pure crop or in mixed stands with other crops. This may be sugar cane, banana, coffee, cocoa, citrus, or vegetables, depending on his location and soil characteristics. In addition, some of the food crops surplus to the family's needs will be sold. He might own a pig or two and several chickens. Some goats are kept; the lucky farmer has a cow that he tethers along the road, on a stream bank, or on land in fallow. The typical farmer has one-third of his land in fallow at any one time. He might own a donkey or a mule to carry produce to the road where it can be loaded on a truck. His principal tools are the machete and hoe.

In addition to his own land he might cash-rent some land within a mile or two of his home, and if there were some idle government land within walking distance he might farm a small patch of that. He might supplement his family income with off-farm labor for a larger farmer in the neighborhood. This practice is usually restricted to landless or near-landless rural workers, since the very labor-intensive activities of planting and harvesting do not leave idle time.

The typical traditional farmer is 48.6 years of age and supports a family of five, one or two of them grandchildren or other relatives under five years of age. His wife works with him; labor from other family members is less common because when children reach a productive age they leave the farm for employment in an urban area. Surveys indicate that as many as 40% of farmers are functionally illiterate.

He usually sells his vegetables and fruit to the wife of a neighbor, who takes them to the local market in her capacity as a "higgler". The average net cash income might be as high as $727 for a family of six, or a per capita income of about $120.

Women have traditionally played an important role on the small farms in Jamaica and are an important factor in the output of a typical farm. She not only bears the children, cooks the meals, and does general house work, she also works with her husband on the land. Under the traditional labor-intensive system, the labor available for planting and harvest is a factor limiting the amount of

land that can be cultivated--so a strong, healthy woman is a real asset. Women tend to be about the same age as their husbands, or a little older. The younger farm family--the wife usually occupied with bearing and looking after small children--has less available labor than the older family.

The Land

Land in farms

During the period 1954 to 1968 there was a continuous decline in the area of land in farms. Of a total land area of 2,715,829 acres, 1,914,375 in farm lands in 1954 decreased to 1,489,188 in 1968 as shown by the 1968/69 Census of Agriculture.

About 24% or 357,412 acres in farms were crops in pure stand. Grassland occupied 321,459 acres or 21.59%; 200,478 acres or 13.46% were mixed stand (all herbaceous crops or tree crops interplanted or mixed), and 23,490 acres or 1.58% were in food forest. Scattered tree crops were not included in the area of food forest. Thus 60.63% of the land in farms was in active use; of the remaining 39.37%, 221,613 acres or 14.88% was in ruinate, 200,652 acres or 13.47% in woodland, 34,377 acres or 2.31% in fallow, and 129,709 acres or 8.71% in other types of land. Somewhat less than half the acreage making up the 14.88% in ruinate was used for pasture.

The main crops in pure stand were sugar cane, 157,386 acres; citrus, 18,188; yams, 25,851; banana, 41,447; Irish potato, 1,920; coconut, 39,291; cocoa, 7,419; coffee, 7,003; and other crops, 58,907.

The census reported 278,710 cattle, of which 34,898 were dairy cattle, 183,654 beef cattle, and 60,158 dual purpose cattle; 40,686 farm animals, of which 37,083 were mules and donkeys and 3,603 were horses; 24,869 breeding sows, 182,024 other pigs, 6,214 sheep, 208,106 goats, 24,383 other animals (rabbits, guinea pigs, etc.); and 4,004,564 poultry, of which 3,727,168 were chickens and 277,416 other poultry.

The pattern of land ownership in Jamaica is highly imbalanced, as the data below show:

Farm size (acres)	Number of farms (000)	Number of farms % of total	Farm land (000)	Farm land % of total
0-5	151.7	78.4	229	15.4
5-25	37.6	19.5	341	22.9
25-100	3.1	1.6	127	8.5
100-500	0.7	0.4	148	9.9
over 500	0.3	0.1	644	43.3
TOTALS	193.4	100.0	1489	100.0

PROGRAM EVOLUTION

This Integrated Rural Development Program evolved from the UNDP/FAO project, 1967 to 1975. During that time UNDP/FAO personnel identified 33 major watersheds in Jamaica, containing about 400,000 acres. Five of these watersheds were later identified as first priority for rehabilitation based on the degree of soil erosion, potential for agricultural development, and downstream potential for irrigation, water supply, and hydroelectric power. The Pindars River is associated with longer-term plans for irrigating the Clarendon Plains and Upper Clarendon, including a proposed dam at Lucky Valley. The Two Meetings watershed is the source of municipal water for the important rural villages in the townships of Christiana and Spaldings.

The program proposed by UNDP/FAO is the result of thousands of hours of staff work: extensive analyses of the soil erosion problem, existing rainfall and soil conditions, cropping patterns, and socio/economic situation. A pilot demonstration center of 100 acres was established at Smithfield and a survey of participating farmers was conducted. The conclusions were that extensive soil conservation work can provide a sound base for increased agricultural production and preservation of the soil resources.

UNDP/FAO recommended a ten-year project to rehabilitate the entire two watersheds, beginning with a three-year pilot project on two subwatershed areas (one each in Pindars and Two Meetings). This proposal was based on an assumption

that very few increases in GOJ staff would be required and that further pilot work would be desirable to obtain farmer acceptance. However, since the UNDP/FAO made their recommendations in 1975, the GOJ has carried out additional pilot activities with its own resources and has decided the project should be accelerated to a five-year program (four-year implementation period). The GOJ is thus prepared to increase or reallocate the human and financial resources needed to carry out the program in a shorter time frame.

RELATIONSHIP TO GOJ AND AID RURAL DEVELOPMENT STRATEGY

In 1973 the GOJ established several rural development goals, summarized as follows:

* Increase rural incomes, and improve rural amenities and social infrastructure as a basis for raising the standard of living of the rural population;

* Ensure that all agricultural land is retained and utilized in as efficient a manner as possible;

* Create agroindustrial and small-enterprise opportunities in rural areas to reduce the unequal distribution of capital and economic activity between rural and urban areas;

* Produce as much of the food and raw materials as is economically feasible to meet domestic food and nutrient requirements, to increase exports of traditional crops, and to develop new crop exports;

* Structure agricultural production to reverse the growing reliance on imported agricultural commodities.

These goals are still valid today, and have been re-emphasized recently in the Emergency Production Plan announced in March 1977. AID supports these goals and Jamaica's other long-run objectives of reducing rural-to-urban migration and creating additional employment opportunities in rural areas.

The Integrated Rural Development Program is focused directly on low-income farmers with its objective of increasing agricultural production within the life of the project, and is fully supportive of the GOJ's strategy of import substitution.

OTHER DONOR PROGRAMS

Major projects presently ongoing or anticipated by other agencies are:

(1) Interamerican Development Bank: Self Supporting Farmers Development Program (SSFDP). The third tranche of this loan disbursed approximately $20 million. An application for a fourth tranche is now pending final IDB approval at about the $8 million level.

(2) IDB: Jamaica Agricultural Research. This project has been developed to provide Min Ag with greater research capability. It has been temporarily delayed pending building design approval and organizational changes in the Min Ag. The total program is approximately $10 million.

(3) IDB: Agricultural Marketing. This project is designed to improve and build new parish markets. Final approval of the $15 million loan is pending.

(4) World Bank (IBRD): Rural Development I. This project with a bank input of about $15 million has been approved; it was reported in June 1977 that the conditions precedent had been met.

Several technical assistance projects by various organizations are being conducted by the UNDP/FAO group in such areas as animal health, forestry development, and commercial fisheries training. Canadian International Development Agency (CIDA) has an ongoing project for the development of the swine industry. The United Kingdom Overseas Development Agency with AID assistance is carrying out a six-year program on coconut lethal yellowing disease.

RATIONALE

As previously indicated, the small Jamaican farmer has been given sporadic, cursory assistance in terms of subsidies and emergency aid--probably designed for political reasons, and not necessarily for increasing production. The target group in this program is the small, hillside farmer who is characterized by an average per capital income of $J265 per year, and land holdings of 2.9 acres, of which nearly all is on slopes between 5 and 30 degrees. There are 150,000 of these farmers in Jamaica and 4,000 in the Two Meetings/Pindars River project area. These watersheds are two of the most important of Jamaica's 18 severely eroded watersheds, preservation and development of which is regarded by the GOJ and UNDP/FAO advisors as essential to the long-term future of Jamaican agriculture. The 4,000 farmers and their families, plus an additional 1,000 landless laborers or rural dwellers and their families, derive their livelihood from farming and related industries in the watershed area.

Nearly all of Jamaica's domestic food is produced by farmers occupying small, hillside plots. Further, 28% of all land in Jamaica suitable for agricultural production is on slopes from 10 to 20 degrees. The flat land is often owned by larger farmers, and is principally suitable for large-scale farming operations, producing such crops as sugar cane, bananas, and coconuts. Land that is not being used productively is gradually being purchased by the GOJ and resettled with landless small farmers. This is a long-term proposition, however, and one which addresses neither the plight nor the productive potential of hillside farmers.

The long-run rationale for this proposed five-year program is based on the need to increase agricultural production on small hillside plots, on the need to protect Jamaica's important watersheds from further erosion, and on the need to strengthen the capabilities of the Min Ag's human resources. The project will aim at developing an agricultural production model that can be replicated on small hillside farms in Jamaica's other watersheds. Soil conservation activities and proper farming methods are essential ingredients to sustaining a base for agriculture and increasing agricultural production. Soil conservation activities facilitate control over water resources, both on the small farm and downstream in the river valley, and are a precondition for effective water resource management, irrigation schemes, and dam construction at a later date.

Early benefits from soil conservation measures are increased yields and production when farmers are able to use multiple-cropping, intensified farming techniques, with higher-value crops on land that has been terraced, will not wash away with heavy

rains, and will allow the moisture to soak in rather than run off.

The soil conservation measures are expensive. However, without attempting to quantify downstream benefits in dollar terms, the program has sufficient merit judged only by production increases on land treated by soil conservation measures. Through innovative yet modest approaches in agricultural extension, marketing, and input supply systems, the small farmer should be able to more than double his average yearly income.

The rationale for an integrated rural development approach is based on indications that rural living is not attractive to the younger population. Employment opportunities are limited; the work is hard and the pay low; housing is often substandard; amenities such as water and electricity are often unavailable; and social services are poor. Thus, rural-to-urban migration increased significantly during the 1960s and 1970s, adding to population and employment pressures in Kingston and other metropolitan areas. This program will attempt to improve the standard of living of a relatively homogeneous and discrete population of 30,000 persons in two specific watersheds, thereby setting the stage for replication throughout Jamaica.

STRATEGY

The overall strategy of this program is embodied in its major objectives, which include an improved standard of living, increased rural incomes, increased long- and short-term employment opportunities, increased agricultural production, erosion control, and a replicable model. These objectives will be achieved by carrying out soil conservation activities on a major portion of the land in the project area, and by strengthening local and national institutions to provide credit, marketing, and agricultural extension services to the small farmer, thereby increasing agricultural production. Employment opportunities will be increased in the short run by providing nearly 600,000 man days of employment through the soil conservation activities alone. Long-term employment opportunities will be created by the increased need for labor generated by establishing continuous and intensified cropping techniques. Other short-term employment opportunities will be created by constructing or rebuilding rural roads, and applying erosion control measures on river and stream banks (300,000 man days); and through reforestation activities (200,000 man days).

GOAL

The goal of this program is to improve the standard of living of small hillside farmers in rural Jamaica. Accomplishment of this goal will be measured by an average increase in rural incomes of 250% to participating farmers. Reduced rural-to-urban migration is a long-term goal of this program, but it may not be achieved within the lifetime of the program. Program beneficiaries will also have access to improved housing, potable water, and electricity.

SUBGOAL

The subgoal is to establish an agricultural production model that can be replicated on small hillside farms in Jamaica's watersheds. This model will be based on continuous multiple-cropping techniques suitable for land that has been appropriately treated with soil conservation measures. Replication will begin during the program's lifetime through extension work with some farmers outside the project area. The project will also train GOJ staff to provide guidance to individual farmers who in turn may be able to undertake soil conservation measures with their own resources, not depending on the Government for replication. The subgoal will be achieved if 75% of the farmers in Pindars and Two Meetings are maintaining the treated land two years after the project's end and are practicing multiple-cropping, intensified farming techniques using higher-value crops appropriate to their own circumstances.

PURPOSE

The project has three purposes:

(a) Increase agricultural production on small hillside farms in the Pindars/Two Meetings watersheds;

(b) Control soil erosion in the watersheds;

(c) Strengthen the capability of the Min Ag's human resources.

Success will be achieved if agricultural production of the region's major crops increases as forecast in the Small-Farm Model, Annex J; if soil erosion is reduced from an average of 53 tons per acre per year in 1977 to 7 tons two years after the end of the project (as explained in Annex K); and if the Min Ag can carry out a similar program in other watersheds.

Principal outputs include:

* Soil conservation activities carried out on 17,700 acres;

* Reforestation of 5,000 acres;

* Construction and rehabilitation of about 22 miles of access roads;

* 1.1 million man days of short-term employment generated;

* Increased and intensified land use by multiple and continuous cropping on 10,000 acres of highly productive land;

* Thirty technicians receive advanced training of from 6 to 24 months;

* Five Demonstration and Training Centers and 50 sub-centers operational in the project area;

* 33 JAS organizations providing improved input, marketing, and extension services to their membership in the region;

* 4 PC Banks disbursing about J$1.6 million in agriculture credit to their membership in the region;

* Water systems installed and servicing 25,000 people in the two watersheds plus adjacent communities by the project's end;

* Rural electrification program serving 15,000 people in the two watersheds plus adjacent communities by the end of 1978;

* 235 houses constructed or refurbished by the end of the project.

PROGRAM COMPONENTS

Introduction

This five-year program is designed as an integrated rural development scheme, with a focus on agricultural production as well as on social services and rural infrastructure to improve the standard of living in rural areas. The erosion control activities and subsequent credit, marketing, and agricultural extension services must be carefully orchestrated to phase back into production after the farmers' land is treated. The Agricultural Extension Service will play a major role, particularly in the early years of the program. Five demonstration centers will be established to show the farmers the benefits of terracing and the possibilities of increased production when new cropping patterns are followed. Local farmers' organizations such as the Jamaica Agricultural Society (JAS) and the People's Cooperative Banks (PC Banks) will be strengthened to provide increased and more relevant

services to the small farmer. All the components discussed below are essential, and aimed at three principal objectives--increasing agricultural production, controlling soil erosion, and strengthening the human resource capabilities of the Min Ag.

Substantial technical assistance is necessary to assure success of this program; even more important, technical assistance will set the stage for follow-on watershed development by establishing a model that can be replicated in other valleys. Also, the GOJ will have to devote substantial human and financial resources to the program. Considerable enthusiasm has already been generated by the collaborative approach to developing this program. By harnessing that enthusiasm and directing people's energies to the task at hand, the GOJ should be able to sustain a dynamic and viable program. Ultimately, success will be determined by the farmers themselves--by their willingness to participate in a program that can substantially change their farming practices, making it easier to work the land and obtain increased production.

Erosion Control Activities

Erosion control activities are subdivided into three major categories: (1) soil conservation, including terracing, ditching, waterways, and pastureland; (2) reforestation; and (3) engineering works, including road and track construction or rehabilitation and river and stream control (check dams, embankments). These activities account for about 50% of the total program cost, of which soil conservation activities cost 75% and will be carried out over a four-year period. Annex K presents a detailed description of these activities and includes cost calculations.

The Min Ag's Southern Region will have overall responsibility for erosion control activities. The soil conservation activities will be carried out by a soil conservation unit responsible to the Southern Region, and the reforestation activities by the Forestry Department. The Ministry of Public Works (Min PW) will construct and rehabilitate feeder roads and tracks and, together with the soil conservation unit, will also construct check dams and rehabilitate stream and river banks.

The following section outlines the broad scope of the erosion control required and summarizes the cost estimates.

Soil Conservation Program

Of the 29,189 acres in the two watershed areas, 17,718 require terracing, ditching, or pastureland treatment, and 7,042 require reforestation. The remaining acreage either does not require treatment because it is sloped less than 5 degrees or is in roads, housing, commercial establishments, and the like. Approximately 4,000 landowners occupy the total 24,760 acres requiring treatment. While it could be argued that not all these farmers will participate in the program, and therefore not all the 24,760 acres will have to be treated, the costs of treatment are based on 100% participation of these farmers, for these reasons:

* 75% of the 500 farmers surveyed indicated a willingness to terrace their land, even before a major educational effort was undertaken;

* The GOJ wants to offer each farmer the opportunity to have his land treated;

* Over the project period, farmers who were originally reluctant may change their minds and wish to participate when they see the benefits;

* From the standpoint of cost and efficiency it is more economical to terrace contiguous pieces of property to avoid excess ditching and waterway construction.

The soil conservation program will begin in two subwatersheds: at Sandy River in Pindars (where work has already started) and at Silent Hill in Two Meetings. As previously discussed, this work will begin only after the Agricultural Extension Service undertakes a comprehensive publicity campaign aimed at enlisting 100% participation of farmers in the two subwatersheds. Following the campaign, the soil conservation teams will conduct a pre-implementation survey to determine priority areas, sequence of work, and a schedule for the first-year plan of operations. The actual implementation period of four years will begin shortly after the pre-implementation work when the supervisory personnel have been trained and the labor force has been mobilized. Min Ag will rent equipment until new equipment to be purchased by loan funds arrives.

The soil conservation (earth moving) activities consist of constructing bench terraces, orchard terraces, hillside ditches, and waterways by machinery and manual labor. Estimates at this time indicate a total of 9.1 million cubic yards of earth will be moved by machine and 2.2 million cubic yards by hand. The criteria for determining (a) whether hand labor or machinery should be used for the earth moving

activities, and (b) the trade-offs between the two methods, are primarily based on soil depth, slope, cost, availability of labor, and time. Initial calculations of the appropriate mix were based on a desire to maximize employment and thus use asmuch hand labor as possible. The final mix suggested in Annex K takes into account several problems with a more extensive use of hand labor and concludes that the mix proposed is both reasonable (considering the interest in maximizing employment) and realistic (considering the availability of labor in the region, the management aspects of adding additional laborers, the high cost of labor and low productivity and the individual farmers interest in treating his land and returning it to production so as not to miss the next growing season). The final determinant of whether to use machinery or hand labor on a particular tract of land will be the farmer himself, who can elect to carry out land treatment by hand, by machine or by some combination of both.

From the MinAg's point of view, the 600,000 work force of about 600 persons at any one time will be one of the most difficult management tasks. Additional laborers would have required even more supervisory personnel. For example, for every 100 additional laborers, the MinAg would also have to employ 3 more soil conservation field assistants, 6 more headman and 14 more senior laborers. As the program begins operating it may well be that these additional skilled personnel will become available; however, even with training programs, the MinAg could not foresee the availability of skilled, labor management personnel at the headman or field assistant level.

A four-year implementation period is planned for several reasons, principally because the GOJ is interested in completing the task and replicating the model in other watersheds. This level of effort will require the soil conservation unit, including supervisory personnel, headmen, survey crews, and laborers, to work a 12-hour day, 5 days per week. Machine operators and a skeleton staff of supervisory personnel will work a 6-day week; in some instances manual laborers may have the option of working 6 days per week. The long days and 6-day work week are necessary to make optimum use of the machinery, and to compensate for the rainy season when crops are growing and the ground is too wet to work. Also, from the standpoint of overall expenses (cash outlays for personnel and idle land) it will be less expensive to complete the soil conservation work as quickly as possible--this despite the fact that overtime pay and compensatory time off will be required.

The average per-acre cost of treatment for 17,700 acres is J$690, including all terracing, ditching, and waterway costs. The GOJ has proposed to absorb 75% of the cost of treatment and to charge the farmer 25%. This is exclusive of waterways, which will often be shared with an adjacent farmer; the GOJ will absorb 100% of waterway costs. Thus, an average farmer is likely to be charged about J$300 for a 2.9-acre farm. Since the farmer is unlikely to have sufficient cash available to repay his 25% share, two options are available: (1) he can work on the terracing activities, using his salary to repay the cost of treatment, or (2) he can repay through the PC Banks. For the latter, the GOJ has proposed repayment over 5 to 10 years at 8% interest, with a 1-to-5-year grace period on repayment of principle. The repayment period would vary depending on the nature of the treatment applied. Bench terraces and hillside ditching will be used for vegetable crops, which will return an income in 6 to 18 months; orchard terraces will be used for food trees and will require a longer payoff time. The farmer will be expected to maintain his treated land; if necessary, the PC Banks will lend him money to perform the maintenance. For common waterways, and in the event of catastrophes, the Min Ag will absorb the cost of maintenance. Experience at the pilot activities thus far indicates that maintenance costs are very low.

All repayments to the PC Banks will in turn be deposited in a soil conservation fund established in the name of the Min Ag. to be used only for soil conservation works in other watersheds.

From the viewpoint of the individual farmer the program would flow as follows:

* Extension agents and soil conservation agents would educate the farmer to the advantages of terracing his land. (This would include the follow-up activities needed to determine continuous cropping patterns and choice of crops optimal for his situation after treatment is applied.)

* The surveying crew would survey his land and stake it according to preferred soil conservation patterns (i.e., terraces or ditches). This crew would also estimate the volume of earth to be moved.

* The soil conservation officer would give the farmer the option of treating his own land and being paid a predetermined amount of money based on the number of cubic yards of earth moved. (This in effect is a fixed amount reimbursement methods) Alternatively, the farmer may choose to do a portion of the work himself (or no work at all), relying on Min Ag machinery and manual labor supplied by other farmers or casual labor. In any case the farmer and the casual laborers would only be paid on a task work basis per volume of earth moved.

* The soil conservation officer would calculate the total cost of treating the farmer's land and, in conjunction with the extension officer who develops an individual farm plan, would agree to the repayment period for the farmer's 25% share of the cost of treatment.

COST SUMMARY (J$000)

Soil Conservation Activities	Total Acreage	Weighted Av. Cost/ac	Total Cost
Bench terraces	4,600	J$ 820	J$ 3,772
Orchard terraces	1,005	600	600
Hillside ditches and basins	10,763	490	5,274
Pasture and hillside ditches	1,350	340	460
Water catchments (200 @ J$375)			75
Subtotal			J$ 10,181
Inflation factor (20% for 5 years)			2,036
TOTAL			J$ 12,217

Forestation Program

The UNDP/FAO report recommends that 7,042 acres in the project area be reforested; 5,740 acres of this land is in Pindars and 1,302 acres in Two Meetings. Based on recent experience under AID's Forestry Development Loan, the Forestry Department will be able to reforest the necessary acreage with Caribbean Pine seedlings at about J$250 per acre, which includes the costs of seedlings, clearing the land, and replanting. Maintenance costs each year for two years afterwards average J$55 per acre per year.

Of the 5,740 acres in Pindars, approximately 5,000 acres owned by about 500 farmers are in one subwatershed in contiguous holdings; 3,000 of these acres are sparsely populated and it is expected that they will be acquired by the GOJ in the early stages of the program. Over the long term and perhaps beyond the life of this project the GOJ should relocate the farmers living on the remaining 2,000 acres.

The remaining acreage in both watersheds (about 2,000 acres) is for the most part held by smaller farmers and is partly in crop production. Presently, the GOJ does not have the legal authority to dedicate and purchase this land for forestry if the private owner does not want to sell. Thus, land ownership laws will need revision. In the interim, two alternatives are possible. The GOJ can offer a subsidy to farmers to encourage them to plant small stands of trees on their plots. The GOJ could also offer to resettle the affected farmers on other lands more suited to higher-value crop production. One large tract of about 1,100 acres now owned by an absentee landlord is presently being acquired by the GOJ and will be available for resettlement. Another large tract will eventually be purchased by the GOJ in conjunction with the construction of a dam on the Pindars River. A portion of this land could also be made available for resettlement, at no real additional cost to the GOJ, on the understanding that farmers involved in a resettlement would receive land at least equal in value to that which was surrendered.

Annex L discusses one proposed subsidy scheme; however, the GOJ is undecided on the final scheme and in fact it seems likely that several alternative schemes will eventually be agreed upon. At this time it is reasonable to budget for reforestation costs on about 2,000 acres of privately held

land. Annex L also presents the per-acre costs of reforestation.

AID's Forestry Development Loan established an institutional capability to carry out forestation activities in Jamaica. The human resources are in place and the Forestry Department has the nursery and logistical capability to reforest the necessary acreage in the Pindars/Two Meetings area. The reforestation activities proposed in this program will be based on the previous forestry loan program. Assuming that 5,000 acres will be reforested over a five-year period, about 200,000 man days of employment will be generated.

COST SUMMARY (J$000)

	Acres	Cost
Land survey and studies	--	J$ 50
Land acquisition	3,000	300
Private subsidies	2,000	400
Maintenance of public lands	--	330
Reforestation: public land	3,000	750
Reforestation: private land	2,000	500
Subtotal		J$ 2,300
Inflation factor (20% for 5 years)		460
TOTAL		J$ 2,760

Engineering Works

The UNDP/FAO report concludes that civil engineering work requirements in both watersheds are similar. Thus, in accordance with GOJ specifications, which are based on practical experience in Jamaica, they recommend standard designs as explained in detail in Annex M.

Three general categories of engineering works have been identified: (1) 22 miles of road construction/rehabilitation. (2) stream control (waterway and check dam construction), and (3) river control (embankment protection). These activities will be undertaken to prevent further erosion from roads, tracks, and river or stream banks and, in the case of road and track construction or reconstruction, to provide farmers better access to markets.

Road construction and rehabilitation and bridge building will be carried out by the Min PW, and the remainder of the activities by the Soil Conservation Unit of the Min Ag.

Based on the road building experience of AID's Rural Feeder Roads Loan and the Forestry Development Loan, the GOJ has sufficient in-house and force account expertise to design, engineer, and implement the project's modest road work effort. In the case of the waterway and check dam construction and the river control works, long-term technical advisors will be provided to the Min Ag.

The UNDP/FAO report recommended an initial level of engineering works in two subwatersheds where soil conservation activities will begin, and engineering works in other areas of the watershed where requirements are most urgent. Most of the UNDP/FAO initial survey work was carried out between 1973 and 1975, with cost estimates updated in early 1977 and again for this PP. However, final location surveys will have to be conducted by joint Min Ag/Min PW teams, with the assistance of the soil conservation advisor.

COST SUMMARY

Road construction or rehabilitation*	J$	1,242,000
Retaining walls and drains		106,000
Bridges		60,000
Track construction or relocation		98,000
River control		24,000
Stream control		110,000
Subtotal	J$	1,640,000
Inflation		160,000
TOTAL	J$	1,800,000

Detailed cost estimates on engineering works are in Annex M.

*AID's contribution to road reconstruction will be limited by a fixed amount reimbursement (FAR) not to exceed $US40,000 per mile for the 22 miles effected. This amount may be adjusted to account for inflation.

Agricultural Extension

To a large extent, this project will depend upon the effectiveness of the agricultural extension program. The concept of extension as it is presently practiced in Jamaica will have to be modified in accordance with the decentralization of the recent reorganization if the project is to meet its objectives. Efforts will have to be made from the beginning to educate the farmers involved, preferably through groups such as the JAS. Extensive use of visual aids, visits to demonstration areas, and discussion groups presented by various specialists as well as by the extension agents themselves will be employed. Since this program is based on an integrated agricultural development approach, it follows that the Agricultural Extension Service will have to promote the total program rather than only certain elements.

The Min Ag under its ongoing reorganization plan has announced the goal of one extension agent for every 500 farmers. In the project area, due to the intensive and multifaceted work that is to be conducted, the ratio will be reduced to one agent for approximately 200 farmers. The Ministry will assign at least 20 extension officers to work in the project area (8 in Two Meetings and 12 in Pindars) under the direct control of the project director. They will be trained by the TA advisors and Min Ag staff to carry out the phases of the project. As the project draws to a conclusion the agents will be transferred out of the project area and reassigned as appropriate.

The present extension system is designed to work closely with the JAS. The JAS has paid and volunteer organizers who will organize group meetings--focal points for special campaigns and promotions. Special emphasis will be given to creating local "grassroots" organizations that can become the action and information groups necessary to the project's success.

Two specific subwatersheds have been chosen to begin the soil conservation work: the Silent Hill watershed in Two Meetings, and the Sandy River area in the Pindars. The extension workers will concentrate on working with these farmers during the early stages of the project. They will coordinate closely with the people assigned to the soil conservation work to supplement one another's activities.

The technological package to be introduced to the farmers will be developed by the extension agents in cooperation with the specialist provided under the technical assistance portion of this project. The agents will have the overall responsibility of not only program development but also creation of a delivery system that will assure the target group is properly informed.

The horticultural advisor will provide information on new varieties, new crops, new planting methods, depths, spacing, cultivation and timing, and disease problems. The extension agents will assist him in carrying out farm demonstrations and advise him of any new or existing problems that should be investigated.

The extension agents will also work closely with the farming systems specialist to develop the best technological package for introduction to the target group. Special attention will be placed on greatest economic return through improved cropping patterns and rational use of fertilizer. They will help the farming systems specialist implement simple cost accounting systems that will provide accurate information on yields and returns.

In addition, the agents will work closely with the marketing/agroindustry specialist in helping the farmers market their produce more effectively. An informal training program will be developed by the extension personnel with the assistance of the marketing specialist to inform the farmers about the preparation and preliminary package for the first-stage marketing program to be developed between the AMC and JAS. They will help this specialist identify potential and actual surplus situations that might lend themselves to processing in existing facilities. The extension agents will also work with the marketing/agroindustry specialist as well as the horticulturalist and the farming systems specialist to determine what crops may be suited to advanced contracting.

Under the present agricultural credit system, extension personnel plan a key role in formulating farm plans and recommending loans. It is hoped that their role in the credit system will become more advisory and less direct. In any event they will work closely with the agricultural credit/farm organization specialist to develop an equitable system of granting credit and collecting repayments based

on crop liens whereby production loans are paid off at harvest time. They will work closely with the supervised credit personnel from the PC Banks.

In addition, agents will cooperate with the agricultural credit/farm organization specialist in developing the local groups necessary to implement the project--mainly local organizations of the JAS. Some local cooperatives may also be formed. These groups will attempt to concentrate products during the first stage of the marketing process; they will supply the necessary inputs such as fertilizer, planting materials, and pesticides; and may become the core for further development of agroindustries. In any and all of these activities, the extension agents will play a critical role.

It is expected that by the end of the project the extension program developed in the project area will serve as a model for the rest of the country. Min Ag personnel will be trained in such fields as horticulture, soil conservation, farming systems, and cooperative development. These personnel would then be available to work as specialists in these fields as the soil conservation program is expanded to other watersheds in the country. The concept of program planning with local participation will have been clearly demonstrated and accepted as the normal approach for extension throughout the country. Audiovisual and other teaching aids developed for use in the project area will be easily transferable for use throughout the entire extension system.

Farmer Organizations and Services

If target area farmers are to benefit fully from the establishment of more intensive cultivation on land modified with bench terraces and other soil conservation measures, increased use of inputs will be necessary--implying the increased use of credit--and current marketing behavior will need modification. The shortcomings and weaknesses of the systems supplying credit, inputs, and marketing services in the project areas--beyond their many symptoms--are rooted in the problematic structure of the farming pattern, which requires farmers' needs be attended to via a large number of low-volume and geographically dispersed transactions. This fundamental problem is the factor contributing most to the high cost, poor reliability, and difficult management observed in the credit, input, and marketing systems serving farmers in the two watersheds.

The project will address this problem in two basic and simultaneous ways. First, groups of small farmers will be helped to achieve economies of scale by planning, borrowing, buying, and selling in a more concerted manner. Second, credit, supply, and marketing institutions and firms will be encouraged and assisted to modify rules and procedures to better accomodate the individual and collective needs of small farmers. This approach will not require the creation of any new organizations or institutions, nor are any planned in the project activity. What will be required are incremental changes in behavior on the part of farmers and managers of institutions to undertake innovations that may initially be perceived as representing higher risk when compared to traditional practices. The project activities are precisely designed to stimulate needed innovations by reducing the perceived risks of the target group and ancilliary institutions.

Farmer groups and organizations

Groups of farmers associated for the purpose of coordinating their plans and sometimes engaging in unified action represent the best alternative to improve the credit, inputs, and marketing services available in the project area. The project proposes no preconceived "best" structure of group activity, and will attempt to assist and develop groups of farmers organized as cooperatives, associations, or societies.

The Jamaica Agricultural Society (JAS) is the organization in the two project areas to which target farmers are mostly likely to be affiliated. A survey indicated more than one-third of the target farmers are members of one of the 33 local JAS groups in the two project areas. For this reason it is proposed initially to concentrate organizational assistance on these groups; they have the potential of playing fundamental and important roles in the eventual success of the project.

The role envisioned for local JAS groups has several facets: conduit through which information, advice, and technical assistance may be disseminated; a forum for discussion among farmers, where local leaders can encourage others to adopt new behavior; a structure wherein coordinated activity will afford local farmers economies of scale in buying and selling; and a vehicle to community and political participation.

Specifically, the project staff with the assistance of the technical advisors will attempt to establish the interrelationships of farm production and ancilliary services, and persuade farmer groups of the economic advantages of concentrated areas of production. The shift to concentrated production areas within the constraints of sound agronomic possibilities is a fundamental first step in subsequent activity to improve delivery of credit, inputs, and marketing services. Such a shift in basic land use and cropping patterns is believed feasible because of the radical modification of the land by soil conservation treatments; this will leave farmers more open to reasoned arguments about changing their traditional farm plans to collectively establish areas of more homogeneous production.

Local JAS groups will also be assisted to understand the various institutions upon which they depend, and encouraged to adopt methods that reduce the cost and facilitate the use of credit, inputs, and marketing services. Toward this end the operations of the PC Banks, farm supply firms, co-ops, the AMC, higglers, and food processors will be discussed with local JAS groups to identify ways small farmers can establish better links with more economically beneficial outcomes. Improved linkages will most often require coordinated group action--simultaneously soliciting credit, pooling input requirements into a single order, or jointly assembling marketable produce. In turn, pressure from local farmer groups may bring changes in the policies of institutions to better accommodate the requirements of farmers.

To harness the potential of small farmer groups to improve the credit, inputs, and marketing systems in the target areas, the key project activities will be technical assistance, training, and promotion. In addition, loan funds will be available for modest grants (seed capital) to local groups. These funds may be used for any purpose that would encourage small farmer groups to undertake innovations to establish better linkages with the credit, inputs, and marketing systems servicing the target area. Seed capital might be used for: partial cost of simple storage buildings for fertilizers ordered jointly and delivered in quantity; partial cost of selected tools and equipment (e.g., backpack sprayers) to be used among local JAS group members; partial cost of establishing simple assembly centers for marketable produce

including appropriate techniques to preserve quality by removing field heat through aeration and water evaporation; the initial cost of appropriate and standardized crates and packing containers; partial cost of prefeasibility studies and design sketches for larger projects (e.g., agroindustries) for which local groups are willing to accept long-term loan financing.

Seed capital grants solicited by local groups shall be approved at the option of the Min Ag Permanent Secretary, upon the request of the Southern Region director, and with the advice of the Project Advisory Committee. Grants shall be made for discrete and specific purposes. A total of J$500 000 shall be available for such grants, but in no event shall the cumulative grants to any single group be in excess of J$250 per member over the life of the project.

Credit

The PC Banks, four of which are located in the two project areas, are the best suited sources for institution credit for small farmers because of their structure, community-based responsibility, and modest eligibility requirements for borrowers. The project will therefore increase the amount of loan capital and managerial capacity of the PC Banks to a level consistent with projected small farmer credit requirements. The GOJ will provide a total of J$1.6 million to the four PC Banks in the project area, specifically for production credit for periods coinciding with crop growing and harvest cycles. Professionally trained managers will be hired by each of the banks; their salaries will be subsidized by the Min Ag over four years of the project. Present staff and directors of the banks will be given training in operational skills and concepts of lending money for agriculture, provided in part by the project's credit/organizations advisor. The PC Banks' directors will be encouraged to modify their usual practice of insisting that production loans be secured by land mortgages, accepting instead crop liens or attachments of sales. Moreover, the banks' directors will be asked to change policies and procedures as necessary to make loans to groups and associations as well as individuals. Procedures should be modified to allow at least the simultaneous application, review, and disbursement of loans to any group of individual farmers engaged in jointly planned agricultural activity.

On the other side of the credit equation, the small farmers in the project areas will require training in the use and management of production credit. While only one-fourth of the farmers currently borrow money for production, the concept is not new to most of the target group. Training will be focused on how to determine credit needs, how to anticipate and arrange credit in advance of need, and how to understand the terms of loans provided by PC Banks. This training will be conducted through local JAS groups by bank staff, agricultural credit field officers, and extension agents with the advice and assistance of the credit/organization advisor.

Inputs

More intensive cultivation practices and improved technology will demand more varieties and larger quantities of commercial inputs be available to small farmers. While knowledge of appropriate inputs is a problem addressed by the agricultural extension activities of the project, the unreliable availability and high cost of most inputs is a major constraint to widespread use by small farmers. Privately owned farm supply stores that sell fertilizers, tools, insecticides, and improved seeds are limited to larger towns, are said to be often short stocked, and are known invariably to charge premium prices for small orders. This supply structure may at length be modified for farmers in the project area by an expanded private sector role if sufficient geographic crop specialization is successfully established. The project, however, intends to address this problem immediately by assisting JAS local groups to pool their requirements for inputs and place single orders with major supply firms or cooperatives for delivery to a convenient community location. Local JAS groups will also be encouraged to adopt other formal and informal procedures to ensure themselves of key input supplies, tools, and services. For example, one or two members of a JAS group may elect to purchase specialized equipment (e.g., backpack sprayer) and perform work for neighbors for a fee.

Direct project assistance will be mostly in the form of training and organization by project staff and advisors to the JAS groups. In addition, grant funds will be available to facilitate or initiate improved input availability. Grants will almost always be directed at giving farmers, acting together, the tangible assets necessary to take

advantage of economies of scale when purchasing inputs. It is not anticipated that grant funds will be used directly to subsidize costs of fertilizer, insecticides, or other purchases.

One cooperative in the project area, the Christiana Potato Growers Association, is the only significant farmer-owned organization already handling an assortment of farm inputs. It is believed that this cooperative's activity can be expanded with current management and facilities. Therefore, the project proposes to offer a grant to this co-op with the condition that it expand its inventory of inputs to better serve more small farmers. The inventory requirements will be determined by the project director and his staff. The amount of the grant would not exceed J$50,000.

Marketing

The availability of market outlets for farm produce is not judged to be a major constraint to increased production, since both higglers and the AMC are active in the project area. However, the performance of the marketing system is a constraint to farm income, and project activities are intended to improve that performance. As with input supply, opportunities for improved marketing will be greatly improved by establishing more geographically concentrated production patterns of selected crops. This is true because sufficient volume of produce in a given place is a precondition to establishing affordable methods to preserve quality and reduce handling cost, and attracting a wider range of buyers. Therefore, project activity to improve marketing will begin with training farmer groups like the JAS to increase their knowledge of marketing costs between farmgate and final consumer. The purpose of this training will be to stimulate local farm groups to identify ways to perform selected market-related services for their produce for which they can capture economic benefits. Improving quality for which buyers are able to pay premium prices is one possibility; improving preservation for longer shelf life is another. Reduced market risk may be desirable: forward contracting could be appropriate, and storage facilities for some commodities. The point is, most marketing improvements will require mutually agreed objectives and jointly executed activities. One example of cooperative linkage between local JAS groups and the AMC to improve market coordination

in a mutually beneficial way is described in Annex F: cleaning, sorting, and packing of set volumes of produce is performed by JAS groups according to AMC specifications and is picked up at predetermined dates and locations. In return, participating JAS farmers receive a price premium for their additional work and for their willingness to contract forward of delivery. The AMC is on record as wanting to expand this type of arrangement, and private processors are apparently eager to establish linkages with groups capable of assuring sufficient volumes in a contractual manner.

In addition to training and technical assistance in marketing, the project staff will use its best efforts to provide the catalyst sometimes needed to establish more beneficial linkages between farmers and market buyers. Particularly important will be the work of the marketing/ agroindustry advisor in rendering fair and experienced judgment to all parties and helping to anticipate problems before they arise.

When deemed necessary, groups will be encouraged to solicit seed-capital grants from the Min Ag to initiate marketing improvements. Examples that come to mind are small assembly sheds, crates, and sorting tables as previously discussed. It should be noted that improved marketing activities of the kind envisioned in this project should require only modest capital investments. No construction of elaborate physical facilities, no sophisticated mechanical equipment, and no advanced technology are desirable or needed. Rather, what the project will seek to accomplish are simple but important changes in marketing behavior that will result in higher prices for farmers. Seed-capital grants should be used judiciously to provide low-cost tangible facilities to elicit changes in the intangible attributes of market performance.

COST SUMMARY

Each of 4 PC Banks will have a full-time professionally trained manager 4 x J$10,000 x 4 Years	J$160,000
Input Supply	
Input reception sheds 20 JAS groups @ J$1,500	J$ 50,000
Special tools and equipment 25 JAS groups @ J$1,500	J$ 37,500
Existing co-op inventory expansion 1 co-op @ J$50,000	J$ 50,000
Marketing	
Assembly/packing sheds 15 JAS groups @ J$2,500	J$ 37,500
Special handling/sorting equipment 15 JAS groups @ J$500	J$ 7,500
Crates/packing boxes 33 JAS groups @J$2,000	J$ 66,000
Appropriate tech. for cooling 5 JAS groups @ J$5,000	J$ 25,000
Contingency	J$ 66,500
TOTAL	J$500,000

Demonstration and Training Centers

The Institute of Interamerican Sciences, in cooperation with the Min Ag, is developing a research, training, and demonstration station at Allsides in the parish of Trelawny. Though this is outside the project area, experiments carried out at this location will be relevant for both watersheds, particularly so for Two Meetings. Close cooperation is anticipated between that station and project activities.

The major effort at Allsides, in addition to bench terracing and other soil conservation measures, is the development of multiple cropping systems with major emphasis on Irish potatoes and yams interplanted with red peas. They are also utilizing various fertilizer treatments to measure response both in terms of total quantities and trace element requirements.

Because of varying soil conditions and some critical microclimate differences the project will develop five replications of the Allsides station within the project area. These centers will be located on typical land either presently owned or to be obtained by the GOJ in plots of from 5 to 10 acres. The land will be treated with the necessary conservation measures and cultivated by resident farm operators with assistance from local laborers. An effort will be made to develop a farming system at each center that can be duplicated by the farmers in the surrounding area. These centers will practice innovative methods, however, and will try out various systems and technologies before they are recommended for individual farm adoption. The centers will be the proving grounds for new crops and varieties to be tested by the horticulturist and the farming systems specialist. The production economist will analyze the cost/benefit ratio of the various technological packages that are tested and develop recommendations for the individual farmers to maximize their returns.

Each center will be directly supervised by a technician with the equivalent of a Jamaica School of Agriculture (JSA) degree. No large or expensive installations will be required. A simple building for office, storage, and living quarters will be adequate.

In addition, these centers will become the initial source of planting materials for the surrounding farms. The innovative development of planting material for yams begun at the Smith-

field station in Hanover will be duplicated at each center. In addition, elephant grass and other pasture grasses will be grown to provide planting material for the risers of bench terraces on individual farms.

Basic meterological information such as rainfall, temperature, and wind velocity will be obtained. Small hand-operated tractors will be tried out at these centers.

The centers will only operate during the life of the project and, if the government chooses, the land can be used for resettlement purposes.

Within six months after the demonstration centers are established, the agricultural extension agents and farm operators of the centers will enlist willing farmers nearby to establish subcenters. These subcenters will be privately owned farms typical of those in the region and will function as practical applications of the model demonstration centers. The owner of the farm will continue to operate it, but will receive specialized attention in the use of fertilizer, cropping patterns, and land maintenance. To encourage these farmers to participate, the GOJ will provide all the necessary inputs for an average two-year period, and will guarantee him an income in the event crops fail. He will provide the labor and, it is hoped, will become promotor of the benefits of treated land and new cropping patterns. The GOJ will have to obtain an understanding from the farmer that the in-kind inputs will be provided free for a two-year period only.

SUMMARY OF ESTIMATED COSTS

Cost per demonstration center	
Land acquisition (5-10 ac)[a/]	J$ 7,000
Soil conservation treatment	7,000
Living, storage, and office quarters	10,000
Input supplies	10,000
Staffing costs @ $10,000/year	40,000
Casual labor	10,000
Subtotal	84,000
Total cost (5 centers for 4 years)	J$420,000
Cost per Subcenter	
Soil conservation treatment	J$ 2,100
Inputs ($400/year for 2 years)	800
Subtotal	2,900
Total cost of 50 subcenters	J$180,000
TOTAL	J$600,000

a/ GOJ share: Land J$7,000 x 5 centers = J$35,000.
All the rest is AID share: J$565,000

Technical Assistance and Training

The technical assistance and training requirements were analyzed, keeping in mind the immediate needs in the project area but also with a view toward the future. The objective was to set the stage for replication beyond the lifetime of the proposed project, for future GOJ and AID plans in rural development in Jamaica.

The technical assistance portion of the project will be extremely important to the success of the activities to be carried out. The available manpower in the Min Ag must be reinforced. There are some well-trained extension officers, but their concept of program development and implementation has been conditioned to responding to crisis and providing Government subsidies. Little work has been done to organize group action or to determine the needs of the people. The current reorganization of the Min Ag provides a structure that can be utilized, but outside assistance will be required to develop an effective organization in the project area.

With the exception of a few export crops, Jamaica has done very little work in the field of applied agricultural research. There are few trained agricultural research people in the country and little organization in the Min Ag to carry out work on such things as crop introduction trials. The status of research workers compared to extension personnel is low; consequently, the better people, unlike those in most countries, are usually not attracted to this area of work.

Seven long-term technicians have been identified as being required for a total of 21 man years during the life of the project (see Annex S for details). Assistance will be required in the fields of horticulture, farming systems, soil conservation, agricultural extension, marketing/agroindustry, agricultural credit/farmers organizations, and agricultural production. Short-term assistance will be required in such fields as heavy machinery maintenance and operation, specialized horticulture, entomology, plant pathology, animal husbandry, rural housing, agroindustrial development, food storage and processing, home economics and nutrition, soil conservation, forestry, and watershed management. It is estimated that 60 man months of this type of assistance will be required during the life of the project.

TA costs are estimated at US$1.53 million.

The shortage of properly trained people to work in the agricultural development process is a serious handicap to progress in the agricultural sector in Jamaica. The most recent figures from the Statistical Yearbook of Jamaica 1976 are indicative. In 1974-75 there were 47 students studying agriculture at the University of the West Indies. The same year 12 students were graduated; in the total period 1952-1975 there were only 93 graduates in agriculture. The same source indicates that in 1974-75 there were 271 students enrolled at the Jamaica School of Agriculture (JSA)--a post-secondary educational institution whose graduates are insufficently prepared to solve the problems of developing improved agricultural technology for the small farmers in Jamaica. Training at all levels will need to be an integral part of this project.

It is estimated that 40 man years of training (See Annex S for details) will be provided under the project. This will be long-term academic training both at undergraduate and graduate levels. The training will be in various fields but important consideration will be given to training specialists to replace those who will be provided under the TA grant portion of the project. There will also be specialized in-country training carried out by the various specialists assigned to the project. Training costs are estimated at US$470,000.

Rural Infrastructure

The housing, electricity and water components discussed below are part of a modest, ongoing effort to improve rural infrastructure.

Housing

The GOJ recognizes the importance of improved housing to rural dwellers. The social survey of the project area indicated that good housing is at least as important to small farmers as improved roads, access to credit, and higher farm prices.

The Min Ag has plans to construct 35 houses in the project area during their 1977/78 financial year at a cost of J$1,100 each (total cost J$38,500). Based on current projections it is expected that at least another 35 units will be built in each of the four years of the project (an additional $185,000 with a 20% inflation factor). These units are small two-bay houses (16' x 12') constructed of concrete blocks, wooden supports, and a metal roof. The

Min Ag is interested in broadening the participation of this program and also exploring the possibilities of alternative materials and construction methodologies. The Min Ag has requested that a specialist on rural housing be provided with TA funds on a short-term basis to analyze the rural housing needs in the project area and to investigate appropriate housing technologies for possible application throughout rural Jamaica.

As part of the Land Lease Program, the Min Ag and Min of Housing during 1977/78 are also constructing a housing scheme at Crofts Hill. A portion of this land lies in the watershed area and will be terraced under program activities. The scheme will cost J$730,000 for 80 units including a sewer system.

Rural Electrification

With assistance from the IDB, the GOJ Public Service Company is providing electricity to a total of almost 15,000 people in the two watershed areas. When the project is completed in mid-1978, approximately 95 miles of line will be in place at a cost of J$1.2 million.

Rural water

The major water need in the project area is expansion of central pumping facilities at Moravia and Two Meetings. The existing plants are now serving 25,000 persons throughout the watershed area, including villages and isolated communities with a central water line near roadways. During the current GOJ fiscal year J$285,000 is earmarked for increasing the capacity of the Moravia plant. Another J$3 million has been requested for the next fiscal year to construct a second treatment plant at Two Meetings. When both projects are completed an additional 25,000 persons will be served.

FINANCIAL PLAN

This five-year program will incur nearly all its expenditures during the four-year implementation period of the erosion control activities. A preimplementation period of six to

nine months beginning as soon as the program is authorized, will be required to mobilize GOJ resources, educate farmers in the watersheds, and recruit TA advisors. Actual earth-moving activities should begin with rental equipment in April 1978.

A fixed amount reimbursement (FAR) approach will be used for payment to day laborers--many will be farmers--employed in the program. As explained in the description of the soil conservation program, they will be paid on a task-work basis for the amount of earth moved, or for the number of ditches cleaned or terraces established.

Approximately US$1,950,000 of loan monies will be foreign exchange costs of equipment, vehicles, and materials; the remaining US$11,050,000 are local currency costs.

Financial summaries follow.

FAR will also be used to reimburse the GOJ for the cost of road reconstruction.

SUMMARY FINANCIAL PLAN

	J$000			US$000		
	GOJ	AID	TOTAL	GOJ	AID	TOTAL
Soil Conservation						
Bench Terraces	1131	3394	4525	905	2715	3620
Orchard Terraces	175	525	700	140	420	560
Hillside Ditches & Basins	1588	4762	6350	1270	3810	5080
Pasture with Ditches	131	394	525	105	315	420
Water Catchments	25	75	100	20	60	80
Subtotal	3050	9150	12200	2440	7320	9760
Forestation	1300	1500	2800	1040	1200	2240
Engineering Works						
Road Construction and Rehabilitation	385	1155	1540	310	920	1230
River and Stream Control	65	195	260	50	160	210
Subtotal	450	1350	1800	360	1080	1440
Demonstration and Training Centers	35	565	600	30	450	480
Farmer Organizations and Services		500	500		400	400
Agricultural Production Credit	1600		1600	1280		1280
Commodities						
Heavy equipment		1625	1625		1300	1300
Vehicles		325	325		250	250
Light equipment and supplies		235	235		200	200
Subtotal		2185	2185		1750	1750
Salaries of Min Ag personnel	5000		5000	4000		4000
Other operating expenses of Min Ag	500		500	400		400
Water Systems	300		300	240		240
Rural Electrification Program	1200		1200	960		960
Rural Housing	225		225	180		180
Evaluation and Replication		400	400		320	320
Technical Assistance		1900	1900		1530	1530
Training		600	600		470	470
Contingency	340	600	940	270	480	750
	14000	18750	32750	11200	15000	26200

Note: US$ 1.00 = J$ 1.25

SUMMARY FINANCIAL PLAN BY YEAR

(J$000)

	Year 1[a]		Year 2		Year 3		Year 4		Year 5		Total	
	GOJ	AID	GOJ	AID	GOJ	AID	GOJ	AID	GOJ	AID	GOJ	AID
Soil Conservation	500	1000	750	2250	1000	3000	750	2350	50	550	3050	9150
Forestation	200	200	300	300	350	350	300	300	150	350	1300	1500
Engineering Works	100	375	200	425	150	550					450	1350
Demonstration & Training Centers	10	300	25	265							35	565
Small Farmer Services		50		150		200		100				500
Agricultural Credit			300		400		450		450		1600	
Commodities		1700		300		185						2185
Min Ag personnel expenses	800		1200		1250		1300		450		5000	
Min Ag operating expenses	50		100		100		125		125		500	
Water Systems	300										300	
Rural Electrification Program	1200										1200	
Rural Housing	35		45		45		50		50		225	
Evaluation and Replication		25		25		100		150		100		400
Technical Assistance		300		450		475		450		225		1900
Training		50		150		150		150		100		600
Subtotal	3195	4000	2920	4315	3295	5010	2975	3500	1275	1325	13660	18150
Contingency											340	600
TOTAL											14000	18750

a/ Project year begins 1/78, GOJ fiscal year begins 4/78

IV PROGRAM ANALYSIS

PROGRAM ORGANIZATION

In 1975 the Management Services Division of the Ministry of Public Service reviewed the structure of the Min Ag and recommended major organizational changes. The report found that the planning, staffing, and control functions of the Ministry needed strengthening, and that program implementation was ineffective because it did not have organizational control over major services such as irrigation, drainage, and extension. Most important, the farmer was not being reached.

Most of these recommendations were accepted and the formal reorganization became effective in April 1977. Essentially, the reorganization placed the planning, data storage, and overall control in headquarters, while implementation of agricultural production and rural development programs was decentralized under three regional directors.

This program will be under the overall direction of the Southern Region's director, who will have the necessary resources at his disposal to achieve timely and efficient implementation. An organization chart for the project structure is presented in Annex U.

TA advisors will be assigned a full-time GOJ counterpart and will work in both watersheds. They will be expected to live in the project area, probably in Mandeville or Christiana. As part of their scope of work, the advisors will conduct training courses and seminars throughout the project's life.

The principal Min Ag divisions to participate in the program will be the Agricultural Extension Service and the Soil Conservation Unit, which will be reformulated slightly to focus its efforts almost entirely in the project area. The Forestry Department, which operates somewhat independently, but under the overall direction of the Min Ag, will carry out the forestation activities and the Ministry of Public Works will carry out the road construction and rehabilitation.

The Agricultural Extension Service will play a major role in project promotion. The present system of agricultural extension has grown out of many changing programs during the last two or three decades. Until 1952 JAS was responsible for extension activities; then the program was placed in the Min Ag. The land authorities were then organized and the extension program was changed to conform to this type of geographical division

rather than to the normal political boundaries. When the Min Ag began its reorganization in April 1977 the extension agents were decentralized. They are now assigned to the respective parish manager's office. Their major activities consist of distributing seed and fertilizer to farmers, making out farm plans and approving loans, and reporting to Min Ag on acreage planted and crop projections. They do hold some community meetings to discuss such things as emergency production plans. It would appear, however, that meetings to discuss improved technology are rarely held.

It is difficult to speculate on the strengths and weaknesses of a recently reorganized Min Ag. The Min Ag believes this program will enable them to carry out the reorganization as it was intended--that is, to decentralize operations. Certain bottlenecks will no doubt be encountered as lines of authority and responsibility are clarified and strengthened. However, the Min Ag is fully behind this program and views it as one of the most relevant projects for Jamaica today.

SOCIAL ANALYSIS

The following social soundness analysis is based in part on a survey conducted in March and April 1977. Annex R provides supplemental information on the role of women in the project area.

I. Beneficiaries:

The beneficiaries are the approximately 20,000 people living on 3,983 small farming units in the Pindars and Two Meetings watershed areas. Because they are drawn from a relatively homogenous social and economic strata, the target population is identifiable by the following generally shared social and economic characteristics.

In the first instance the historical and social realities of the plantation economy and related latifundia-minifundia land division system are responsible for current tenure condition of the target group. Farm sizes are small (survey data for the entire country, of which Two Meetings and Pindars are representative samples, indicate that almost 80% are five acres or less), and they are located on marginally arable steep mountain slopes. Production practices are rudimentary, the typical tool kit is limited to hand implements (machete, hoe, etc.), and there is scattered use only of modern technological inputs. Available evidence suggests that the overwhelming majority (78%) of the landholding units in the target areas are privately owned. However, the precise meaning of this ownership includes a strong element of familial "corporateness" which, as will be discussed below, has serious implications in relation to farmer participation in the project.

The main source of income for the target population is derived from the production of agricultural goods which are directed toward both subsistence and marketing ends. Principal crops include sugar cane, banana, yams, coconut and Irish potato. Due to the poor quality of the soil, small size of the holdings, and traditional farming techniques, yields and resultant farm incomes are low. Best estimates place the per capita income of the target population at approximately $200 U.S.

In terms of health status and education small farmers rank at the lowest end of the Jamaican socioeconomic scale. On the basis of 1974 statistics a still-born death rate of 7.2/1000* was recorded among small scale farming households. In addition the mortality rate among pre-school children (1-4) is 4.5/1000, which is almost double the rates for other West Indies territories such as Barbados, Puerto Rico, and Trinidad. Further, 45% of women in the pregnant and lactating sub-group suffer from dietary deficient related anemic conditions. Overall, approximately 70% of the small farmer population exhibit energy intake levels which are below recommended minimums by an average of 27%. Concerning education, nearly 80% of the expected beneficiaries have completed six years of primary school. However, project related survey results reveal that nearly 40% of the farmers in the target areas are functionally illiterate. This indicates the existence of a rather strong regressive trend caused by living in a cultural environment which places only limited emphasis on reading and writing skills.

*Jamaican Agriculture Sector Assessment 1976: 9, 10.

II. Sociocultural Feasibility

The sociocultural feasibility of the project hinges upon a series of related items: (1) family decision making process with regard to land use; (2) migration patterns and perception of agricultural labor; (3) cooperation among neighbors; and (4) institutional structure. With all of these matters there are serious but manageable constraints.

A. Decision-making Process

To properly understand the decision-making process among the small farmers attention must be given to the organization of the household and the corporate character of the family. In Jamaica there are three basic types of mating arrangements which are generally accepted -- the visiting union, the common law union, and marriage. According to 1960 census data, the visiting union was the most common form - 45% of all mothers were not living permanently with a partner; common law unions accounted for 22% of the pairings, and marriage 33% of the unions. The importance of these types of unions is that in visting and common law cases the partners are not expected to have much responsibility for each other in terms of sharing economic resources such as money or property Moreover, these types of unions are reported to have a rather short life span -- three years is the average and the children typically remain with the mother after the father leaves the household. The upshot of these factors is that (1) generally households consist of more people than are found in a typical nuclear family and (2) the role of the women in managing household affairs is significant in that in nearly 70% of the households there are children whose father is present for only a limited amount of time.

Compounding the issue is the corporate nature of the families. The marginal character of the land makes it impossible for the small farmer households to survive from agriculture alone. As a coping strategy some members of each family are forced to seek wage laboring positions in agricultural, commercial, or tourist related sectors. However, given the general state of the Jamaican economy and the increasing difficulty of overseas migration, there is a considerable amount of uncertainty in securing and maintaining off-farm employment. The risk involved causes those who must leave the land to seek a fall-back position -- return to the farm -- if they encounter economic difficulties. To maintain their right to return to the holding, the absentee members, when employed, send remittances back to the household in order to help support it. Through this process families, as individual entities, participate in a dual economy and the mutual support of the two sectors establishes their corporate character.

The relevance of these two factors to the project is that they affect decisions concerning the productive use to which land is put. Farm managers include the absentees as resident members of the family when making calculations of the benefit incidence of changing their

production system; the result is a tendency to drive the expected benefits upward. In addition, absentee members must be consulted which increases the time required to make a decision.

To overlook these factors and consider each family as an autonomous nuclear unit is likely to result in limited farmer participation. Rather, the first difficulty can be turned to an advantage by emphasizing the employment generation aspect of the project. The creation of work on the homestead will not only create more income for each family, but also will reduce the need for members to migrate. The second matter can be dealt with successfully by moving forward the starting date of promotional activities to offset the almost certain slippage which will occur from deliberations among family members.

B. Migration Patterns and Perception of Agricultural Labor

It is a relatively well-known fact that migration, both rural to urban and country to country, has been a means of reducing the high population density found in farming areas of Jamaica. It is also well known that the migration is most prominent among the young adults; a fact which was born out by a field survey of the target area which revealed that a significant portion (50%) of the farm managers are over 50 years of age. Further it has been asserted (IDB:6) that a prime reason for this outmigration is an aversion to the agricultural field labor which is associated with a heritage of slavery.

If accurate, the assertion concerning an aversion to farm labor could present serious difficulties for the project. In the first instance it would limit the recipients of training and technical assistance to an older group of farmers, thereby diminishing future replication probabilities. Secondly, it would nullify the work generation component of the project. Creation of employment niches serves little purpose unless there are people willing to fill them.

Based on the foregoing presentation it should be apparent that most of the migration which is taking place, particularly among young males, does not involve a total separation from the land even though they may be physically absent for extended periods of time. The move from the countryside is not the result of a "built in" aversion to participating in the agricultural sector. Rather, it is the upshot of economic pressures placed on the entire household. As noted above, young adults migrate to find employment in the wage earning sector of the economy, both for their own benefit and for the benefit of those remaining on the land. To be sure, farming, under the conditions it is practiced by target group members, is physically exhausting and promises little renumeration. But it seems likely that a sufficient number of the younger males could be attracted to stay in the countryside, both in terms of farming and day laboring, if there are reasonable prospects of economic rewards which were on a par with those of the other sectors.

C. Cooperation

Cooperation among recipient group households, particularly in regard to the matter of land terracing, is critical for project success. Land tenure follows a dispersed miniplot pattern, with few households owning contiguous parcels. If the terracing were to follow the tenure patterns, that is a dispersed patchwork fashion coinciding with the physical location of the plots of only those families who agreed to participate in the project, the scheme would fail. To be technically and economically feasible it must be carried out over the entire area. This in turn requires the participation and cooperation of all farmers.

Outside of kin group allegiance there is very little indication of cooperation among neighboring households. In the past there was a practice of mutual work exchanges among neighbors, but this has fallen into disuse. The most reasonable approach to enlist cooperation would be to start with neighboring holdings which are bound to each other through kinship. The strong allegiance to the family group demonstrated among the recipients will facilitate cooperation in these instances.

Failing familiar ties, promotional efforts should emphasize the potential for economic gain to secure cooperation. The fact that most households participate in a dual economy underscores their desire to improve their financial position. A promotional campaign which stresses the potential monetary benefits of the project could be a strong inducement for gaining cooperation and participation of the farmers.

D. Institutional Structure

As described in an earlier section, an institution which has strong farmer participation is a key element of the project insofar as a reliable channel is needed for the transfer of credit, training, and technological inputs. The projected related field survey yielded mixed results with respect to this matter. Although farmers interviewed said they belonged to a number of different types of organizations (church groups, Jamaican Agricultural Society, day for day cooperatives, and the Farmers Bank), no one group stood out as a clearly dominant structure upon which to build the project. The situation is further complicated by the fact that current extension services are far below par. Considerable strengthening is needed in the technical and administrative areas if the extension services are to perform adequately. Moreover, there has been limited contact between extensionists and target group members in the past. This means that a concerted effort in establishing a positive rapport between agents and farmers is likewise necessary.

The organization which appears to present the best alternative is the JAS. Throughout the country the JAS has approximately 800,000 members distributed among 900 local chapters. Survey data demonstrate

that about 35% of the farmers in the target areas are members. The JAS has traditionally been open to any farmer interested in agriculture and animal husbandry and in this capacity contributes to the general welfare of farming and rural life. It is especially active in the dissemination of knowledge among farmers. Although small farmer participation within the JAS is generally nominal and passive, there are indications (local chapter officials elected from among the rank and file) of active participation. At a minimum the JAS is well known in the countryside and will provide a vehicle through which project activities can be carried out.

III. Benefit Incidence and Spread Effect

Because of its experimental, pilot nature the project will be of direct benefit to a rather limited number of people -- approximately 20,000. Yet, it is believed that it will make a substantial contribution toward improving the standard of living of the small farmers in the target area. The terracing aspect will reclaim and increase the productive potential of land to a point not heretofore possible. Timely production credit will enable the farmers to purchase fertilizers and other chemical products to further improve yields. The training provided for the extension agents will be beneficial for the recipients in the form of improved technical assistance. The employment generation component will augment household income and stem the flow of out-migration. Finally, the realignment of marketing facilities to coincide more closely with geographic production patterns of selected crops will remove a major constraint to improve farm income.

The project will have significant spread effects on two different levels. It will provide a model for reclaiming marginal hill land and providing needed technical services to small farmers which could be replicated in the other 31 watershed areas, thereby impacting on approximately 750,000 rural poor. Moreover, it will provide the basis for extension agent training which could be replicated throughout the country.

IV. Impact on Women

An important factor in the speed and intensity of socioeconomic development is the participation of women in this process. To plan and implement change through integrated development in the rural sector, close attention must be given to the role played by women in the operation of the farm and the management of the household.

From the foregoing discussion it is evident that throughout the Jamaican countryside women play an active role in operation of the farm. Survey data from the two watersheds upon which the project is targeted confirmed this assertion. In the first instance 22% of the holdings are managed principally by women. In addition, 40% of the males who are operators felt the management of their holding to be a partnership arrangement among co-equals -- husband and wife. The important role played by women

is also noticed in the production activities (47% of the women interviewed claimed they participated regularly in plowing, weeding, and harvesting), in marketing (46% said they were the principal sellers), and management of family financials where the co-equal partnership arrangement prevails.

Although women are active and responsible participants in most of the key operations of the farm and the importance of the role of women has been recognized by the GOJ, little has been done to draw them more directly into the actual change process. Of those extension activities which do exist the wide majority are directed toward the men. Only occasionally is assistance designed for women and that which is constructed usually deals with home economic topics.

A concerted effort will be made in this project involving women more directly in the change process. Current plans call for the recruitment and training of at least two women agricultural extension agents in each sub-project area. In addition a minimum of two women will be trained at the M.S. level in rural sociology and work in the planning department of the extension service. Moreover, farm household women will be included among the recipients of credit, production, and marketing technical assistance undertaken under the auspices of this project.

MICRO-ECONOMIC ANALYSIS OF AGRICULTURAL PRODUCTION

The sociological survey discussed above also obtained detailed information on farm income, land holdings, cropping patterns, and production yields. The results of the survey indicated that 71% of the total farms had less than 5 acres of land and that 42% of the farms are between 2 and 5 acres. A typical farm has 2.9 acres, with 1.7 acres actually being farmed, 0.4 acres in food/forest, and the balance of 0.8 acres in fallow or unusable land.

Annex J presents an economic analysis of present and potential production based on the survey data and on average farmgate price information estimated after discussions with farmers, higglers and other middlemen, agricultural extension officers, and AMC officials.

In order to determine the microeconomic impact of the proposed program on small farmers in the Two Meetings and Pindars River project areas, prototype farm models were constructed, based on actual and anticipated on-farm conditions. The prototypes were derived from survey data on actual cropping conditions, yields and expenditures, using best agronomic and agro-economic information available to project future on-farm benefits.

In each area, a typical farm is composed of 2.9 acres, with approximately 1.7 actually being farmed, 0.4 acres in food/forest and the balance of 0.8 acres in fallow or unuseable land. Actual conditions, of course, vary from farm to farm, and the prototypes are designed to demonstrate "average" conditions. Annex J, Table 9 shows the typical existing cropping pattern in each of the two areas.

In comparing the "without project" cashflow to the "with project" anticipated conditions, the following assumptions were made:

1. All new perennial crops will be planted in the year of treatment (year one of the "with project" cashflow).

2. "Without project" incomes could be maintained at present levels, because fallow land and land in rotation will be brought in and out of production as perennial crops are replaced.

3. The prototype farms land use was set up on the basis of the entire watershed area, and cropping pattern differences reflect the difference between the Pindars and Two Meetings areas.

   For aggregate analysis and summary, the increase in income after treatment was weighted two-thirds Pindars, one-third Two Meetings, to reflect the approximate areas in the two watersheds.

4. A 15-year analysis period was used in estimating returns; this closely approximates the productive life of perennial crops which will be cultivated.

Tables 16 through 20 of Annex J show the derivation of new income increases for the two farm models. The bottom line in Tables 19 and 20 show incremental cash flow after treatment, including costs of on-farm investment and maintenance as well as cost of soil conservation. A calculation of the present worth of the final stream of benefits results in an internal rate of return of over 50% for each of the prototype farm models.

Table 21 of Annex J presents the weighted average of net income increases for the two farm models. Again, the internal rate of return is over 50%.

This small-farm model shows the annual expected income in the Pindars area could be raised from J$732 to J$1757, and in Two Meetings from J$978 to J$2671 on the typical 2.9-acre farm. Agricultural production increases and resultant income gains were conservatively estimated; they will derive principally from more intensive land use after suitable soil conservation treatments are applied. No major changes in crop mix are necessary: the major crops will continue to be yams, red peas, bananas, coffee, sugar cane, and Irish potatoes. However, changed will be needed in farming techniques, with farmers practicing multiple and continuous cropping.

These large increases in income, as forecast by the model, compare favorably to experiences of farmers in the region who have had their land terraced, and are less than half the income gains from experimental results obtained at the Smithfield research station.

POLICY FRAMEWORK

Land Use and Tenure Policies

The GOJ's announced policy is to maximize the use of all land suitable for agricultural production. To carry out this policy and encourage increased production, GOJ strategy has been to take over idle or unproductive agricultural lands under a long-term lease or through outright purchase at assessed valuation. Payment can be in cash or land bonds. The land is then subdivided and leased or sold to individual farmers or developed as worker cooperatives; the ongoing Land Lease Program is an example of these procedures.

Until very recently the owner of idle or unproductive land was granted a period of up to two years to present an approved land utilization program in lieu of actual GOJ purchase. In 1976, the Government announced it may now take over underutilized land simply by notification, on the theory that owners have been given ample time to put their land into productive use. There is no announced intention of widescale Government land takeover. The small farmers of the country place a high value on private ownership of their property and there are no existing laws that would allow the Government to take over land being properly utilized. In particular, the GOJ has announced it will give no support to illegal "land capture" by individuals.

Agricultural Prices and Marketing Policies

The GOJ policy is to maintain a freely competitive market for the production and distribution of domestic food crops--a market dominated by private-sector firms--while the Government maintains control over imported commodities by administratively determined volumes, prices, and distribution channels. The dual objectives of this mixed policy are to give incentives for domestic production and at the same time keep the price for the consumer market basket low.

Within this general policy, the GOJ attempts to influence the prices and distribution of domestic food by open-market operations carried out by the Government-owned Agricultural Marketing Corporation (AMC). In addition to trading actively in almost all commodities produced in the island, at all stages of distribution from farmgate to consumer, the AMC maintains guaranteed minimum prices for 17 priority crops. The AMC has been a moderately effective policy tool.

The import control policy is implemented by granting exclusive privileges to the AMC and other Government-owned trading corporations for selected commodities considered essential--most cereal grains, fish, meat, and pulses. Volumes and price ceilings for nonessential commodities imported by private traders are set and policed by designated Government ministries.

The GOJ policy toward major export commodities is to maintain a single market channel for each crop. This policy facilitates the capture of foreign exchange earnings and maintenance of Jamaica's produce image in world markets, an extremely important consideration in the case of coffee. Export policy is implemented through seven crop-specific semiautonomous commodity boards, whose members are appointed by the Minister of Agriculture; these boards determine the rules and regulations governing export of major commodities.

Policies on Agricultural Credit

The GOJ has apparently failed to adopt a clearly defined general policy on agricultural credit and has fostered a maze of different credit programs. Production credit for agriculture is particularly fragmented even though the Government attaches high priority to this key service and continues to support programs that make money available at 6% interest. The most recent action was the establishment of a J$20 million credit fund for food crops as part of the Emergency Production Plan announced in June 1977. This credit is to be disbursed through PC Banks with the new and additional requirement of Min Ag parish manager approval. Thus, yet another credit procedure has been added to the already numerous credit schemes in Jamaica. At least it is a real attempt to serve the credit needs of the small farmer.

Policymakers are aware of the shortcomings of the present structure and performance of credit sources. The GOJ is apparently moving toward the consolidation of credit institutions whereby a more coordinated and less duplicative policy can be developed and administered.

FINANCIAL AND BUDGETARY ANALYSIS

In recent years the Jamaican economy has suffered from severe internal and external disequilibria, as manifested in a chronic and worsening balance of payments gap, a large and growing fiscal gap, a rate of unemployment and under-employment, and declining rates of growth in all sectors except the Government sector. Highly dependent upon foreign financing and the import sector, Jamaica's increasing isolation from traditional sources of foreign credit has--by mid-1977--placed the island's economy in a position where even short-run survival is questionable unless international support becomes available almost immediately. Annex T presents a more complete macro-economic survey of Jamaica.

The GOJ recognizes the need for long-term investments in the agricultural sector and is beginning those investments with programs such as the one presented in this PP. The GOJ is committed to channeling more money into this sector to boost domestic food consumption and reduce food inports. This will require an increase in the present 1977/78 Min Ag budget of J$1.8 million, which is 9% of the GOJ budget. A five-year plan for agricultural investment is expected in December 1977, thus no future forecasts are attempted at this time.

V PROGRAM EVALUATION AND IMPLEMENTATION

EVALUATION PLAN

The sample survey conducted under the supervision of the Data Bank and Evaluation section of the Min Ag established the baseline data needed to measure project progress. The total information gathered has not been properly analysed and will require short-term technical assistance during the early stages of project implementation. At the same time, these specialists, in collaboration with the Min Ag Data Bank and Evaluation team, will work out the details of a system for future monitoring and evaluation.

In addition to monitoring physical deliveries and financial flows and evaluating the effects of the project on the target population, the system will have several other important features:

* It will permit project decisionmakers to spot upcoming problems, diagnose their causes, and prescribe what might be done to alleviate them;

* It will provide for two-way information flows, so that the results of monitoring and evaluation can be used by lower as well as upper echelons;

* Beyond the immediate needs of project staff, the system will also provide information on whether and how to replicate project activities elsewhere.

Adopting a comprehensive approach will not burden the project with a costly and difficult-to-operate system. Skilled specialists will be needed during the detailed design phase for the precise purpose of developing a simple system--one that is selective and sparing in its data requirements, with modest low-cost survey and reporting techniques that do not strive for unnecessary statistical elegance.

Special Information Needs

This project has special requirements for monitoring and evaluation. First, there are uncertainties, as with any project, however excellent its planning and preparation. There is uncertainty about yields under new technology, about the performance of soil conservation works, about the best methods of assisting local organizations at the community level, and about who will participate readily in project activities.

Second, some components of the project will be quasi-experimental, or initiated on a pilot basis, to learn what processes of development are most effective, and to avoid expensive setbacks. The information requirements of such a project, particularly when it also involves the integration of institution-building, research, production, and engineering activities, are far more complex than for routine, single-function projects.

Data Required

It is not obvious in the beginning of data collection which variables should be recorded and which can be ignored. Determining the optimal data set prior to the project is impossible; a generous amount must be collected in the initial phase, and then pared down to the essential items as actual experience with the project dictates. Time is also required to permit decisionmakers to play a role in the design and refining of the monitoring/evaluation system, which must suit their needs rather than the interests and capabilities of the information specialists.

(1) Baseline

Baseline data permits changes brought about by the project to be measured in relation to the pre-project state. Unfortunately, baseline data are often wasted when subsequent data collection uses different data points and collection techniques. Baseline data collection should, therefore, be tightly focused, interviewing farmers combined with occasional small-sample surveys as a cross-check on accuracy.

(2) Monitoring

The physical and financial data are relatively easy to identify and collect; they can be drawn from detailed implementation plans that will be prepared on an annual basis. Adoption of improved cropping systems, water use, and soil conservation practices, and membership or participation in community organizations are examples of key behavior changes that must be monitored and verified.

(3) Evaluation

Data are required to measure the project's impact on small-farmer productivity, output, and income; small-farmer and group self-help capacity; and reduction in soil

erosion. At the same time, it is essential to identify the types of data needed to analyze why events happened as they did. Why did some farmers adopt improved practices and others not? Why did some participate in community organizations and others not? Why were soil conservation programs more successful in one area than another?

Timing of Monitoring/Evaluation

In general, the system will provide a continuous source of information for both monitoring and evaluation, though not all the necessary evaluative data can be collected in this regularized fashion. Subject to possible revision by the detailed design team, the following timing categories will be observed:

(1) Daily records, with monthly and annual summaries

* Activities of field extension staff
* All financial transactions, including credit
* All movement of personnel, equipment, and supplies, including agricultural inputs
* Meetings and other activities of farmer and community groups

(2) Monthly records with annual summaries

* Progress of soil conservation work in relation to target
* Progress of research programs in relation to target
* Progress of training programs
* Reports on crop conditions, rainfall, etc.

(3) Other annual reporting

* Crop acreages, yields, production
* Farmer incomes
* Loan repayment
* Improved agricultural package: adoption rates
* Self-help capacity indicators

At the end of the second full year of project implementation, a team should be brought in to perform an objective evaluation of the progress of the project.

During the final six months of the project implementation, aerial photos will be taken of the project area and compared with photos presently available, to determine the following:

(1) Soil conservation practices that have been initiated;

(2) Changes in gully patterns and visible signs of erosion;

(3) Changes in cropping systems;

(4) Intensity of land use;

(5) Progress of reforestation.

Budget

US$160,000 has been budgeted for evaluation as follows:

Consultants for	
Further analysis of baseline data and training of Jamaican staff at beginning of project	US$ 25,000
First major evaluation (year 2-3)	US$ 40,000
End of project evaluation (year 5)	US$ 60,000
Aerial photos and interpretation at end of project	US$ 25,000
Additional local survey work during project period (including transportation costs, employment of interviewers, and analysis of data	US$ 25,000
In-country training courses	US$ 10,000
Miscellaneous materials and supplies	US$ 5,000
Contingency	US$ 10,000
An additional US$160,000 has been budgeted for replication activities in other watersheds, to include cost of additional aerial photos, model demonstration centers and subcenters, survey work and local transportation and training costs	US$160,000
TOTAL	US$320,000

IMPLEMENTATION PLAN

Conditions precedent to disbursement will require that the GOJ develop implementation plans for the soil conservation, forestation, and engineering works activities. The plans will be updated yearly and will form the basis of forecasting expenditures throughout the project's life. A preliminary implementation schedule is included as Annex H.

DISBURSEMENT PROCEDURES

US Dollar Costs

US dollar costs of the loan will be disbursed for commodities. Participant training and technical assistance will be paid for under a grant to the GOJ.

US dollar disbursements will be made using standard AID procedures by issuance of Letters of Commitment and Letters of Credit in accordance with the terms of the Loan Agreement. Disbursement of dollar costs will be made exclusively to finance the procurement for the program of services having both their source and origin in countries in Code 941 of the AID Geographic Code Book as in effect at the time orders are placed or contracts are entered into for such services. All transportation financed by dollar costs under the Loan shall have its source and origin in countries included in Code 941 of the AID Geographic Code Book as in effect at the time transportation is initiated.

Local Currency Costs

An advance of local currency equivalent to three months expenditures is anticipated for the soil conservation, reforestation and engineering works activities. Upon AID approval of the request for advance, USAID/J will request the US Treasury to purchase the appropriate amount of Jamaican dollars and deposit them in the Government of Jamaica's account at the Federal Reserve Bank of New York. The Federal Reserve Bank will in turn notify the Bank of Jamaica in Kingston and the Min Ag's account will be credited. To replenish or increase the advance, the GOJ will submit documentation satisfactory to AID which supports the amount

of expenditures over the previous period, and the AID and GOJ share of those expenditures, and estimates the requirements for the next period. The total advance outstanding at any one time will not total more than an estimated three months expenditures.

The GOJ will be reimbursed for other than soil conservation, forestation, or engineering works expenses only after actual payment by the GOJ. That is, AID will not issue an advance for these expenses.

CONTRACTING PLANS

TA and training funds will be granted to the GOJ. The Project Committee recommends an institutional contract for the long-term advisors, and personal services contracts for short-term advisors. Contracting procedures for the institutional contract will include prequalifying 5 to 10 institutions most qualified to advise on soil conservation projects in tropical lands; requesting technical proposals; ranking the respondents; and ultimately negotiating a contract.

PROCUREMENT PLANS

Procurement of the equipment and supplies will be made in accordance with normal AID procurement regulations.

USAID MONITORING PLANS

The Project Committee recommends that an AID direct-hire project officer be assigned full-time responsibilities for this project. The long-term advisory team will nominate a team leader who will have day-to-day responsibilities to the AID project officer and the GOJ Southern Region director.

CONDITIONS, COVENANTS, AND NEGOTIATING STATUS

The program has been thoroughly discussed with the GOJ. No major problems are anticipated during negotiations of the project agreement. Proposed conditions precedent to disbursements are included in the draft Loan Authorization, Annex D.

ANNEX A

OFFICE OF THE DEPUTY PRIME MINISTER
AND MINISTER OF FINANCE
30 NATIONAL HEROES CIRCLE.
P.O. BOX 512.
KINGSTON,
JAMAICA

[illegible]

No. 6/43/07

Telephone No. [illegible]

11th August, 19 77

Mr. Charles F. Campbell,
AID Affairs Officer
US/AID Mission to Jamaica
2 Oxford Road
Kingston 5.

Dear Mr. Campbell,

On behalf of the Government of Jamaica I request a loan of US$13 million and a grant of US$2 million from the Government of the United States of America. This money will be used, together with a counterpart contribution from the Government of Jamaica in the amount of about J$14 million to carry out an Integrated Rural Development Programme in the Flinders and Two Meetings Watersheds over a four year period.

The major components of this project are summarized as follows:

- Appropriate soil conservation activities including bench and orchard terraces, hillside ditches and permanent pastures on about 17,700 acres.

- Reforestation activities on about 7,000 acres.

- Road and track construction and rehabilitation and stream and river control measures to further protect the watershed and to provide small farmers better access to markets.

In order to develop the agricultural production in the areas to its fullest extent, farmer organizations will be formed in collaboration with the Jamaica Agricultural Society and the People's Co-operative Banks. These organizations, in conjunction with the Extension Service of the Ministry of Agriculture will provide advice to the small farmer on the appropriate cropping patterns and techniques for his land and on the use of fertilizer and improved seed varities. Agricultural credit will be provided to enable the farmer to purchase the necessary inputs to increase his production. Sound marketing principles will be fostered to improve the quantity and quality of produce marketed and to return a greater share of the profits to the producer.

In order to improve the overall standard of living in the watershed, housing, electrification and potable water projects will be carried out through the appropriate agencies.

Government recognises that certain conditions should be met to maximize the effectiveness of this programme. In this regard the Government plans to:

(a) declare the Flinders and Two Meetings legal watershed areas;

(b) require that farmers repay a portion of the cost of the soil conservation activities, amounting to about 25%, exclusive of waterways; and that these funds will be earmarked for a special Soil Conservation Fund to be used in carrying out soil conservation measures on lands occupied by small farmers in other watersheds. Further, the Government agrees to make up any short-falls to the fund in the event the farmers default on their repayments;

(c) make maximum efforts to employ a sufficient number of soil conservation and agricultural officers in this programme on a permanent basis so as to develop a cadre of officers capable of spreading the effects of a successful integrated development programme to other watersheds after the proposed programme terminates.

(d) Appoint a full-time project manager for the duration of the project.

The Government's major implementing agencies for the programme will be the Southern Region of the Ministry of Agriculture for Soil Conservation; the Forest Department of the Ministry of Agriculture for the Reforestation Activities and the Ministry of Works for most of the Engineering Works; the Ministry of Local Government through the National Water Authority for the potable water systems; and the Jamaica Public Service for the Rural Electrification Programme.

The loan funds from the United States will be used for the capital expenses and certain operating costs of the programme, while the grant funds will be used for Jamaican, U.S. or third country training costs and technical assistance advisers.

Yours sincerely,

A.C. Elliott
for Financial Secretary

c.c. Permanent Secretary
Ministry of Agriculture

Chief Technical Director
National Planning Agency

ANNEX B

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

I, Charles P. Campbell, the principal officer of the Agency for International Development in Jamaica, do herewith certify that in my judgment, Jamaica has both the financial capability and human resources to maintain and effectively utilize the goods and services procured under the capital assistance project entitled: Integrated Rural Development I.

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

Charles P. Campbell

Charles P. Campbell
AID Affairs Officer
Jamaica

Date: July 29, 1977

6C(1) - COUNTRY CHECKLIST

Listed below are, first, statutory criteria applicable generally to FAA funds, and then criteria applicable to individual fund sources: Development Assistance and Security Supporting Assistance funds.

A. GENERAL CRITERIA FOR COUNTRY

1. FAA Sec. 116. Can it be demonstrated that contemplated assistance will directly benefit the needy? If not, has the Department of State determined that this government has engaged in consistent pattern of gross violations of internationally recognized human rights?	Assistance will directly benefit needy people.
2. FAA Sec. 481. Has it been determined that the government of recipient country has failed to take adequate steps to prevent narcotics drugs and other controlled substances (as defined by the Comprehensive Drug Abuse Prevention and Control Act of 1970) produced or processed, in whole or in part, in such country, or transported through such country, from being sold illegally within the jurisdiction of such country to U.S. Government personnel or their dependents, or from entering the U.S. unlawfully?	No.
3. FAA Sec. 620(a). Does recipient country furnish assistance to Cuba or fail to take appropriate steps to prevent ships or aircraft under its flag from carrying cargoes to or from Cuba?	No.
4. FAA Sec. 620(b). If assistance is to a government, has the Secretary of State determined that it is not controlled by the international Communist movement?	Jamaica's government is not controlled by an international Communist movement.
5. FAA Sec. 620(c). If assistance is to government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen for goods or services furnished or ordered where (a) such citizen has exhausted available legal remedies and (b) debt is not denied or contested by such government?	No.
6. FAA Sec. 620(e) (1). If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities?	No.

A

7. FAA Sec. 620(f); App. Sec. 108. Is recipient country a Communist country? Will assistance be provided to the Democratic Republic of Vietnam (North Vietnam), South Vietnam, Cambodia or Laos?	No.
8. FAA Sec. 620(i). Is recipient country in any way involved in (a) subversion of, or military aggression against, the United States or any country receiving U.S. assistance, or (b) the planning of such subversion or aggression?	No.
9. FAA Sec. 620(j). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction, by mob action, of U.S. property?	No.
10. FAA Sec. 620(l). If the country has failed to institute the investment guaranty program for the specific risks of expropriation, inconvertibility or confiscation, has the AID Administrator within the past year considered denying assistance to such government for this reason?	An investment guaranty agreement with Jamaica is in effect.
11. FAA Sec. 620(o); Fisherman's Protective Act, Sec. 5. If country has seized, or imposed any penalty or sanction against, any U.S. fishing activities in international waters,	No.
a. has any deduction required by Fishermen's Protective Act been made?	No.
b. has complete denial of assistance been considered by AID Administrator?	No.
12. FAA Sec. 620(q); App. Sec. 504. (a) Is the government of the recipient country in default on interest or principal of any AID loan to the country? (b) Is country in default exceeding one year on interest or principal on U.S. loan under program for which App. Act appropriates funds, unless debt was earlier disputed, or appropriate steps taken to cure default?	(a) No. (b) No.
13. FAA Sec. 620(s). What percentage of country budget is for military expenditures? How much of foreign exchange resources spent on military equipment? How much spent for the purchase of sophisticated weapons systems? (Consideration of these points is to be coordinated with the Bureau for Program and Policy Coordination, Regional Coordinators and Military Assistance Staff (PPC/RC).)	The GOJ's consolidated budget estimate for FY1977/78 is J$1.3 billion. Funds apportioned to the Ministry of National Security, which includes budgets for Jamaica Defense Force and Jamaica Constabulary, are J$88 million or 7% of national budget. There is no evidence that Jamaica plans to procure sophisticated weapons systems.

A

14. FAA Sec. 620(t). Has the country severed diplomatic relations with the United States? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption? — No.

15. FAA Sec. 620(u). What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearages taken into account by the AID Administrator in determining the current AID Operational Year Budget? — Jamaica is current on U.N. obligations.

16. FAA Sec. 620A. Has the country granted sanctuary from prosecution to any individual or group which has committed an act of international terrorism? — No.

17. FAA Sec. 666. Does the country object, on basis of race, religion, national origin or sex, to the presence of any officer or employee of the U.S. there to carry out economic development program under FAA? — No.

18. FAA Sec. 669. Has the country delivered or received nuclear reprocessing or enrichment equipment, materials or technology, without specified arrangements on safeguards, etc.? — No.

19. FAA Sec. 901. Has the country denied its citizens the right or opportunity to emigrate? — No.

B. FUNDING CRITERIA FOR COUNTRY

1. Development Assistance Country Criteria

a. FAA Sec. 102(c), (d). Have criteria been established, and taken into account, to assess commitment and progress of country in effectively involving the poor in development, on such indexes as: (1) small-farm labor intensive agriculture, (2) reduced infant mortality, (3) population growth, (4) equality of income distribution, and (5) unemployment. — In all 5 cases, Jamaica has developed criteria to measure progress and assess problems in each important indicator of social and economic development.

b. FAA Sec. 201(b)(5), (7) & (8); Sec. 208; 211(a)(4), (7). Describe extent to which country is: — Jamaica currently has an Emergency Production Plan in effect to encourage increased self-sufficiency in food production. This Plan also attempts to establish a more favorable climate for investment, with the intention of reducing imported commodities which can be more economically produced in country.

(1) Making appropriate efforts to increase food production and improve means for food storage and distribution.

(2) Creating a favorable climate for foreign and domestic private enterprise and investment.

81b

(3) Increasing the public's role in the developmental process.	The Production Plan devotes significant GOJ resources to small farmer development and is attempting to encourage large numbers of small coop/private enterprise formation.
(4) (a) Allocating available budgetary resources to development.	
(b) Diverting such resources for unnecessary military expenditure and intervention in affairs of other free and independent nations.	Jamaica's military budget is very small.
(5) Making economic, social, and political reforms such as tax collection improvements and changes in land tenure arrangements, and making progress toward respect for the rule of law, freedom of expression and of the press, and recognizing the importance of individual freedom, initiative, and private enterprise.	Jamaica's history of social and political reforms and freedom of the press has been very good since independence.
(6) Otherwise responding to the vital economic, political, and social concerns of its people, and demonstrating a clear determination to take effective self-help measures.	
c. FAA Sec. 101(b), 211(a). Is the country among the 20 countries in which development assistance loans may be made in this fiscal year, or among the 40 in which development assistance grants (other than for self-help projects) may be made?	Development assistance loans and grants will be made.
d. FAA Sec. 115. Will country be furnished, in same fiscal year, either security supporting assistance, or Middle East peace funds? If so, is assistance for population programs, humanitarian and through international organizations, or regional programs?	No.
2. Security Supporting Assistance Country Criteria	Not applicable.
a. FAA Sec. 502B. Has the country engaged in a consistent pattern of gross violations of internationally recognized human rights? Is program in accordance with policy of this Section?	
b. FAA Sec. 53. Is the Assistance to be furnished to a friendly country, organization, or body eligible to receive assistance?	
c. FAA Sec. 609. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made?	

6C(2) - PROJECT CHECKLIST

Listed below are, first, statutory criteria applicable generally to projects with FAA funds, and then project criteria applicable to individual fund sources: Development Assistance (with a subcategory for criteria applicable only to loans); and Security Supporting Assistance funds.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE? IDENTIFY. HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PROJECT?

A. GENERAL CRITERIA FOR PROJECT.

1. App. Unnumbered; FAA Sec. 653(b) (a) Describe how Committees on Appropriations 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 figure plus 10%)?	Project is not included in FY77 Congressional Presentation; thus an Advice of Program Change will be made to the Congress.
2. FAA Sec. 611(a)(1). Prior to obligation in excess of $100,000, will there be (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?	Firm cost estimates for all aspects of the project have been made.
3. FAA Sec. 611(a)(2). 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 such legislation is required.
4. FAA Sec. 611(b); App. Sec. 101. If for water or water-related land resource construction, has project met the standards and criteria as per Memorandum of the President dated Sept. 5, 1973 (replaces Memorandum of May 15, 1962; see Fed. Register, Vol 38, No. 174, Part III, Sept. 10, 1973)?	Benefit/cost calculations indicate a favorable ratio and a favorable internal rate of return.
5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed $1 million, has Mission Director certified the country's capability effectively to maintain and utilize the project?	Certification has been made.

A.

6. FAA Sec. 209, 619. Is project susceptible of 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. If assistance is for newly independent country, is it furnished through multilateral organizations or plans to the maximum extent appropriate?

No. Project is region-specific in two watershed areas of the Two Meetings and Pindars rivers. Project will build institutional base for replication to other watersheds.

7. FAA Sec. 601(a); (and Sec 201(f) for development loans). 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; (c) encourage development and use of cooperatives, 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.

(a) Project unlikely to directly affect international trade; (b)and(c) Private sector initiative and coops/ credit unions will be fostered through training and technical assistance; (d)and(e) Increased competition by strengthening private marketing channels will be developed.

8. FAA Sec. 601(b). Information and conclusion 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).

Contract for technical advisory services will be needed with U.S. institution to strengthen Jamaica's Ministry of Agriculture.

9. FAA Sec. 612(b); Sec. 636(h). 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 to meet the cost of contractual and other services.

Jamaica will be contributing a major share of the local project costs. All foreign currency will be contributed by U.S.

10. FAA Sec. 612(d). Does the U.S. own excess foreign currency and, if so, what arrangements have been made for its release?

No.

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FAA Sec. 102(c); Sec. 111; Sec. 281a. Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production, spreading investment out from cities to small towns and rural areas; and (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions?

Project is aimed directly at rural poor farmers in two river valleys. Objectives include rehabilitating farmers' land through soil conservation measures, thereby facilitating more productive use of hillside land. Local cooperative movement (Jamaica Agricultural Society) will be strengthened. Project goal is increased rural incomes and decreased urban migration.

B1

b. FAA Sec. 103, 103A, 104, 105, 106, 107. Is assistance being made available: [Include only applicable paragraph -- e.g., a, b, etc. -- which corresponds to source of funds used. If more than one fund source is used for project, include relevant paragraph for each fund source.]

(1) [103] for agriculture, rural development or nutrition; if so, extent to which activity is specifically designed to increase productivity and income of rural poor; [103A] if for agricultural research, is full account taken of needs of small farmers;

(2) [104] for population planning or health; if so, extent to which activity extends low-cost, integrated delivery systems to provide health and family planning services, especially to rural areas and poor;

(3) [105] for education, public administration, or human resources development; if so, extent to which activity strengthens nonformal education, makes formal education more relevant, especially for rural families and urban poor, or strengthens management capability of institutions enabling the poor to participate in development;

(4) [106] for technical assistance, energy, research, reconstruction, and selected development problems; if so, extent activity is:

(a) technical cooperation and development, especially with U.S. private and voluntary, or regional and international development, organizations;

(b) to help alleviate energy problem;

(c) research into, and evaluation of, economic development processes and techniques;

(d) reconstruction after natural or manmade disaster;

(e) for special development problem, and to enable proper utilization of earlier U.S. infrastructure, etc., assistance;

(f) for programs of urban development, especially small labor-intensive enterprises, marketing systems, and financial or other institutions to help urban poor participate in economic and social development.

Yes. As stated in B.1.a., project is designed to directly benefit poor, rural farmers (generally owning about 5 acres of land) in two watershed areas of Jamaica. By terracing hilly land, more effective use of the land can be made and greater food production will result. Project will also supply the necessary credit, marketing, and extension services to permit farmers to take maximum advantage of rehabilitated lands. Increased food or cash crop production will result in increased incomes to the participating farmers.

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(5) [107] by grants for coordinated private effort to develop and disseminate intermediate technologies appropriate for developing countries.

c. FAA Sec. 110(a); Sec. 208(e). Is the recipient country willing to contribute funds to the project, and in what manner has or will it provide assurances that it will provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or has the latter cost-sharing requirement been waived for a "relatively least-developed" country)?

Jamaica is contributing over 25% of total project costs.

d. FAA Sec. 110(b). 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?

Not applicable.

e. FAA Sec. 207; Sec. 113. Extent to which assistance reflects appropriate emphasis on; (1) encouraging development of democratic, economic, political, and social institutions; (2) self-help in meeting the country's food needs; (3) improving availability of trained worker-power in the country; (4) programs designed to meet the country's health needs; (5) other important areas of economic, political, and social development, including industry; free labor unions, cooperatives, and Voluntary Agencies; transportation and communication; planning and public administration; urban development, and modernization of existing laws; or (6) integrating women into the recipient country's national economy.

U.S. assistance to Jamaica places emphasis on encouraging economic, social, and political institutions required for a democratic society. A major objective of this project is to strengthen GOJ institutions. Emphasis is also to be placed on development of local community organizations and replicability of the program after AID funding ceases. Additional cash income to farm owners and their spouses should enable them to upgrade their standard of living.

f. 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 institutional development; and supports civic education and training in skills required for effective participation in governmental and political processes essential to self-government.

Our aspect of this program is to increase the flow of resources to rural areas concerned for increased economic and social benefits. This program provides inputs and service relying on technical assistance for development of local leadership and community action, for major responsibility. It is also looking to appropriate governmental agencies to provide trained personnel and essential services. Women share a large portion and participate actively in the country's national economy, especially in agricultural production and marketing of crops. Women will also be actively engaged in and working on community councils for the self-help aspects of this project.

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g. FAA Sec. 201(b)(2)-(4) and -(8); Sec. 201(e); Sec. 211(a)(1)-(3) and -(8). 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; or of educational or other institutions directed toward social progress? Is it related to and consistent with other development activities, and will it contribute to realizable long-range objectives? And does project paper provide information and conclusion on an activity's economic and technical soundness?	Project is aimed at establishing a model watershed development program capable of being replicated across the island. Because nearly all Jamaica's small farmers live on hilly land, and because of the scarcity of flat farmland, the long-term development of Jamaican agriculture depends on utilizing small farms more effectively. PP concludes that project is technically and economically sound.
h. FAA Sec. 201(b)(6); Sec. 211(a)(5), (6). Information and conclusion on possible effects of the assistance on U.S. economy, with special reference to areas of substantial labor surplus, and extent to which U.S. commodities and assistance are furnished in a manner consistent with improving or safeguarding the balance-of-payments position.	Project will have negligible effect on U.S. balance of payments.
2. Development Assistance Project Criteria (Loans only)	
a. FAA Sec. 201(b)(1). Information and conclusion on availability of financing from other free-world sources, including private sources within U.S.	Other donors are not interested in financing this project.
b. FAA Sec. 201(b)(2); 201(d). Information and conclusion on (1) capacity of the country to repay the loan, including reasonableness of repayment prospects, and (2) reasonableness and legality (under laws of country and U.S.) of lending and relending terms of the loan.	(1) Despite short-term financial problems, Jamaica's long-term economic prospects remain healthy and repayment prospects are good. (2) Lending terms are reasonable and legal. No relending anticipated in this project.
c. FAA Sec. 201(e). If loan is not made pursuant to a multilateral plan, and the amount of the loan exceeds $100,000, has country submitted to AID an application for such funds together with assurances to indicate that funds will be used in an economically and technically sound manner?	Letter of Application has been received from GOJ.
d. FAA Sec. 201(f). Does project paper describe how project will promote the country's economic development taking into account the country's human and material resources requirements and relationship between ultimate objectives of the project and overall economic development?	Yes. Project is directly in support of long-term agricultural strategy of Jamaica.

e. FAA Sec. 202(a). Total amount of money under loan which is going directly to private enterprise, is going to intermediate credit institutions or other borrowers for use by private enterprise, is being used to finance imports from private sources, or is otherwise being used to finance procurements from private sources?	$2.5 million
f. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete in the U.S. with U.S. enterprise, 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?	Not applicable.
3. Project Criteria Solely for Security Supporting Assistance FAA Sec. 531. How will this assistance support promote economic or political stability?	Not applicable.
4. Additional Criteria for Alliance for Progress [Note: Alliance for Progress projects should add the following two items to a project checklist.]	
a. FAA Sec. 251(b)(1), -(8). Does assistance take into account principles of the Act of Bogota and the Charter of Punta del Este; and to what extent will the activity contribute to the economic or political integration of Latin America?	Project will take into account the principles of the Act of Bogota and the Charter of Punta del Este.
b. FAA Sec. 251(b)(8); 251(h). For loans, has there been taken into account the effort made by recipient nation to repatriate capital invested in other countries by their own citizens? Is loan consistent with the findings and recommendations of the Inter-American Committee for the Alliance for Progress (now "CEPCIES," the Permanent Executive Committee of the OAS) in its annual review of national development activities?	Jamaica is taking steps to repatriate capital invested in other countries by their own citizens. Loan is consistent with findings and recommendations of CEPCIES and the Permanent Executive Committee of the OAS.

6C(3) - STANDARD ITEM CHECKLIST

Listed below are statutory items which normally will be covered routinely in those provisions of an assistance agreement dealing with its implementation, or covered in the agreement by exclusion (as where certain uses of funds are permitted, but other uses not).

These items are arranged under the general headings of (A) Procurement, (B) Construction, and (C) Other Restrictions.

A. Procurement

1. FAA Sec. 602. Are there arrangements to permit U.S. small business to participate equitably in the furnishing of goods and services financed?	Yes, normal AID procurement regulations will be required.
2. FAA Sec. 604(a). Will all commodity procurement financed be from the U.S. except as otherwise determined by the President or under delegation from him?	Yes.
3. FAA Sec. 604(d). If the cooperating country discriminates against U.S. marine insurance companies, will agreement require that marine insurance be placed in the U.S. on commodities financed?	Yes.
4. FAA Sec. 604(e). If offshore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity?	Yes.
5. FAA Sec. 608(a). Will U.S. Government excess personal property be utilized wherever practicable in lieu of the procurement of new items?	Yes.
6. MMA Sec. 901(b). (a) Compliance with requirement that at least 50 per centum of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on privately owned U.S.-flag commercial vessels to the extent that such vessels are available at fair and reasonable rates.	Yes.
7. FAA Sec. 621. If technical assistance is financed, will such assistance be furnished to the fullest extent practicable as goods and professional and other services from private enterprise on a contract basis? If the facilities of other Federal agencies will be utilized,	Yes. Federal agency services not anticipated.

are they particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs?

8. International Air Transport. Fair Competitive Practices Act, 1974

If air transportation of persons or property is financed on grant basis, will provision be made that U.S.-flag carriers will be utilized to the extent such service is available? — Yes.

B. Construction

1. FAA Sec. 601(d). If a capital (e.g., construction) project, are engineering and professional services of U.S. firms and their affiliates to be used to the maximum extent consistent with the national interest? — Not applicable.

2. FAA Sec. 611(c). If contracts for construction are to be financed, will they be let on a competitive basis to maximum extent practicable? — Not applicable.

3. FAA Sec. 620(k). If for construction of productive enterprise, will aggregate value of assistance to be furnished by the U.S. not exceed $100 million? — Not applicable.

C. Other Restrictions

1. FAA Sec. 201(d). If development loan, is interest rate at least 2% per annum during grace period and at least 3% per annum thereafter? — Yes.

2. FAA Sec. 301(d). If fund is established solely by U.S. contributions and administered by an international organization, does Comptroller General have audit rights? — Not applicable.

3. FAA Sec. 620(h). Do arrangements preclude promoting or assisting the foreign aid projects or activities of Communist-Bloc countries, contrary to the best interests of the U.S.? — Yes.

4. FAA Sec. 636(i). Is financing not permitted to be used, without waiver, for purchase, long-term lease, or exchange of motor vehicle manufactured outside the U.S. or guaranty of such transaction? — Yes.

5. Will arrangements preclude use of financing:

a. FAA Sec. 114. to pay for performance of abortions or to motivate or coerce persons to practice abortions?	Yes.
b. FAA Sec. 620(g). to compensate owners for expropriated nationalized property?	Yes.
c. FAA Sec. 660. to finance police training or other law enforcement assistance, except for narcotics programs?	Yes.
d. FAA Sec. 662. for CIA activities?	Yes.
e. App. Sec. 103. to pay pensions, etc., for military personnel?	Yes.
f. App. Sec. 106. to pay U.N. assessments?	Yes.
g. App. Sec. 107. to carry out provisions of FAA Sections 209(d) and 251(h)? (transfer to multilateral organization for lending).	Yes.
h. App. Sec. 501. to be used for publicity or propaganda purposes within U.S. not authorized by Congress?	Yes.

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ANNEX D

DRAFT LOAN AUTHORIZATION

Provided From: FAA Section 103 Funds (Food and Nutrition)

Jamaica: Integrated Rural Development Program

Pursuant to the authority vested in the Administrator, Agency for International Development (AID) by the Foreign Assistance Act of 1961, as amended ("The Act"), and the delegations of authority thereunder, I hereby authorize the establishment of a Loan pursuant to Section 103 of said Act and in furtherance of the Alliance for Progress to the Government of Jamaica ("Borrower") of not to exceed thirteen million United States dollars ($13,000,000) to assist in financing United States dollar and local currency costs of an Integrated Rural Development Program ("Program") described in the following sentence. The Program will carry out activities in soil conservation, erosion control, forestation, engineering works such as road building and stream control in the Two Meetings and Pindars River watershed areas; develop local and national institutions in order to increase agricultural production and increase opportunities for employment in agriculture.

The Loan shall be subject to the following terms and conditions:

1. Interest and Terms of Repayment

Borrower shall repay the Loan to AID in United States dollars within twenty (20) years from the date of the first disbursement under the loan, including a grace period of not to exceed five (5) years. Borrower shall pay to AID in United States dollars interest at the rate of two percent (2%) per annum during the grace period and three percent (3%) thereafter on the outstanding balance of the Loan and unpaid interest.

2. Other Terms and Conditions

Goods, services (except for ocean shipping) and marine insurance shall have their source and origin in countries included in Code 941 of the AID Geographic Code

Book. Marine insurance may be financed under the Loan only if it is obtained on a competitive basis. Ocean shipping shall be procured in any country included in AID Geographic Code 941.

3. Conditions Precedent to Initial Disbursement

Prior to the first disbursement the GOJ shall:

(a) Appoint a full-time project manager;

(b) Declare the Pindars and Two Meetings Valleys legal watershed areas;

(c) Designate a Project Advisory Committee composed of representatives of the major implementating organizations.

4. Conditions Precedent to Disbursements for the Soil Conservation Activities

Prior to disbursement of funds for soil conservation activities the GOJ shall:

(a) Establish a Soil Conservation Fund. This Fund will be earmarked for carrying out soil conservation measures on small private farms in other than Pindars and Two Meetings watersheds; and will be initially capitalized by requiring farmers participating in the subject AID/GOJ Program to pay for twenty-five percent (25%) of the cost of soil conservation measures undertaken on their land, exclusive of waterways.

(b) Prepare a time-phased implementation plan for the life of project, with emphasis on activities to be carried out during the first year.

5. Conditions Precedent to Disbursements for the Reforestation Activities

Prior to any disbursement of funds for reforestation activities on public or private land, the COJ shall prepare an implementation plan for the life of project with emphasis on activities to be carried out during the first year.

6. Conditions Precedent to Disbursements for Engineering Works

Prior to disbursement of funds for engineering activities, the GOJ shall:

(a) Prepare an implementation plan for the life of the project with emphasis on the activities to be carried out during the first year.

(b) Finalize all survey work showing the location of engineering works to be carried out under the program.

7. In addition to the standard AID covenants, the GOJ shall covenant that: the Min Ag will make maximum efforts to employ a sufficient number of soil conservation and agricultural extension officers in the program on a permanent basis.

ANNEX E LOGICAL FRAMEWORK

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goal: The broader objective to which this project contributes	Measures of Goal Achievement		Assumptions for achieving goal targets
To improve standard of living of farmers in Jamaica by increasing income and providing improved roads, housing, electricity, water.	The increase in average income by 250% and improved amenities.	Future sample survey compared to available benchmark data	High priority to increased agricultural production by GOJ and small farmers
Subgoal: To establish an agricultural production model that can be replicated on small hillside farms.	The acceptance of soil conservation practices and adoption of improved production techniques by 75% of participating farmers.	-Aerial photo reconnaissance -In-depth interviews -Periodic sampling of farmers -Replication in other areas	Use of soil conservation measures and improved cropping methods will bring about significant increase in production
Project purpose	End-of-project status		Assumptions for achieving purpose
(a) Increase agricultural production on small hillside farms in the Pindars/Two Meetings watersheds	Increased agricultural production of major crops as indicated in Small-Farm Model (Annex J)	Farmer surveys of future production compared to present	AMC continues to offer guaranteed floor prices to farmers
(b) Control soil erosion in the watersheds	Soil erosion reduced from 53 tons/ac/yr in 1977 to 7 tons/ac/yr two years after end of project	Visible inspection of project area Aerial photo reconnaissance	Casual labor available for employment on small farms Farmers maintain their treated land
(c) Strengthen the human resource capability of the Min Ag.	-Ability to carry out similar projects in other areas -Trained manpower in place -Improved extension program -Viable credit program -Development of farmers' groups and associations	Project evaluation system	
Project Outputs	Magnitude of outputs		Assumptions for achieving outputs
(1) Development of the soil conservation measures in project area	17,700 acres of land treated	Aerial photos Project evaluation	Farmers' willingness to have land terraced
(2) Reforestation of land in project area not suitable for agricultural use	Trees planted on 5,000 acres of public and private land		GOJ will develop a program of reforestation of lands now in private ownership
(3) Construction and rehabilitation of access roads	22 miles to be constructed or rehabilitated	Engineering control	
(4) Employment generation	1.1 million m/d of short-term employment		Unemployed manpower available in the area
(5) Intensified land use	Introduction of improved farming system on 10,000 acres of productive land		
(6) Advanced training of technicians	30 participants to receive training		
(7) Development of training and demonstration centers	5 stations and 50 subcenters to be established by end of 1978-79		
(8) Development of small-farmer organizations	33 JAS and 4 PC Banks providing improved services to their memberships		
(9) Credit system for small farmers	PCBanks disbursing $1.6 million in agricultural credit to target group		GOJ makes necessary decisions to allow PC Banks greater freedom in making loans
(10) Improved potable water supply system	25,000 people to be assured of adequate domestic water supply		
(11) Rural electrification	15,000 people to be served by end of 1978		
(12) Rural housing	235 houses to be constructed or refurbished		
Project Inputs			

See Financial Plan.

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ANNEX F

PRP APPROVAL CABLE

AIDAC

E.O. 11652: N/A

TAGS:

SUBJECT: DAEC REVIEW - INTEGRATED RURAL DEVELOPMENT
(532-0046)

DL
JPB
CH
MB
JS

1. THE DAEC REVIEWED AND APPROVED THE SUBJECT PRP AND AG SECTOR ASSESSMENT ON NOVEMBER 3, 1976. THE DAEC WAS UNABLE TO APPROVE THE 8 MILLION DOLS LEVEL REQUESTED AT THIS TIME. HOWEVER, THE MISSION SHOULD PROCEED WITH THE INTENSIVE REVIEW AND PP SUBMISSION IN EARLY FY 1978 ON THE ASSUMPTION THAT AN 8 MILLION DOLS LOAN WILL BE BUDGETED IN THE CONGRESSIONAL PRESENTATION. THE MISSION WILL BE NOTIFIED BY FEBRUARY 1, 1977 AS TO THE FINAL CONGRESSIONAL LEVELS ESTABLISHED.

2. IN CONJUNCTION WITH THE PREPARATION OF THE PP, THE MISSION SHOULD OBTAIN PROJECT SPECIFIC INFORMATION RELATED TO THE FOLLOWING CONSTRAINTS IDENTIFIED IN THE SECTOR ASSESSMENT:

A. EXISTING FARM SYSTEMS AND TECHNOLOGY LEVEL AND CROP MIXES SHOULD BE DISCUSSED IN PP BASED ON EXISTING FAO STUDIES.

B. AG CREDIT - AN ANALYSIS OF THE PRESENT AVAILABILITY ~~(SUPPLY) AND USE (D~~EMAND) OF CREDIT BY THE TARGET GROUP AND,

UNCLASSIFIED

(SUPPLY) AND USE (DEMAND) OF CREDIT BY THE TARGET GROUP SHOULD BE MADE; AND, THE STATEMENT IN THE ASSESSMENT THAT LACK OF CREDIT IS NOT A SERIOUS CONSTRAINING PRODUCTION FACTOR TO THE SMALL FARMER SHOULD BE CLARIFIED. FARMER PARTICIPATION THROUGH THE JAS AND THE LIKELIHOOD OF THEIR USE OF CREDIT SHOULD BE ASSESSED THROUGH FARM SURVEYS.

C. AG MARKETING - THE PP SHOULD CLARIFY A STATEMENT IN THE ASSESSMENT THAT THE MARKETING SYSTEM DOES NOT OFFER MAJOR PRODUCTION CONSTRAINTS TO THE SMALL FARMER. FURTHER, CLARIFICATION SHOULD BE GIVEN TO THE STATEMENT THAT FLOOR PRICES OF THE AMC HAVE ASSURED SELF SUFFICIENCY IN 35 CROPS. WILL THESE CROPS BE GROWN IN THE PROJECT AREA? WILL THERE BE SUFFICIENT DEMAND FOR THESE CROPS? THE RECENT IDB MARKETING STUDY IN JAMAICA SHOULD SHED LIGHT ON OTHER QUESTIONS OF SURPLUS AGRICULTURAL SUPPLIES IN CERTAIN CROPS, THE AVAILABILITY OF STORAGE AND PROCESSING FACILITIES, POLICIES AND EFFECTIVENESS OF AMC, PROFIT MARGINS IN THE PRIVATE SECTOR (HIGGLER SYSTEM) ETC.

3. IN LIGHT OF THE INCREASED EMPHASIS THE GOJ IS PLACING ON DEVELOPMENT OF THE SECTOR, AND CONSIDERING THE MAGNITUDE OF THE PROGRAMS OTHER DONORS ARE PLANNING FOR THE NEAR FUTURE, THE MISSION'S RURAL SECTOR STRATEGY AND RATIONALE FOR A REGION SPECIFIC APPROACH SHOULD BE FURTHER DELINEATED. ALTHOUGH BRIEFLY DISCUSSED IN THE PRP, THIS ISSUE IS ESPECIALLY IMPORTANT AT THE PP STAGE BECAUSE THE REORGANIZTATION OF THE MA WILL BE FURTHER ALONG AND OTHER DONOR PLANS SHOULD BE MORE CLEARLY DEFINED. WHERE POSSIBLE, DEVELOPMENT OF THE AID/GOJ SOIL CONSERVATION BASED INTEGRATED RURAL DEVELOPMENT PROGRAM SHOULD TAKE ADVANTAGE OF RESOURCES AVAILABLE THROUGH ONGOING GOJ OR OTHER DONOR PROGRAMS (ESPECIALLY CREDIT, MARKETING, HOUSING, WATER AND ELECTRIFICATION PROGRAMS). THIS MIGHT PERMIT EXPANSION OF THE SOIL CONSERVATION APPROACH TO MORE THAN TWO WATERSHEDS WITHOUT INCREASING THE AMOUNT OF AID FUNDING.

4. THE FOLLOWING ADDITIONAL POINTS SHOULD BE CONSIDERED IN DEVELOPING THE PP:

A. BENEFICIARIES AND SPREAD EFFECT - CONSIDERING THE HIGH PER CAPITA COST OF THIS REGION SPECIFIC PROJECT, THE MISSION SHOULD CONSIDER WAYS TO REDUCE THE COST PER BENEFICIARY OR SPREAD THE BENEFITS OVER A LARGER NUMBER OF RECIPIENTS. FOR EXAMPLE, WORKING THROUGH A SOIL CONSERVATION RURAL DEVELOPMENT APPROACH TO REDUCE UNEMPLOYMENT AND INCREASE AG PRODUCTION, OR STRENGTHENING INSTITUTIONS SUCH AS THE MA, THE JAS, LAND AUTHORITIES AND PARISH COUNCILS BEYOND THE PROJECT AREA SHOULD BE EXPLORED. THE PP SHOULD

ALSO CLARIFY THE PRODUCTION AND EMPLOYMENT BENEFITS EXPECTED TO BE ACCRUED BY INDIRECT (E.G. DOWNSTREAM) BENEFICIARIES BOTH WITHIN AND OUTSIDE OF THE PROJECT AREA. F# FARM SURVEYS WILL PROBABLY HAVE TO BE UNDERTAKEN TO DETERMINE POTENTIAL FARMER PARTICIPATION AS WELL AS FAMILY SIZE AND INCOME, OWNERSHIP AND SIZE OF LANDHOLDING (BOTH LARGE AND SMALL, OWNED AND RENTED) HEALTH AND NUTRITIONAL STATUS, ETC.

B. PROJECT DESIGN - AS THE PROJECT DEVELOPS THE PROJECT OBJECTIVES AND LOGICAL FRAMEWORK MAY NEED TO BE REFINED TO INDICATE THE IMPORTANCE OF INSTITUTIONAL AND PERSONNEL DEVELOPMENT IN A NEW.Y REOG#RGANIZED MINISTRY TO HELP INSURE REPLICATION OF A SOIL CONSERVATION PROGRAM. TECHNICAL ASSISTANCE AND TRAINING TO DEVELOP GOJ FIELD SUPERVISORS AND EXTENSION AGENTS IN CONJUNCTION WITH OTHER DONOR PROGRAMS WOULD SEEM TO BE TWO OF THE MOST IMPORTANT PERSONNEL CONSIDERATIONS.

C. MA - THE INSTITUTIONAL AND FINANCIAL CAPACITY OF THE MA SHOULD BE EXAMINED IN VIEW OF A#MAJOR EMPHASIS THE GOJ AND OTHER DONORS ARE PLACING ON AGRICULTURE. CAPITAL AND HUMAN RESOURCE REQUIREMENTS AND THE ABILITY OF THE MA TO MEET ITS ONGOING AND PLANNED PROJECT COMMITMENTS AND ALSO REPLICATE A SOIL CONSERVATION PROGRAM SHOULD BE ANALYZED. MA OPERATING EXPENSE PROJECTIONS SHOULD BE MADE FOR AID AND OTHER DONOR PROJECTS. THE STATUS OF THE REORGANIZATION AND HOW AID'S PROJECT WILL IMPACT ON THE NEW MA STRUCTURE SHOULD BE DISCUSSED.

D. AGRI-BUSINESS - THE POTENTIAL ROLE OF JIDC AND THE AG DEVELOPMENT CORP SHOULD BE CONSIDERED IN DEVELOPING THE AGRI-BUSINESS ELEMENT OF THE PROJECT.

E. RURAL INFRASTRUCTURE - THE USE OF A FIXED AMOUNT REIMBURSEMENT (FAR) APPROACH FOR RURAL ROADS AND POSSIBLY WATER AND HOUSING CONSTRUCTION SHOULD BE EXAMINED.

F. MA AND MIN ED COORDINATION - THE PP SHOULD DISCUSS THE AGRICULTURALLY RELATED CONTINUING EDUCATION ACTIVITIES UNDERTAKEN BY THE MIN ED IN THE PROJECT AREA AND HOW THESE PROGRAMS WILL BE COORDINATED WITH THE PROPOSED PROJECT. THE IMPACT OF THE AGRICULTURAL ELEMENT IN AID'S ONGOING RURAL EDUCATION LOAN (009) SHOULD ALSO BE CLARIFIED.

G. CONTRACTING PROCUREMENT PLANS - DURING THE DAEC, SER/CM AGREED TO PARTICIPATE IN DRAWING UP CONTRACTING AND PROCUREMENT PLANS FOR INCLUSION IN THE PP. SUCH PLANS SHOULD BE ESPECIALLY USEFUL SINCE THIS WOULD BE AID'S FIRST LOAN THROUGH THE MA. YY

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ENVIRONMENTAL ANALYSIS

The Initial Environmental Examination (IEE) for this project was approved on November 24, 1976 and recommended a negative determination. The discussion in this annex will attempt to clarify certain portions of the IEE.

Point 1:

As pointed out in the discussion of program evaluation (p. 13), this project is based on a UNDP/FAO Mission to Jamaica from 1967 to 1975. The results of that Mission are summarized in UNDP/FAO Technical Report 13/11, which in turn is based on finding documented in previous technical reports. These previous technical reports set forth the basic rationale and justification for soil conservation and erosion control measures to be carried out by this AID program. The previous reports discussed alternative solutions to the erosion problem and through repeated testing of the alternatives at the Smithfield Demonstration Center, ultimately proposed the solutions to be implemented in this project - namely bench terraces, forestation, hillside ditches, permanent pasture, river and stream bank protection and road and track rehabilitation. The final mix of the solutions (i.e., certain number of acres in terraces etc.) was then proposed in the UNDP/FAO Report 13/11, and modified slightly in this PP.

A major objective of the UNDP/FAO study was to develop and recommend a watershed rehabilitation program which would (a) protect the natural resources in the Pindars and Two Meetings Watersheds (particularly soil and water) and (b) facilitate increased agricultural production. In other words, the study was with an environmental focus as well as a production focus, and the recommendations contained in this PP and the UNDP/FAO Report 13/11 are based on a proven methodology (at Smithfield) which has protection of the environment as a major thrust of the program.

Point 2:

The IEE briefly discusses construction of a downstream dam on the Pindars River. The dam will not be funded under this program. If fact, the pre-feasibility of the dam has not yet been examined. Before the dam is built, the Jamaicans will have to arrange funding for and carry out both pre-feasibility and feasibility studies. Financing for these studies is not yet available and there is no timetable for conducting the studies. Nor is their financing or a time-table for dam construction. The feasibility of a dam has been under consideration for several years and it seem likely that the proposal will move forward, whether or not AID funds this proposed PP.

Point 3:

One aspect of this program is the provision of rural infrastructure - housing, potable water and rural electrification - funded entirely by the GOJ (and the IDB in the case of electrification). This infrastructure is considered an essential component to any rural development program in Jamaica. One objective being to make rural living more attractive to Jamaicans, thereby curtailing rural to urban migration in the long run. At the time the IEE was prepared, AID had considered funding a portion of the rural housing and potable water component. However, as the program developed and moved into the PP stage, the GOJ had already committed themselves to carrying out infrastructure improvements in potable water, housing and electrification. Thus, these components will go ahead with or without the watershed protection plans presented in the PP. The reason for presenting the infrastructure components in this project is simply to show what the GOJ is doing to improve the standard of living in rural areas.

The approved IEE is on file in LA/DR.

ANNEX H

Jamaica Integrated Rural Development Project

PROJECT EXECUTION SCHEDULE*

Calendar year	1977				1978				1979				1980				1981				1982			
Quarters	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1. Project authorized			x																					
2. Intensified extension activities in project area				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
3. GOJ names project manager				x																				
4. Project agreement signed					x																			
5. Grant funds become available	x																							
6. GOJ mobilizes staff				x	x	x	x	x	x	x	x													
7. Soil conservation work begins						x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
8. Conditions precedent met						x	x	x																
9. Order and receive machinery and vehicles	x				x	x	x	x	x	x														
10. Negotiate and award TA contract					x	x																		
11. TA team on board							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
12. Establish field offices					x	x	x	x																
13. Establish demonstration centers						x	x	x	x	x	x	x	x	x	x	x								
14. Begin local training courses					x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
15. Off-shore participant training begins							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
16. Reforestation work begins							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
17. Road construction begins								x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
18. Strengthen small farmer organizations								x	x	x	x	x	x	x	x	x								
19. Disburse agricultural credit								x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
20. Evaluate project														x	x	x								
21. Aerial photo reconnaissance																			x	x				
22. Final project evaluation																						x	x	
23. Rural electrification program continues	x	x	x		x	x	x																	
24. Rural housing program continues	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
25. Water supply improved		x	x		x	x	x	x	x	x														

*A condition precedent to disbursement will require detailed implementation plans for the soil conservation, forestation and engineering works program.

ANNEX I

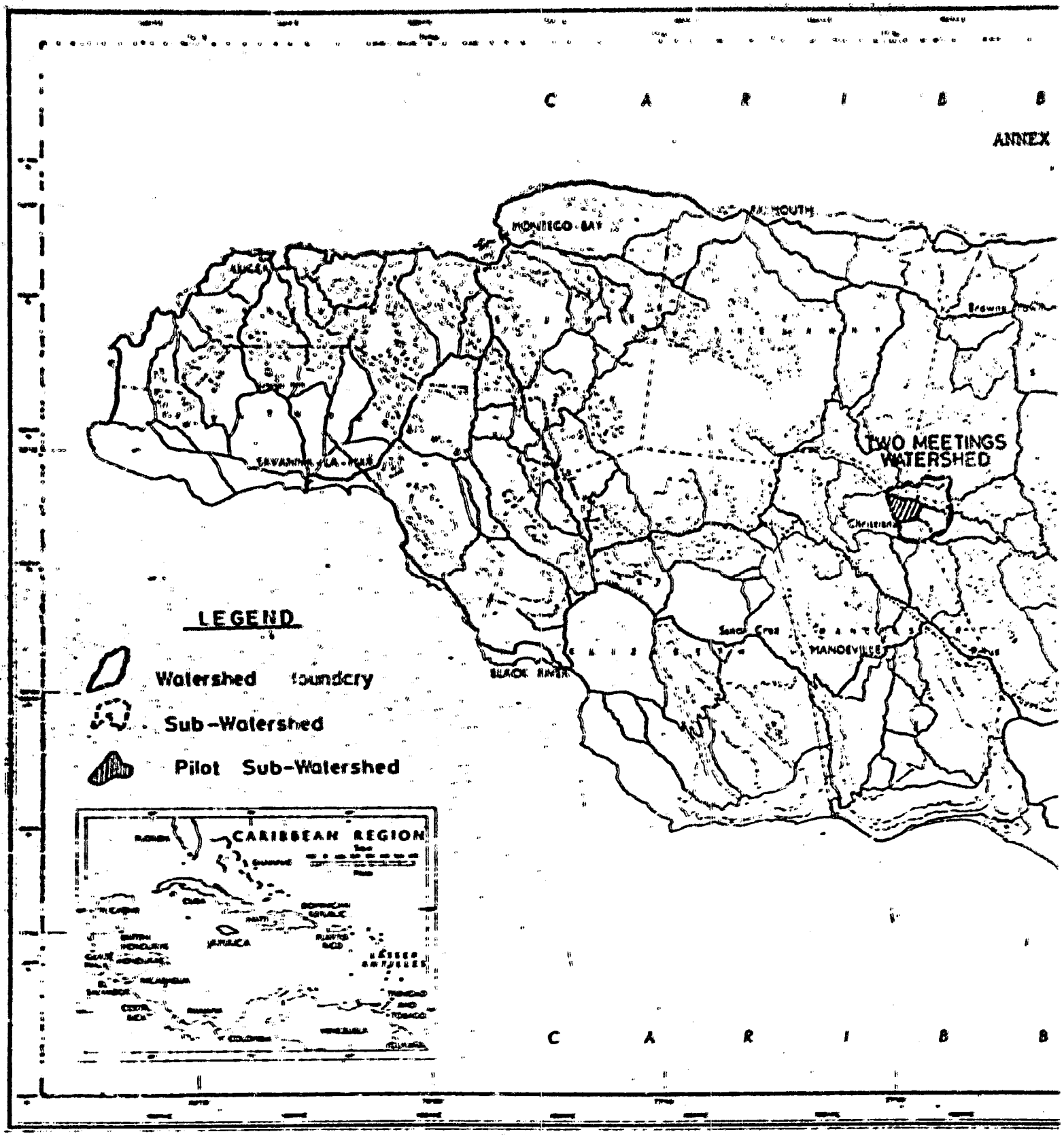
MAP OF PROJECT AREA

(See Facing Pages)

SCALE 1 : 500,000

JA

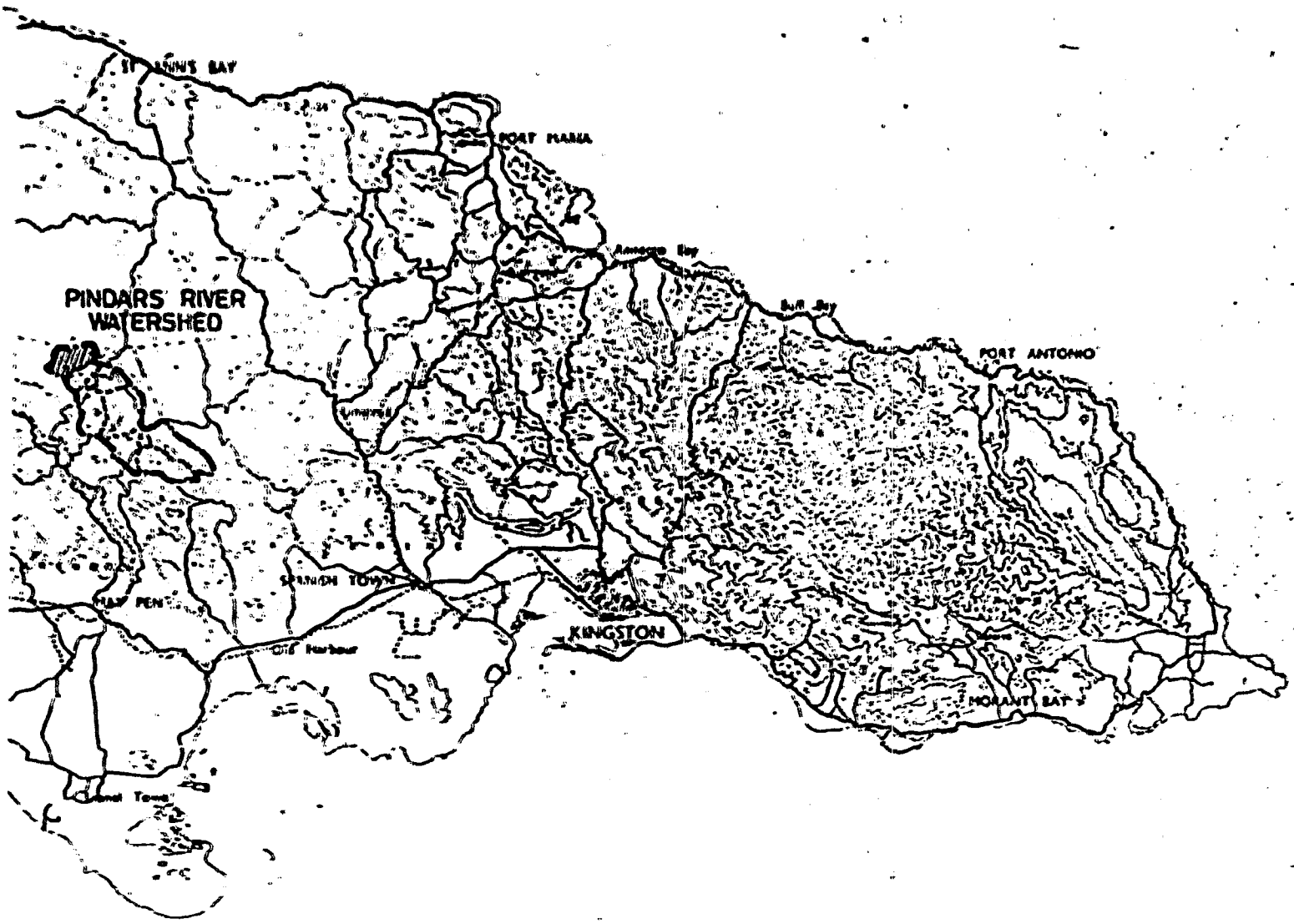
ANNEX



MAICA

E A N S E A

I MAP OF PROJECT AREA



E A N S E A

ECONOMIC EVALUATION OF AGRICULTURAL PRODUCTION

The Small-Farm Model

Characteristics of Farms in Project Area . . . . . J 2

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ECONOMIC EVALUATION OF AGRICULTURAL PRODUCTION

The Small-Farm Model

CHARACTERISTICS OF FARMS IN PROJECT AREA

Information to describe the farm units and farmers was collected through a sample survey in the Two Meetings and Pindars River watersheds. The survey was done by the Data Bank Division of the Ministry of Agriculture (Min Ag) in cooperation with the agricultural extension officers of the project area in March and April of 1977. The following is a brief discussion of the findings of the farmer survey.

Agricultural production in the project area is dominated by small farms on hilly land: only 7% is considered level enough not to require erosion control treatment. Seventy-one percent of the farms in the area have less than 5 acres of land and these farms occupy 36% of the land area. Most farms (42%) are from 2 to 5 acres in size, have an average size of 2.9 acres, and occupy 29% of the land area (Table 1).

In the target group of farms (less than 5 acres but more than one-half acre), the 2-to-5-acre category accounts for 80% of the land area and nearly 60% of the farmers.

Present land use of farms is shown in Table 2. Of all farms in the area, cropland accounts for nearly 60% and food/forest 5%. The rest is unproductive while soils depleted through erosion and fertility lost from cropping are rebuilt. Soil conservation measures will permit this underutilized 34% to be continuously used for crop production.

Smaller farmers grow crops more for household consumption than for sale. Table 3 shows that farms of 2 to 5 acres are used both for consumption and for commercial sales. Adequate information on what portion of production for the average family goes to consumption is not available. Family consumption does account for use of most non-marketable commodities such as undersized potatoes and yams.

Although survey results indicate 71% of the farmers used fertilizer (Table 4), they do not use the most profitable amounts and combinations, local technicians report. Average crop yields are known to be very low and not increasing (see Appendix 1 for estimated yields of marketable commodities).

TABLE 1. FARM ACREAGES AND NUMBERS OF FARMS BY SIZE GROUP

Farm Size (acres)	Total Acres	Percent of total land area	Number of Farms	Percent by size	Average size (acres)
½ to less than 1	262.3	1.5	406	10.1	0.65
1 to less than 2	974.0	5.8	768	19.3	1.26
2 to less than 5	4,814.5	28.7	1,658	41.6	2.9
5 to less than 10	5,148.0	30.7	799	20.1	6.4
10 to less than 20	3,734.3	22.2	281	7.1	13.3
20 to less than 50	1,675.2	10.0	66	1.7	25.4
50 or over	180.5	1.1	2	0.05	90.25

TABLE 2. LAND UTILIZATION (in percents) a/

Farm size (acres)	Pure Stand	Mixed Stand	Food/ Forest	Pasture	Ruinate	Fallow	Other
½ to less than 1	5.8	69.2	4.5	1.1	1.6	9.5	8.0
1 to less than 2	15.5	56.5	5.4	0.7	5.1	13.8	3.0
2 to less than 5	19.7	47.9	1.5	3.6	12.1	13.2	1.8
5 to less than 10	18.6	38.3	3.8	8.3	15.0	13.8	2.2
10 to less than 20	24.3	19.5	10.2	10.2	18.9	13.0	1.9
20 to less than 50	22.3	37.4	6.3	6.3	10.0	12.0	3.0
50 or more	67.9	17.7	0.8	0.8	10.8	0	0
TOTAL	20.7	38.1	4.9	7.3	13.7	13.0	2.2

a/ Land use pattern is somewhat affected by timing of the survey: Some crops were not yet planted, and planting was not normal anyway, due to drought.

TABLE 3. PURPOSE OF FARMING (in percents)

Farm size (acres)	Consumption	Commercial	Both
½ to less than 1	25.3	0	74.7
1 to less than 2	13.3	3.0	83.7
2 to less than 5	5.2	3.1	91.7
5 to less than 10	2.1	2.3	95.6
10 to less than 20	0	3.9	96.1
20 to less than 50	0	7.5	92.5
50 or over	0	66.7	33.3
TOTAL	7.7	2.8	89.5

TABLE 4. FARMS USING FERTILIZER AND PESTICIDES (in percents)

Farm Size (acres)	Fertilizer	Pesticide
½ to less than 1	52	16
1 to less than 2	61	26
2 to less than 5	77	34
5 to less than 10	74	62
10 to less than 20	85	46
20 to less than 50	65	35
Over 50 acres	67	33
TOTAL	71	30

Table 5 shows that the five crops most frequently grown are yams, red peas, bananas, coffee, and sugar cane. This is similar to the national food cropping pattern, which is dominated by yams and red peas (Table 6).

The Irish potato is an important crop in the Two Meetings area and sugar cane is important even as a small-farm crop in the Pindars River watershed.

CROP PRODUCTION FOR IMPORT SUBSTITUTION

Future crops in the two watersheds will not differ substantially from those grown there now: the principal five--yams, red peas, bananas, coffee, and sugar cane--and other main crops--Irish potatoes, oranges, and vegetables such as carrots and cabbage. These crops have a well-established and increasing domestic and/or export market, and the farmers have a tradition of producing them.

Import expenditure for rice, beans, and lentils was nearly J$28 million in 1975 (Tables 3 & 8). Increased production of tuber crops and red peas--crops well suited to the project area--could help reduce such imports. If production of food can be expanded and prices to consumers reduced through improved land use and production technology, an important improvement in Jamaica's standard of living and quality of diet will have been made. Food accounts for over 53% of what consumers buy overall in Jamaica. For rural areas, it is nearly 59%. Increasing the production and lowering the price of red peas--now considered a luxury food--would in itself be a significant boost to the Jamaican diet.

With hillside ditches, coffee production can be increased substantially, especially in the Two Meetings area. This crop is well suited to the small-farm, excess-labor situation; and Jamaica, although a minor coffee exporter in the world market, grows a premium coffee. In 1975, Jamaica had a net exchange earning of over half a million dollars and was able to sell coffee on the world market for twice the price of coffee imported into Jamaica.

Although no reforestation programs have taken place in small-farm areas, large forest plantations for wood production appear to have good potential. Starting reforestation on watershed land with no other crop possibilities would not only conserve soil but could also contribute to local employment and income, since costs of imported wood products are rising.

TABLE 5. CROPS AND USE OF FERTILIZER AND PESTICIDES

Crop[a/]	Farmers Reporting	Percent using Fertilizer	Percent using Pesticides
Cowpea	151	17	1
Red pea	1,426	77	23
Gungo pea	719	16	1
Carrot	166	52	24
Cabbage	381	76	52
Pumpkin	360	59	18
Yellow yam	2,228	77	3
Negro yam	288	84	0
Renta yam	804	44	0
Sweet yam	547	71	0
Tau yam	543	76	3
Irish potato	765	87	71
Sweet potato	262	47	2
Coco	321	45	1
Ginger	595	52	2
Plantain	171	63	6
Banana	1,325	64	22
Sugar cane	865	82	3
Citrus	148	44	19
Coffee	1,284	32	5
Cocoa	678	23	8

a/ Includes all crops reported by more than 150 producers.

TABLE 6. ACREAGE REAPED, SELECTED CROPS, 1971-1975

CROPS	1971	1972	1973	1974	1975
Legumes	21,786	25,067	19,377	18,792	20,350
Red Peas	8,769	9,513	7,149	7,610	7,530
Congo Peas	7,797	10,327	7,249	5,642	6,920
Cow Peas	1,392	1,510	1,275	1,750	2,290
Others	3,829	3,710	3,704	3,790	3,610
Vegetables	19,051	19,542	18,270	18,825	19,800
Cabbage	3,859	3,204	2,478	3,660	2,950
Carrot	2,409	2,884	2,656	2,455	2,050
Cho Cho	1,516	1,830	1,617	1,770	1,730
Cucumber	1,003	1,069	908	920	1,310
Pumpkin	5,308	5,031	4,866	4,970	6,310
Tomato	2,529	2,400	2,715	2,635	2,810
Other	2,427	3,124	3,030	2,415	2,640
Plantains	5,632	6,490	6,872	6,315	5,160
Potatoes	9,368	10,646	8,446	9,680	9,650
Irish	3,321	4,211	3,152	3,420	4,590
Sweet	6,047	6,435	5,294	6,260	5,060
Yams	26,164	28,138	27,872	27,720	29,550
Negro Yam	5,044	5,429	5,083	5,090	4,990
Yellow Yam	8,174	8,604	8,792	8,750	9,600
Lucea Yam	2,743	2,756	2,756	2,685	2,740
Other Yams	10,203	11,349			
Other Tubers	12,227	13,682	11,560	11,595	13,380
Bitter Cassava	3,081	3,686	2,877	2,845	3,700
Sweet Cassava	2,013	2,235	1,732	1,565	1,690
Dasheen	3,435	3,776	2,946	3,010	3,870
Coco	3,698	3,985	4,005	4,175	4,120

Source: Statistical Yearbook of Jamaica 1976

TABLE 7. PRODUCTION AND IMPORTS OF SELECTED AGRICULTURAL CROPS, 1974-1975

	Production		Imports			
	1974 (lbs)	1975 (lbs)	1974 (lbs)	1974 (J$)	1975 (lbs)	1975 (J$)
Vegetables						
Beans, peas, lentils	13,580,000	13,840,000	4,340,122	1,355,156	5,639,572	1,239,728
Potatoes	32,200,000	30,200,000	13,089,366	1,442,457	7,132,225	776,264
Onions	3,020,000	4,780,000	7,032,230	3,238,288	7,806,150	1,600,609
Garlic 1/	NA	NA	230,100	159,025	331,100	168,971
Spices						
Black pepper	0	0	640,477	397,155	694,382	474,505
Cinnamon	0	0	3,627	4,917	4,678	6,538
Nutmeg	0	0	4,932	8,662	22,425	28,597
Ginger	1,720,000	1,880,000	835	3,932	1,826	12,223
Coffee 2/	3,040,000	3,120,000	1,187,228	549,806	250,793	163,987
Corn	21,660,000	3,580,000	232,781,362	14,628,081	258,400,390	16,790,277
Rice	489,000	1,621,900	86,995,492	22,313,124	109,356,249	25,639,000
	J$ Totals		J$	44,100,603	J$	46,900,699

Source: Statistical Yearbook of Jamaica 1976

1/ Garlic is produced in Jamaica. Acreage and yield data are not available.

2/ Jamaica has a record of exporting more than 10 million pounds of washed coffee in peak years, and of exporting consistently over a long period more than 5 million pounds a year.

TABLE 8. MAJOR FOOD IMPORTS AND EXPORTS (J$ 000)

	1973	1974	1975
Food Imports	115,346	175,214	178,402
Meats and meat preparations	18,189	22,094	27,403
Dairy products, eggs and honey	21,288	25,742	20,540
Fish and fish preparations	14,496	16,687	19,633
Cereal and cereal preparations	48,117	83,884	84,902
Animal feed	5,613	6,008	3,951
Food Exports	72,314	109,642	179,096
Fruits and vegetables	23,154	18,636	24,080
Sugar, sugar preparations, and honey	37,333	76,843	140,053
Coffee, tea, cocoa, spices and their products	9,642	11,919	11,530

Source: Statistical Yearbook of Jamaica 1976

CAPITAL AVAILABLE AND REQUIRED

Farmers of the target group (those with less than five acres) are for the most part self-financing; fewer than 25% use production credit (see fuller discussion of credit in Annex O). Their reluctance to use credit stems primarily from the practice of requiring land as collateral and from institutions' delays in making credit available.

For various reasons, may of the small farmers do not qualify for People's Cooperative Banks (PC Banks) credit. The survey shows that farmers in the project area perceive credit availability as a major problem. Small farmers in the area do qualify for commodity credits (for sugar and coffee) and for certain crop subsidies in the form of seed and fertilizer, which can offset some of the farmers' costs.

It should be recognized that the present small-farm system can operate with little working capital because of limited purchase of products from outside the farm, such as fertilizer and pesticides. Labor is the primary input: to the self-employed farmer, this does not represent a cash expense. On-farm production for household consumption reduces cash needs for subsidies but also reduces cash inflow. Off-farm employment can contribute to cash flow, both for the farm and for the farmer's living costs, but the survey indicated limited off-farm employment even on the very small farm.

Changes in the cropping system proposed in this project will make quite a difference in required operating capital for the farm unit: capital needed will more than double. The need for more capital will stem from increased use of products purchased off-farm, from investments in establishing perennial crops such as coffee and citrus, and from a more intensive cropping system.

On the other hand, the improved cropping system will generate a greater cash inflow because of a greater marketable surplus. Labor will continue to be a major input in production without increasing cash outflow. Hence, a low cash outflow relative to gross income under improved production methods should result in low-risk opportunities to extend credit to small farmers in the area.

To illustrate that relatively little cash can support a major production activity, a farmer would spend 25% of his gross income if he already had half his own seed materials, in a yellow yam/red pea combination.

Adopting the soil conservation/improved cropping system will increase operating capital needs of the small farms, but it will also increase the cash inflow for self-financing and savings. Increasing the availability of operating credit will be necessary to support the project effort. Any means developed to channel farm savings into the project area will contribute to meeting the capital requirements and reduce outside needs.

LABOR AVAILABLE

Extension personnel in the watersheds estimate the average farm family has about 1.5 man equivalents available for agricultural work, or 360 man days (m/d) labor per household based on 240 m/d per year. This means that among farmers of less than five acres there is considerable underemployment. In the 2-to-5 acre category, where most farms are involved in agriculture for both consumption and marketing of surplus, only 1.7 acres of the average of 2.9 acres are in crops other than food/forest. The labor availability for crop land is approximately 212 m/d per acre. The most labor-intensive cropping system of yams interplanted with red peas would use an estimated 75 m/d of labor per acre for production. Seasonal distribution of labor required is, of course, uneven; there is a higher level of employment in land preparation, planting, and harvesting periods during the two rainy seasons. Since the family normally participates in marketing the commodity, this takes additional labor. No real measure of excess labor is available, but a great deal of potentially productive labor is recognized as available. Since off-farm employment opportunities are limited, labor with essentially a zero opportunity cost during parts of the year is wasted in very unproductive tasks or not used at all.

In the farm survey, less than 26% of the farmers indicated they were involved in some off-farm employment.

The problem of urban migration of the young people can be clearly seen from the survey data. The survey showed 53% of the farmers to be 50 years old or older, and only 10% of the farmers less than 30 years old.

Migration has also affected the availability of farm labor; 46% of the farmers indicated difficulty obtaining farm labor or said that farm labor was unavailable. This is consistent with national estimations of unemployment in rural areas at only 7% as against the national average of 24% unemployment in 1976. These figures do not measure rural underemployment.

Hiring labor is not expected to be a problem, however, for the target group, farmers under five acres. On the contrary, the considerable underemployment on small farms, especially during the dryer seasons of the year when crop production activities are minimal, means adequate labor will be available.

THE SMALL-FARM MODEL: UNDER TRADITIONAL METHODS

Based on the preceding information from the survey and from the UNDP/FAO study defining land use capabilities, a farm model was developed to establish farm income in the project area. Table 9 summarizes land use and income for the average farm (2.9 acres) in the 2-to-5-acre category, the most representative farm in the target group of farms of less than 5 acres.

Of the total land of 2.9 acres, 0.4 is for food/forest and other uses. Information is not available on food/forest productivity, but most of it is used for household consumption. The traditionally required land for ruinate, fallow, and pasture takes 0.8 acres, leaving a balance of 1.7 acres for cropping.

Cropping systems in the watersheds vary widely, but, with the exception of sugar cane in the Pindars area, most crops are grown in mixed stands, that is, yams or potatoes intercropped with red peas and coffee, plantains, bananas, and oranges.

To find farm income, based on 1976 prices received by farmers, gross income was estimated based on expected crop yields in the area; then material and labor costs were estimated, using improved practices. Table 9 summarizes present income under current land use and cropping systems. Details are shown in Appendix 1, Tables 2 and 3.

Income from sugar cane in the Pindars area is less than that from mixed crops, but its low production risk, available credit, market, and the tradition of growing the crop make it important even on small farms.

The estimated return to a self-employed farmer's labor and management is estimated to be J$732 in the Pindars area and J$978 in the Two Meetings area. The return to land and capital was estimated to be J$397 and J$596 respectively for the two areas.

TABLE 9. SMALL-FARM MODEL: LAND USE AND FARM INCOME UNDER TRADITIONAL PRACTICES

Land Use (acres)	
Intensive mixed crops	0.6
Less intensive mixed crops	0.6
Pure stand sugar cane	0.5
Fallow and ruinate	0.8
Other land and food/forest	0.4
Total	2.9

Income: Pindars River Area	Net acres	Return to capl & land	Return to labor	Labor required (m/d/yr)
Intensive[a/]	0.6	J$ 281	J$ 462	30
Less intensive	0.6	88	157	13
Sugar cane	0.5	28	103	13
Totals	1.7	J$ 397	J$ 732	56

Income: Two Meetings Area				
Intensive[b/]	0.85	J$ 472	J$ 742	45
Less intensive	0.85	124	236	19
Totals	1.70	J$ 596	J$ 978	64

a/ Yams/red peas, and carrot (as an estimate for cabbage and lettuce). See Appendix 1.

b/ Yams/red peas, and potatoes/red peas. See Appendix 1.

SOIL CONSERVATION TREATMENTS

The number of acres identified in the project area for the soil conservation treatments and the criteria for determining the treatment are described in UNDP/FAO Technical Report 13. Soil depth and slope were used as the primary criteria in choosing the necessary soil conservation treatment. Acres required for the specific treatment are summarized in the soil conservation section.

Table 10 indicates the weighted average cost of the prescribed soil conservation treatment for the five alternative methods based on slope of the land and on whether treatment is done partly by machine or completely by hand. The soil conservation report shows treatments to be very labor-intensive; a good deal of work must be done by hand. Maintaining the soil conservation treatments will require 15 m/d per acre of treatment for the bench terraces and 4 m/d per acre for orchard terraces and hillside ditches. Construction of the treatments and maintenance will have a major impact on increasing employment in the area.

Although the investment cost per acre of J$820 is greatest for the bench terraces, their potential productivity is also the greatest through intercropping and multicropping of high-income crops. The average cost for all treatments for a representative farm is about J$500 per acre treated.

Soil conservation treatment of land and adoption of improved cultural practices will allow for continuous cropping of all the farm land. Farm land will not have to rotate into non-productive use as fallow or ruinate to rebuild fertility. At the same time, however, 25% of the effective crop land will be lost in construction of bench terraces for risers and waterways. The net amount of intensive crop land on a typical small farm (2.9 acres) will be about the same; the very steep land in the treated farm will be in productive forest and pasture, protecting the watershed, whereas on present farms the land is nonproductive.

The survey in the project area indicated that there is a high degree of interest in terracing; only 15% of the farmers reported they were not interested in terracing their property. Moreover, the survey was taken before any major educational effort in the area to show benefits of terracing or to teach better production practices.

TABLE 10. SUMMARY OF SOIL CONSERVATION TREATMENT COSTS a/

Treatment	Method	% of land	Cost/ acre	Cost summaries: Weighted cost/acre	Cost summaries: Rounded cost/acre
Bench terrace	Machine	87	J$ 755		
	Hand	13	1,249		
				J$ 819	J$ 820
Orchard terrace	Machine	48	392		
	Hand	52	785		
				596	600
Hillside ditches and basins	Machine	65	450		
	Hand	35	571		
				492	490
Pastures with hillside ditches	Machine	21	311		
	Hand	79	433		
				342	340
Reforestation b/	Hand	100	244	244	245
			Average	J$ 499	500

a/ See Annex K for details on estimated treatment costs.

b/ Actual distribution between pulp and lumber cannot be established at this time because of dependence on market development. Cost includes tree establishment.

TREATMENT COST FOR TYPICAL FARM

For the base farm size (2.9 acres), the projected land use is shown in Table 11A. Of the productive land, 2.3 acres requires treatment, based on estimates from the total watershed in the UNDP/FAO project report. The various treatments are shown in Table 11B. The estimated cost of treatment for each farm based on Table 10 is J$1,149. The annual maintenance cost is J$78. If the total initial investment were amortized over 25 years, annual cost would be J$46 per farm, not including interest, plus J$78 for maintenance, or a total cost of J$124 per year. (Amortized cost allocated over 25 years at yearly interest would be J$46 per farm or about J$12 annually for the farmer's 25% share of the investment: Table 11C.) Cost sharing by the public sector of 75% of the cost reduces the annual cost to individual farmers to J$90. The GOJ provides maintenance for the first two years, after which the farmer pays maintenance.

PROJECTED INCOME ON TREATED FARM

Table 11C summarizes the projected average annual income for the treated farm, with improved production practices at 1976 price levels as received by farmers and early 1977 input costs. Individual enterprise budgets and supporting materials are shown in Appendix 1 and summarized in Table 12. Production coefficients are based on interviews with technicians in the project area, on research information, and on the Hand Book for Credit Officers (see References list 3,5, and 7).

Projected income is based on assumptions about the cropping system for the various land treatments. To recognize the widely varying crop pattern that may exist on the bench terraces in the project area, an average income for all annual crops per acre was used as a base for estimation. Orchard terraces were assumed to be used for oranges, which were chosen to reflect income potential for any citrus crop. The hillside ditched land would most likely be used for coffee and plantain in the Two Meetings area, but for sugar cane in the Pindars area because of long tradition, ready market, and credit availability. Production of sugar would reduce income, however, as reflected in the parenthesized values in Table 11C.

The amortized soil conservation treatment investment of J$1,149 for the farm or J$287 for the farm share over a 25-year period would be about J$12 per farm, as mentioned above. An interest cost for the investment is not included because it is anticipated that the individual farmer can earn income while participating in the soil conservation treatment effort, to cover his share of the cost; that would be about 54 m/d of labor.

TABLE 11. SMALL-FARM MODEL: LAND USE AND FARM INCOME AFTER SOIL CONSERVATION TREATMENT [a]

A. Land Use (acres)

Productive cropland		2.5
Treated land	1.8	
Nontreated land (<7° slope)	0.2	
Forest land	0.5	
Other land and food/forest		0.4
Total		2.9

B.

Treatment	Acres	Tot.Cost [b]	Maint.Cost/yr
Bench terrace	0.47	J$ 385	J$ 42
Orchard terrace	0.09	54	2
Hillside ditches and basins	1.10	539	26
Pasture with hillside ditches	0.14	48	3
Reforestation	0,50	123	5
Totals	2.30	J$1,149	J$ 78

C.

Productive land	Net acres	Projected Income [c] Return to capl&land	Return to labor [d]	Labor required [e] (m/d/yr)
Nontreated land & bench terrace	0.67	J$ 585	J$1,078	80
Orchard terrace	0.09	22	28	1
Hillside ditches and basins	1.10	827 (118) [f]	1,440 (526)	92
Pasure with hillside ditches	0.14	--	--	--
Reforestation	0.50	39	59	--
Subtotals	2.50	J$ 1,473 (764)	J$2,605 (1,691)	173 (135)
Cost of maintenance		-78	78	13
Subtotal before treatment cost		J$ 1,395 (686)	J$2,683 (1,769)	
Farmer share of cost [g]		-12	-12	
Totals		J$ 1,383 (674)	J$2,671 (1,757)	196 (148)

a/ Based on average-sized farm in the 2-to-5-acre category and on estimated land use capabilities by which soil treatments are determined

b/ At rounded cost/ac, including labor at J$5.30/day. Farmer's share depends on cost share base.

c/ Cropping systems income determined by taking simple average return for all annual crops for nontreated and terraced cropland, oranges on orchard terraces and coffee and plantain on hillside ditched area for Two Meetings. Sugar cane could be put on hillside ditched area in Pindars but it would produce less income.

d/ Returns to owner capital, labor management and risk..

e/ Includes labor to establish perennial crops.

f/ Values in parentheses are for Pindars area and reflect production of sugar cane on hillside ditched land.

g/ Amortized cost of investment in soil conservation treatment.

TABLE 12. ESTIMATED ECONOMIC RESULTS AND LABOR SUMMARY FOR A TREATED FARM a/

ANNUAL CROPS ON BENCH TERRACES b/

	Negro yams & red peas	Yellow yams & red peas	Red peas pure stand	Red peas and carrots	Irish potatoes & carrots
Material cost (J$)	1,286	985	216	227	605
Labor required (m/d)	140	140	82	103	133
Return to labor and management (J$)	1,159	1,114	634	763	1,009
Total specified cost (J$)	2,593	2,233	910	1,063	1,152
Net income to capital and land (J$)	941	866	350	767	1,440
Net income to self-employed farmer c/ (J$)	2,100	1,980	984	530	2,448

PERENNIAL CROPS

	Orange	Sugar cane	Banana	Coffee & plantain	Forest	
					Pulp	Lumber
Establishment cost (J$), 1st yr	244	780	553	607	244	244
Material cost	65	211	203	197	34	34
Labor required (m/d)	24	72	58	53	40	40
Annual average over prod. life						
Return to labor and mgt (J$)	69	371	287	567	37	45
Labor req. (m/d)	10	49	41	84	2.4	1.9
Net income to capital & land	246	107	298	752	26	128
Net income to self-empl. farmer (J$) c/	315	478	585	1,309	63	173

a/ See Appendix 1 for details on individual crop budgets.

b/ Yams grown with two crops of red peas; red peas in pure stand, two crops; carrots as second crop with either red peas or potatoes.

c/ Net income to pay for labor, management, capital, and land.

The projected annual average farm income to land capital, management, and labor for the self-supporting farmer after treatment is estimated to be J$2,671 for farms in the Two Meetings area and J$1,757 in the Pindars area.[1/] Returns to land and capital wer estimated at $J1,395 and J$686 for the two areas respectively.

PROJECTED INCREASE IN FARM INCOME

The total investment required at the individual farm level for the necessary soil conservation treatment is estimated at J$1,149 for the representative farm. of which J$287 would be the farmer's share. The increase in the operating capital required annually to purchase materials for crop production, unadjusted for sales during the cropping season, would be approximately J$290 in the Pindars area and J$380 in the Two Meetings area over the estimated requirement for the traditional farm model. Thus, the projected additional investment at the farm level is J$577 in Pindars and J$667 in the Two Meetings area per farm.

When soil conservation treatment is completed and changes in the cropping system are made, the annual expected income to a self-employed farmer in the Two Meetings area, with a J$667 capital investment, would rise to J$2,671, or more than 2.7 times the present level (Table 13). In the Pindars area, with a J$577 investment, income per farmer would rise to J$1,757 or 2.4 times the present level.

These large increases in income are based on moderate yield increases presently obtained by producers in the areas; they are much less than income increases under the experimental results at the Smithfield research station.[2/]

The self-employed farmer income increase is the appropriate measure of the project's benefits at the farm level, due to the fact that most farmers do not have off-farm employment opportunity and are essentially underemployed with a zero opportunity cost of labor.

With ample credit availability in the first few years to get crops started, particularly perennials, the project's proposed changes are economically feasible and financially viable at the farm level.

1/ A return was not estimated for the food/forest crop--used mostly for on-farm consumption--nor for the pasture crops; there is not enough information to place a value on such production.

2/ See Appendix 1, Table 4 for yield estimates from improved practice.

TABLE 13. CHANGE IN FARM INCOME WITH SOIL CONSERVATION TREATMENT AND IMPROVED PRODUCTION PRACTICES

Income to capital and land	Two Meetings	Pindars
Before	J$ 596	J$ 397
After	1,383	674
Change a/	787	277
Income to self-employed farmer		
Before	J$ 978	J$ 732
After	2,671	1,757
Change a/	1,693	1,025

a/ Total increased investment required at the farm level is estimated to be J$667 in the Two Meetings area, and J$577 in the Pindars area for soil conservation treatment and average annual increase in operating capital.

NOTES ON BENEFITS AND COSTS OF PROJECT

Costs

(1) Machinery and labor to build terraces;

(2) Waterway construction;

(3) Loss in crop production during construction or yield reduction initially after treatment (no real estimate available);

(4) Increased technical assistance to carry out the program;

(5) Additional feeder roads required to move commodities to market;

(6) Added facilities for commodity marketing and input supply.

Benefits

(1) Increased intensity of land use, increased productivity, and increased farm income;

(2) Increased labor requirement and use efficiency;

(3) Increased quantity and quality of food for household consumption;

(4) Minimized soil erosion and cost of sedimentation;

(5) Reduced food imports and foreign exchange requirements;

(6) Agriculture made more attractive as an occupation and, in turn, urban migration reduced;

(7) Demonstration unit created for other watersheds in the country;

(8) Land made easier to farm and more susceptible to mechanization;

(9) A large number of farmers and technicians trained in soil conservation and improved farming systems--training transferable to other areas.

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A P P E N D I X 1

Data and Budgets Used in Economic Evaluation of Project Impact at Farm Level

TABLE 1

Farm Gate Prices for Select
Agriculture Commodities - 1976

CROP	PRICE ¢/lb.	CROP	PRICE ¢/lb.
Legumes		**Other Tubers**	
Gungo Peas	47	Bitter Cassava	10
Red Pea	63	Sweet Cassava	10
Cow Pea	43	Cocoes	14
		Dasheen	9
Vegetables			
Carrot	15	**Miscellaneous**	
Cucumber	11	Pineapple	13
Cabbage	32	Paw-paw	12
Iceberg Lettuce	25	Hybrid corn	6
Pumpkin	11	Ordinary corn	6
Tomato	35	Plantain, Maiden	12
Onion	37	Ginger	51
		Forest Products	88¢/cu.ft.
Potatoes		Oranges	
Irish potato	22	Coffee	$7/box
Sweet potato	18	Bananas	$1.80/stem
		Plantain	$1.50/stem
Yams			
Negro Yam	17		
Yellow Yam	19		
Lucea Yam	15		

Source: Ministry of Agriculture and Fisheries - Kingston 1977.

TABLE 2

Base Farm Model, Yield Estimates and Gross Income
Using Traditional Production Practices

Crops	Units/Acre	Yield/Acre	Gross Income
Yams	tons	3.0	J$ 1,080.00
Irish Potatoes b)	tons	2.5	1,100.00
Inter Cropped red Peas	lbs.	300	189.00
Mixed crops			
Less intensive mixed crops			
(a) Coffee	boxes	20	140.00
(b) Bananas	stems (30 lb.)	50	90.00
(c) Plantains	stems (35 lb.)	40	60.00
(d) Oranges	boxes	40	60.00
Other crops			
Carrots	tons	3	900.00
Cabbage & lettuce e)	tons	2	1,160.00
Pumpkin	tons	2.5	550.00
Sugar cane	tons	15	300.00

b) Grown for the most part in the Two Meetings area

c) Grown for the most part in the Pindars area

TABLE 3

Estimated costs and Labour required for Crops in the traditional Small Farm Cropping System per acre a)

Crops	Material Cost J$	Labour Required	Labour Return	Total Cost
Yams and red peas	568.00	70	420.00	988.00
Potatoes and red peas	243.00	36	215.00	459.00
Carrots	60.00	31	186.00	246.00
Sugar cane	94.00	25	150.00	244.00
Mixed Crops				
Bananas	76.00	20	120.00	196.00
Coffee and plantain	112.00	41	246.00	358.00
Citrus	29.00	5	30.00	59.00
Combined mixed crop cost	72.00	22	132.00	204.00

Estimated return to crops

Crops	Estimated gross income	Total cost	Return to capital and land	Return to self-employed farmer
Yams and red peas	J$ 1,269.00	J$ 988.00	J$281.00	J$ 701.00
Potatoes and red peas	1,289.00	459.00	830.00	1,046.00
Carrots	900.00	246.00	654.00	840.00
Sugar cane	300.00	244.00	56.00	206.00
Mixed less intensive crop Coffee, plantain and citrus	350.00	204.00	146.00	278.00

a) Developed on the base of 50% level of use of materials and production labour used inthe improved crop production budgets.

TABLE 4

Potential Yields Assumed in Economic Analysis

On Bench Terraces	Units	
1. Red peas pure stand per crop	lb/acre	1000
2. Red peas inter cropped with yams per crop	"/acre	650
3. Yellow yams, saleable yams	tons/acre	6
4. Negro yams, saleable yams	tons/acre	8
5. Irish potatoes	lb/acre	9000
6. Carrots	lb/acre	8000

	Year	3	4	5	6	7-15
7. Oranges		100	200	300	350	350

	Year	1	2	3	4	5	6
8. Bananas stems		120	600	600	280	360	360

Plantains interplanted with coffee:	Year	1	2	3	4	5	6	7-15
9. Plantains stems		160	240	160	120			
10. Coffee Boxes				75	100	150	250	300

	Year	1	2	3	4	5
11. Sugar cane tons		30	35	35	35	30

TABLE 5

Yams (Yellow), Estimated Costs and Returns Per Acre Planted With Red Peas (two crops) 1,000 Hills of Yams Planted Per Acre of Bench Terraces - a)

	1st year	2nd year	Month
A. Labour Operations			
Yams (Yellow)			
Land preparation, digging mounds	$ 120	$ 120	December
Transport plants to field	24	24	December
Planting yams	30	42	December
Transport stakes to field	48	24	January
Staking	60	30	January
Forking between hills	100	100	January
Applying fertilizer	12	12	February
Wrapping Vines	24	24	Feb. - March
Weeding	150	120	February
Reaping	60	60	May
Pack and transport	12	12	May
Burying vine ends	30	30	May
Reap and transport yam heads	30	30	May
Strip vines	20	20	May
Red Peas (two crops)			
Digging holes and planting	48 b)	48 b)	Jan. - July
Reaping, thresh and bagging	96 b)	96 b)	April - Oct.
Crop protection (spraying)	12 b)	12 b)	Feb. - August
Total labour cost	$ 876	$ 804	
Total labour required m/d	146	134	

	1st year	2nd year	Month
B. Materials			
Yam Heads, 5 cwt. @ $20	$ 1,000	-	
Stakes @ 40¢	400	200	
Fertilizer, 6 cwt. (6-8 - 2 7 @ $11)	66	66	
Red peas seed 40 lb @ $1/lb	80 b)	80 b)	
Insecticide and Fugicide red peas	40 b)	40 b)	
Total materials cost	$ 1,586	$ 386	
Sub-total - labour plus material cost (A+B)	$ 2,462	$1,190	
C. Other Costs			
Overhead costs, 10% of A	88	80	
Depreciation, 5% of B	79	19	
Return to management 15% (A+B)	369	179	
Total of other costs	$ 536	$ 278	
D. Total specified costs (A+B+C)	$2,998	$1,468	
E. Returns to labour and management (A+Management)	$1,245	983	
F. Return to capital investment & land			
6 tons of saleable yams @ 19¢/lb.	2,280	2,280	
1 ton of yam heads	c)	c)	
1,300 lbs (b) of red peas @ 63¢	819	819	
Total income	$3,099	$3,099	
Net income to capital and land	$ 101	$1,631	
Average net income to capital and land for 2 years		866	

a) All values rounded to nearest dollar

b) Doubled for two crops, one planted in January the other in July.

c) Available for sale as seed in addition to the 50 cwt. required for replanting in 2nd year when market is available, this would be a source of additional income.

TABLE 6

Yams (Negro); Estimated Costs and Returns Per Acre Planted With Red Peas (Two Crops), 1,000 Hills of Yams Planted Per Acre of Bench Terraces: a)

A. Labour Operations	1st year	2nd year	Month
Yams (Negro)			
Land preparation, digging mounds	$ 120	$ 120	December
Transport plants to field	24	24	December
Planting yams	30	42	December
Transport stakes to field	48	24	January
Staking	60	30	January
Forking between hills	100	100	January
Apply fertilizer	12	12	February
Wrapping vines	24	24	Feb. - March
Weeding	150	120	February
Reaping	60	60	May
Pack and transport	12	12	May
Burying vine ends	30	30	May
Reap and transport yam heads	30	30	May
Strip vines	20	20	May
Red Peas (two crops)			
Digging holes and planting	48 b)	48 b)	Jan. - July
Reaping, thresh and bagging	96 b)	96 b)	April - Oct.
Crop protection (spraying)	12 b)	12 b)	Feb. - August
Total labour cost	$ 876	$ 804	
Total labour requirement m/d	$ 146	$ 134	
B. Materials			
Yams heads 80 cwt. @ $20 each	$ 1,600	-	
Stakes @ 40¢	400	$ 200	
Fertilizer, 6 cwt. (6-8-27) @ $11	66	66	

	1st year	2nd year	Month
B. Materials contd.			
Red bean seed 40 lbs @ $2 / lb	$ 80 b)	$ 80 b)	
Insecticide & fungicide, red peas	40 b)	40 b)	
Total materials cost	$2,186	$386	
Sub-total labour plus material cost (A+B)	$3,062	$1,190	
C. Other costs			
Over head costs, 10% of A	$ 88	$ 80	
Depreciation, 5% of B	109	19	
Return to management 15% of (A+B)	459	179	
Total of other costs	$656	$278	
D. Total specified costs (A+B+C)	$3,718	$1,468	
E. Returns to labour and management (A + Management)	$1,335	$ 983	
F. Returns to capital investment & land			
8 tons of saleable yams @ 17¢/lb.	$2,720	$2,720	
2 tons of yam heads @ 20¢/lb.	c)	c)	
1,300 lbs of red peas @ 63¢/lb. b)	819	819	
Total income	$3,539	$3,539	
Net income to capital and land	-189	2,071	
Average net income to capital and land for 2 years		$ 941	

a) All value rounded to the nearest dollar

b) Doubled for two crops one planted in January, the other in July

c) Available for sale as seed in addition to 4 tons required for replanting in 2nd year. When market is available, this would be a source of additional income.

TABLE 7

Irish Potatoes and Red Peas:
Estimated Costs and Return
Per Acre on Bench Terraces: a)

A. Labour Operation	Quantity	Value	Month
Potatoes			
Land preparation, cutting furrows etc.	20 m/d	$ 120	December
Planting	5 m/d	30	January
Applying fertilizer	1 m/d	6	January
Weeding and moulding	8 m/d	48	April
Crop protection (spraying)	6 m/d	36	March - April
Reaping	8 m/d	48	June
Select, collect and transport to store	8 m/d	48	June
Red Peas			
Digging holes and planting	6 m/d	36	January
Reaping, thresh and bagging	8 m/d	48	April
Crop protection (spraying)	1 m/d	6	Feb. - March
Total labour cost		$ 426	
Total labour requirement	71	-	
B. Materials			
Seed potatoes, @ $15/bag	15 bags	$ 225	
Fertilizer, 12-24-12	15 cwt.	$ 165	
Insecticide and Fungicide, 6 applications	6	36	
Red pea seed	40 lbs.	40	
Insecticide and fungicide for peas	-	20	
Total materials cost		$ 486	
Sub-total labour plus material cost (A+B)		$ 912	

	Quantity	Value	Month
C. Other Costs			
Overhead cost, 10% of A		$ 43	
Depreciation, 5% of B		24	
Return to management, 15% of (A+B)		137	
Total of other costs		$ 204	
D. Total specified costs (A+B+C)		$ 1,542	
E. Return to labour and management (A+Management)		$ 563	
F. Return to capital investment and land			
Income: Potatoes, @ 22¢ / lb	9000 lbs.	$ 1,980	
Red peas, @ 63¢ / lb	650 lbs.	410	
Total income per acre		$ 2,390	
Net income to capital and land (income - D)		$ 848	

a) All values rounded to the nearest dollar. Crop occupys the crop land 6 months.

TABLE 8

Carrots: Estimated Costs and Returns Per Acre Planted in Pure Stand on Bench Terraces (a)

	Quantity	Value	Month
A. Labour Operations			
Land preparation, refine and furrow	10 m/d	$ 60	October
Planting	6 m/d	36	November
Apply Fertilizer	2 m/d	12	November
Weeding, thinning and moulding	30 m/d	180	Nov. - Jan.
Reaping	6 m/d	36	February
Grading and bagging	5 m/d	30	February
Crop Protection spraying	3 m/d	18	Nov. - Jan.
Total labour cost		$ 372	
Total labour requirements, m/d	62 m/d	-	
B. Materials			
Seed	4 lb.	28	
Fertilizer 12-10-18	5 cwt	55	
Chemicals	12 lb.	36	
Total material cost		$ 119	
Sub-total labour plus materials (A+B)		$ 491	
C. Other costs			
Overhead costs, 10% of A		$ 37	
Depreciation, 5% of B		6	
Return to management, 15% of A+B		74	
Total of other costs		$ 117	
D. Total specified costs (A+B+C)		$ 608	
E. Return to labour and management (A+Mgmt.)		$ 446	
F. Return to capital investment and land			
Income per acre @ 15¢ / lb.	8,000 lb.	$1,200	
Net income to capital and land (income - D)		$ 592	

(a) Assume crop occupys land 6 months. Values rounded to the nearest dollar.

TABLE 9

Red Peas: Estimated Costs and Returns Per Acre Planted In a Pure Stand on Bench Terrace (a)

	Quantity	Value	Month
A. Labour Operations			
Land preparation, refine and furrow	5 m/d	$ 30	July - December
Planting and covering	10 m/d	60	July or Nov.
Applying Fertilizer	1 m/d	6	July or Nov.
Weeding	10 m/d	60	July - Sept. or Nov. - Jan.
Crop protection	5 m/d	30	July - Sept. or Nov. - Jan.
Reaping	4 m/d	24	Sept. or Jan.
Shelling and sifting	4 m/d	24	Sept. or Jan.
Bagging and transport	2 m/d	12	Sept. or Jan.
Total labour cost	-	$ 246	
Total labour requirement	41 m/d	-	
B. Materials			
Seed (32 qts)	64 lb.	64	
Fertilizer 2 cwt. @ $11	2 cwt.	22	
Insecticide		22	
Total materials cost		$ 108	
Sub-total plus material cost (A+B)		$ 354	
C. Other costs			
Overhead costs, 10% of A		25	
Depreciation, 5% of B		5	
Return to management, 20% of A+B		71	
Total of other costs		$ 101	
D. Total specified costs (A+B+C)		$ 455	
E. Return to labour and management (A+Mgmt.)		$ 317	

	Value
F. Return to capital investment and land	
Income per acre 1,000 lb. @ $63	$ 630
Net income to capital and land (income-D)	$ 175

(a) Assume each crop occupys land 6 months planted in July or November. Values rounded to nearest dollar.

(b) Because of risk, management return is raised to 20%.

TABLE 10

Bananas: Costs and Returns Per Acre, Planted Soil Conservation Treated Land With Hillside Ditches and Individual Basins (600 plants/acre) a)

	YEAR					
	1	2	3	4	5	6
A. Labour Operations						
Dig holes for planting	90					
Cut pegs and line	18					
Clean and treat plants	12					
Head and drop suckers	14					
Plant and cover	14					
Supplying	15					
Apply fertilizer	18	18	18	18	18	
Hand Weeding	120	60	30	30	30	30
Pruning and field sanitation	12	12	12	12	12	12
Clean ditches		40	40	40	40	40
Mireage Injector oil	6	12	12	12	12	12
Kepone and slug bait	3	6	6	6	6	6
Pre-harvest bunch care	5	10	10	10	10	10
Reaping 4¢ / stem	5	24	24	20	14	14
Heading from field	6	30	30	24	18	18
Field handling or wrapping	5	24	24	20	14	14
Transport to boxing 6¢ / stem	7	36	36	28	22	22
Total labour cost	$350	$272	$242	$220	$196	$178
Total labour requirement m/d	58	45	40	37	33	30

	1	2	3	4	5	6
B. Material costs						
Plants $15 per 100	105					
Fertilizer 6 cwt. 12-4-28 2 cwt. S/A	88	88	88	88	88	88
Nemagon 2 gallons per yr. @ $10	10	20	20	20	20	20
Kepone 60 lb. @ 50¢	-	30	30	30	30	-
Slug bait 20 lbs.	-	3	3	3	3	-
Total material costs	$203	$141	$141	$141	$141	$141
Total labour plus material costs	$553	$413	$383	$351	$337	$286
C. Other costs						
Overhead costs, 10% of A	35	27	24	22	20	18
Depreciation, 5% of B	10	7	7	7	7	5
Returns to management 10% of (A+B)	55	41	38	35	34	29
Total other costs	$100	$ 75	$ 69	$ 64	$ 61	$ 52
D. Total specified costs (A+B+C)	$663	$488	$452	$415	$393	$338
E. Returns to labour and management (A+Management)	$405	$313	$311	$255	$230	$207
F. Returns to capital investment and land sale of bananas @ $1.80/stem	$215	$1080	$1080	$864	$648	$648
Net income to capital and land (income-D)	- $448	$592	$628	$449	$255	$310
Average annual net income (6 years)	$298					

TABLE 11

Coffee Interplanted With Plantains: Costs and Returns Per Acre Planted on Land After Prepared With Hillside Ditches and Individual Basins

	YEAR						
	1	2	3	4	5	6	7-15
A. Labour Operation							
Coffee							
Land preparation, line and dig holes	$112						
Apply coffee planting mixture	24						
Planting seedlings	18						
Applying Fertilizer	12	12	12	12	12	12	12
Billing	20	20	20	20	20	20	20
Crop Protection Spraying	18						
Bending and staking coffee	24						
Reaping Coffee $2/box			150	200	300	500	600
Plantains							
Land preparation, line and dig holes	65						
Treat and plant suckers	24						
Application of Kepone		3	3				
Reaping Plantains @ 3¢/stem		5	7	5	4		
Total labour cost	$317	$ 40	$192	$237	$336	$532	$632
Total labour requirement m/d	53	7	32	40	56	89	105
B. Materials							
Coffee							
Coffee seedlings (500)	12						
Coffee planting material	25						
Fertilizer 10-5-20 @ $11	50	33	111	176	176	176	176
Sulphate of ammonia, @ $11	22	22	44	44	44	44	44
Grammoxone, 1 gallon	10	10	10	10	10	10	10
Malathion & Shell white oil	8	8	8	8	8	8	8

	1	2	3	4	5	6	7-15
Plantains							
Plants (400)	12						
Fertilizer							
Nemagon, 2 gallons per year	10	10					
Kepone			24	24			
Total material costs	$197	$ 83	$197	$262	$238	$238	$238
Sub-total labour plus material cost (A+B)	$514	$123	$389	$499	$574	$770	$870
C. Other costs							
Overhead costs 10% of A	$ 32	$ 4	$ 19	$ 24	$ 34	$ 53	$ 63
Depreciation, 5% of B	10	4	10	13	12	12	12
Return to Management 10% of (A+B)	51	12	39	50	57	77	87
Total other costs	$ 93	$ 20	$ 68	$ 87	$103	$142	$162
D. Total specified costs (A+B+C)	$607	$143	$457	$586	$677	$912	$1,032
E. Return to labour and Management (A+Management)	$368	$ 52	$231	$287	$393	$609	$719
F. Return to Capital investment - and land							
Income per acre: Coffee @ $7/box			$525	$700	$1,050	$1,750	$2,100
Plantains @ $1.50 per box		$240	$360	$240	$ 180	-	-
Total income	-	$240	$885	$940	$1,230	$1,750	$2,100
Net income to Capital and land (income-D)	$-607	$ 97	$428	$354	$ 553	$ 838	$1,068
Average net income per acre (15 years)	$752						

TABLE 12

Sugar Cane: Estimated Costs and Returns Per Acre, Non-irrigated Manual Tillage a)

	YEAR				
	1	2	3	4	5
A. Labour Operation					
Land preparation (trenching)	$ 210				
Planting	30				
Supplying	2	10	10	10	10
Applying Fertilizer, 1 m/d	6	6	6	6	6
Crop Protection (spraying)	12	18	18	18	18
Moulding	50	50	50	50	50
Cleaning Trenches	-	40	40	40	40
Reap and Transport to roadside $3/ton	90	105	105	105	90
Load for transport @ $1/ton	30	35	35	35	30
Total labour cost	$ 430	$264	$264	$264	$244
Total labour requirement m/d b)	72	44	44	44	41
B. Materials c)					
Purchase tops and transport 10,000	40				
Herbicides	15	15	15	15	15
Fertilizer 6 cwt. 12-10-18	66	66	66	66	66
Transport $3/ton	90	105	105	105	90
Total material cost	$ 211	$186	$186	$186	$171
Sub-total labour plus material cost (A+B)	$ 641	$450	$450	$450	$415
C. Other costs					
Overhead cost, 10% of A	$ 43	$ 26	$ 26	$ 26	$ 24
Depreciation, 5% of B	32	23	23	23	22
Return to management, 10% of A+B	64	45	45	45	41
Total other costs	$139	$ 94	$ 94	$ 94	$ 87

	1	2	3	4	5
D. Total specified costs (A+B+C)	$780	$544	$544	$544	$502
E. Return to Labour and Management (A+Management)	$497	$358	$358	$358	$285
F. Return to capital investment					
Income per acre @ $20/ton	$600	$750	$750	$750	$600
Net income to capital and land (income-D)	$-180	$206	$206	$206	$ 98
Average net income per acre (5 years)	$107				

(a) all values rounded to the nearest dollar

(b) Labour at $6 per man-day

(c) Include transport cost

TABLE 13

Oranges: Estimated Costs and Returns Per Acre Planted in a Pure Stand on Land with Hillside Terrace and Individual Basins or Orchard Terrace

	YEAR					
	1	2	3	4	5	6-15
A. Labour Operations						
Land preparation for planting	$ 34					
Planting	30					
Care immediately after planting	36					
Applying fertilizer	3	6	6	6	6	6
Crop Protection (spraying)	25	30	30	30	30	30
Weed control		12		12		
Cut, mulch and cover mounds	12	12	12			
Pruning	6					
Reaping	-	-	5	10	15	18
Total labour cost	$146	$ 60	$53	$ 58	$ 51	$ 54
Total labour requirement m/d b)	24	10	9	10	8	9
B. Materials						
Plants and Transportation @ 20¢	22					
Fertilizer: 12-24-12, 1 cwt.	11	11	11	11	22	22
S/A, 1 cwt.		11	11	11	22	22
Herbicides and insecticides						
Grammoxone		6	6	6	3	3
Karmex	18					
Dieldrin and Sluggit	4	4	4	4	4	4
White Oil & Malathion	10	10	10	10	10	10
Total of material costs (cash cost)	$ 65	$ 42	$ 42	$ 42	$ 61	$ 61
Sub-total labour plus material cost (A+B)	$211	$102	$ 95	$100	$112	$115
C. Other costs						
Overhead costs, 10% of A	$ 15	6	5	6	5	5
Depreciation, 5% of B	3	2	2	2	3	3
Return to Management 10% of A+B	21	10	10	10	11	12
Total other costs	$ 33	$.18	$ 17	$ 18	$ 19	$ 20

	1	2	3	4	5	6 -15
D. Total specified costs (A+B+C)	$244	$120	$112	$118	$131	$135
E. Return to labour and management (A+Management)	167	70	70	68	62	66
F. Returns to capital investment and land						
Income per acre @ $1.50/box			150	300	450	525
Net income to capital (income-D)	-244	-120	38	182	319	390
Average net income over productive life of 15 years	$246					

(a) All values rounded to the nearest dollar

(b) Labour at $6 per man/day.

TABLE 14

Summary of Costs and Returns for Reforestation (a)

		Pulp	Lumber
A.	Total labour cost	$ 337	$ 407
B.	Total material cost	34	34
C.	Sub-total (A+B)	$ 371	$ 441
D.	Other costs		
	Overhead 10% of A	34	41
	Management 10% of (A+B)	37	44
		71	85
E.	Total specified cost	$ 442	$ 526
F.	Return to labour and management	$ 374	$ 451
	Return to labour and management per year	37	45
	Return to capital and land		
	Income @ 88¢ / cu. ft.	$ 704	$3,080
G.	Net income to capital and land	$ 262	$2,554
	Average net income to capital and land per year	$ 26	$ 128

(a) Labour charge of $5.30 per day, or Government wage rate used in cost estimate for soil conservation treatments.

TABLE 15

Estimated Cost Per Acre For Reforestation With Carib Pine of Land in The Pindars and Two Meetings Watersheds - May 1977

ITEM	UNITS	J$/acre (b)
Establishing cost		
clearing of site	$/acre	$65
Planting (a)		
Digging holes	5/100	34
Transporting to site	10/100	7
Heading plants to site	3/100	20
Carrying plants and placing in holes	$2.50/100	17
Planting trees	2/100	14
Cost of plants	$5.00/100	34
Weeding first year		53
Total establishment cost		$ 244
Maintenance cost		
Second year, one weeding	10/m/d/acre	53
Third year, one weeding	10/m/d/acre	53
Pruning 6th year	4 m/d/acre	21
Thinning, year 8 (only if for lumber)	13 m/d/acre	70
Total maintenance cost		$ 197
Total establishment plus maintenance if for lumber		J$ 441
Total establishment plus maintenance if for pulp		J$ 371

(a) Values rounded

(b) Based on 680 Carib Pine Trees planted per acre

(c) Labour cost $5.30 per man day

TABLE 16- NET RETURNS PER ACRE AFTER SOIL CONSERVATION TREATMENT a/
FOR CROPS USED IN FARM MODELS

	YEARS J$/acre														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Annual Crops	1609	1609	1609	1609	1609	1609	1609	1609	1609	1609	1609	1609	1609	1609	1609
Oranges	-77	-50	108	250	381	456	456	456	456	456	456	456	456	456	456
Coffee and Plantain	-239	149	659	641	946	1447	1787	1787	1787	1787	1787	1787	1787	1787	1787
Sugar Cane	317	564	564	564	383	317	564	564	564	383	317	564	564	564	383
Pulp	-34	0	0	0	0	0	0	0	0	636	-34	0	0	0	0

a/ Returns to labor, capital, land and management or for a self employed farmer.

Source: Table 12, P. J-20 and Appendix J, PP J-21 - 48.

TABLE 17 - NET INCOME INCREASE FOR THE FARM MODEL IN THE TWO MEETING AREA (FIGURES IN J$)

	YEARS														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Non-treated land and Bench Terraces Annual Crops .67A	1078	1078	1078	1078	1078	1078	1078	1078	1078	1078	1078	1078	1078	1078	1078
Orchard Terraces Oranges .09.A	-[illegible]	-5	10	23	34	41	41	41	[illegible]	41	41	41	41	41	41
Hillside Ditches and Basin Coffee and Plantain 1.1A	-263	164	725	705	1041	1592	1966	1966	1966	1966	1966	1966	1966	1966	1966
Reforestration Pulp .5A	-17	0	0	0	0	0	0	0	0	318	-17	0	0	0	0
Conservation Treatment Maintenance (labor)	-	78	78	78	78	78	78	78	78	78	78	78	78	78	78
Total Net Income after Treatment	791	1315	1891	1884	2231	2789	3163	3163	3163	3481	3146	3163	3163	3163	3163
Net Income before Soil Conservation Treatment[a]	978	978	978	978	978	978	978	978	978	978	978	978	978	978	978
Increase in Net Income	-187	337	913	906	1253	1811	2185	2185	2185	2503	2168	2185	2185	2185	2185

a/ Source: Table 9, P. J. 15

TABLE 18 - NET INCOME INCREASE AND ON FARM INVESTMENT AND MAINTENANCE COST OF SOIL CONSERVATION TREATMENTS FOR THE FARM MODEL IN THE TWO MEETINGS AREA

	YEARS														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Increase in Net Income	-187	337	913	906	1253	1811	2185	2185	2185	2503	2168	2185	2185	2185	2185
Added Investment	1149 a/														
Maintenance Cost		78	78	78	78	78	78	78	78	78	78	78	78	78	78
Net Income Increase less Treatment Cost	-1336 (-187) b/	259	835	828	1175	1733	2107	2107	2107	2425	2090	2107	2107	2107	2107

a/ Source Table 11, P. J 19, and previous table 2, full cost, producers portion would be 25% or $287 per farm.

b/ Without treatment investment

RATE OF RETURN IS OVER 50%

TABLE 19 - NET INCOME INCREASE FOR THE FARM MODEL IN THE PINDERS AREA

	YEARS														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Non-treated land and Bench Terraces Annual Crop .67A	1078	1078	1078	1078	1078	1078	1078	1078	1078	1078	1078	1078	1078	1078	1078
Orchard Terraces Oranges .09A	-7	-5	10	23	34	41	41	41	41	41	41	41	41	41	41
Hillside Ditches and Basins Sugar 1.1A	349	620	620	620	421	349	620	620	620	421	349	620	620	620	421
Reforestration Pulp .5A	-17	0	0	0	0	0	0	0	0	318	-17	0	0	0	0
Conservation Treatment Maintenance (Labor)	-	78	78	78	78	78	78	78	78	78	78	78	78	78	78
Total Net Income After Treatment	1403	1771	1786	1799	1611	1546	1817	1817	1917	1938	1829	1817	1817	1817	1618
Net Income Before Conservation Treatment a/	732	732	732	732	732	732	732	732	732	732	732	732	732	732	732
Increase in Net Income.	671	1039	1054	1067	879	814	1085	1085	1085	1206	987	1085	1085	1085	886

a/ Source Table 9, P. J15.

TABLE 20 - NET INCOME INCREASE AND ON FARM INVESTMENT AND MAINTENANCE OF COST OF SOIL CONSERVATION TREATMENT FOR THE FARM MODEL IN THE PINDERS AREA

	YEARS														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Increase in Net Income	671	1039	1054	1067	879	814	1085	1085	1085	1204	797	1085	1085	1085	886
Added Investment in Treatment	1149 a/														
Maintenance Cost		78	78	78	78	78	78	78	78	78	78	78	78	78	78
Increase Income Minus Added Cost	-478 (671) b/	961	976	989	801	736	1007	1007	1007	1126	719	1007	1007	1007	808

a/ Source: Table 11, P. J 19 and previous Table 4, Full cost, producers portion would be 25% or $287 per farm.

b/ Without treatment investment

RATE OF RETURN IS OVER 50%

TABLE 21 - WEIGHTED AVERAGE NET INCOME INCREASE FOR FARM MODELS IN THE PINDERS AND TWO MEETINGS WATERSHEDS

	YEARS														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Increase in Net Income Pinders	671	1039	1054	1067	879	814	1085	1085	1085	1204	797	1085	1085	1085	886
Two Meetings	187	337	913	906	1253	1811	2185	2185	2185	2503	2168	2185	2185	2185	2185
Weighted Ave.[a/]	385	805	1007	1013	1004	1146	1452	1452	1452	1637	1254	1452	1452	1452	1024
Investment in soil conservation treatment per farm[b/]	1149														
Maintenance of Treatment		78	78	78	78	78	78	78	78	78	78	78	78	78	78
Increased Farm Income Minus Added Cost	-764	727	929	935	926	1068	1374	1374	1374	1559	1176	1374	1374	1374	946

a/ Weighted on the basis of 2/3 of the area in farms will be in the Pinders area 1/3 in the Two Meetings area after the soil conservation treatment.

b/ Full cost of investment, for financial analysis this would be $278 to producer. Table 11, P J9

PROPOSED PROJECT FOR PINDARS RIVER AND TWO MEETINGS WATERSHEDS
Integrated Rural Development

ANNEX K

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THE SOIL CONSERVATION PROGRAM

INTRODUCTION

The erosion control activities discussed below form the basis upon which this entire program is based--how erosion will be controlled and water resources preserved. For definitional purposes erosion control is subdivided into three elements: (1) soil conservation, including terracing, ditching, waterways, pastureland; (2) forestation; and (3) engineering works, including road and track construction or rehabilitation and stream and river control. The basic investigative work for these activities was undertaken by the UNDP/FAO from 1968 to 1975 and resulted in a project proposal.1/ Their work on soil conservation is summarized in the following paragraphs and except for some modifications in project cost estimates and an accelerated timetable for implementation, it remains the technical guideline for all of the erosion control activities.

BACKGROUND

UNDP/FAO Activities at Smithfield

The UNDP/FAO Forestry Development and Watershed Management project set up four demonstration areas in soil conservation. Six major soil conservation treatments and seven types of waterways were introduced in these areas. Their cross-sectional views and applications are shown in Appendixes 3, 4, and 5.

Among these demonstration areas, Smithfield is the most comprehensive one, covering 110 acres. In the last eight years, not only has it demonstrated the beneficial effects of erosion control in an area subject to 130 inches of annual rainfall, but crop research has also demonstrated successful results in continuous cropping. For example, an acre of yams on terraces can yield a net return of J$750 a year. The Smithfield experience forms the base for the unit cost per acre of treatment for this project.

1/ FAO: DP/JAM/67/505 Technical Report 13/11, dated 1977, Forestry Development and Watershed Management in the Upland Regions--Jamaica--Project for the Rehabilitation and Development of the Pindars River and Two Meetings Watersheds. This publication with accompanying drawings and maps is available in LA/DR.

The experimental erosion plots in Smithfield also gave data on quantitative results of various land treatments. A four-year study in yams showed that the soil loss from untreated land was 54 tons/ac/yr, whereas from the bench terrace soil loss was only 7 tons. The preliminary result in bananas showed that conventional cultivation would lose 74 tons of soil/ac/yr, while the bench terracing plot lost around 6.7 tons.

The UNDP/FAO project at Smithfield has trained 120 erosion control technicians and has published lecture notes and a volume of specification tables for soil conservation treatments in which cubic yards of earth to be moved per acre are given for different slopes and different types and widths of terracing systems.

The Smithfield model has been followed by the Min Ag for treating 1,000 acres of a 2,600-acre Government-owned property at Kenilworth.

Watershed Studies

The UNDP/FAO project conducted a brief survey in 1973 to identify critical watersheds of the island. Of the 33 watersheds of Jamaica, 10 were identified as most critical, covering 250,800 acres.

The survey results were submitted to the Government to select the most critical two for rehabilitation. The Pindars River and Two Meetings watersheds were chosen due to their serious erosion problems, potential for agricultural development, and ample downstream interests in irrigation and domestic water supply.

Following the Government's decision to develop a project for these two watersheds, the UNDP/FAO team worked with the Government until 1975 to prepare the project proposal (Technical Report 13). Much of the detailed basic data from that report has been used for this PP.

In addition to providing the physical and socioeconomic data on the watersheds, the UNDP/FAO report proposed a plan of development that included: (1) soil conservation treatments, (2) watershed protection and rehabilitation, and (3) engineering.

Table 1 shows the major needs for soil conservation treatment listed in this report.

Table 1. Soil Conservation Needs in Pindars River and Two Meetings Watersheds (in acres)

Major Treatments	Pindars River	Two Meetings	
Bench terraces	2,776	1,824	
Orchard terraces	457	548	
Hillside ditches and basins	6,569	4,194	
Pastures with hillside ditches	961	389	
Subtotals	10,763	6,955	
TOTAL			17,718*

*This 17,718 total does not include land for forests (7,042 acres), roads and streams, etc. The total acreage of the two watersheds is 29,189 acres.

Source: UNDP/FAO Technical Report 13

Other aspects of the UNDP/FAO plan included road and track erosion control, reforestation and revegetation, some stream and river control work, and small check dams. This work was to be carried out by the Soil Conservation Unit of the Min Ag, but in cooperation with the Ministry of Public Works and the Forestry Department.

Pilot Project at Sandy River

Since 1975 the Government has undertaken a pilot rural development project at Sandy River, situated in the headwaters of the Pindars River wacershed. The pilot project's objective is "agricultural development based on sound principles of soil conservation." At the same time, the project has stressed improving the amenities of rural life and community infrastructure in the area.

The soil conservation work in the pilot project has been done by a Government-contracted tractor and by manual labor of local farmers at the Government's established daily rate (J$5.30). Up to the present, about 95 acres have been terraced and 75 acres cropped.

A field study of the pilot project established that:

(a) The farmers' acceptance of soil conservation work has been satisfactory, considering the fact that terraces cause a drastic change not only in the land surface but also in cultivation practices from traditional farming methods.

(b) The pilot project was established so that a better approach would be developed, which would encourage the farmers to maintain the terraces and waterways under the close supervision of the Min Ag field office.

(c) The field office needs to be strengthened, particularly by training staff to do the farm planning in cooperation with the farmers, and to put into operation a soil conservation and water runoff system.

THE PROGRAM

Introduction

Soil conservation activities will be the major component of the project. The activities will be carried out by the special soil conservation project unit that will report to the Min Ag's Southern Region director.

Scope of the Treatment

There are 29,189 acres of land in the Pindars River and Two Meetings watersheds. About 6.5% of the land in the two projects is on 5° slopes (8.6%) or less. About 15.6% of the land is on 30° (57.7%) slopes or greater and too steep for crop production: this should be put back into trees or other permanent vegetation. That leaves approximately 78% of the land area on slopes between 5° and 30°. This is the land that will require soil conservation treatment to reduce soil erosion. It is estimated that crop land accounts for nearly 60% of the land in the watersheds, or about 17,500 acres. Among the treatments that can be installed on the land on slopes between 5° and 30° are bench terraces, orchard terraces, hillside ditches, mini-convertible terraces, individual basins, and waterways.

Estimates are based on the maximum acreages that can be treated and on which conservation practices can be applied either by machine work or by hand labor.

There are approximately 24,760 acres to be treated in Two Meetings and Pindars River watersheds. Approximately 65% of the land is on slopes between 5° (8.6%) and 25° (46.6%). It is estimated that 17,718 acres of this area will require soil conservation treatments to reduce soil erosion.

Yardage calculations indicate that approximately 9.1 million cubic yards of earth has to be moved to construct the soil conservation systems. Of the total cubic yards to be moved, approximately 9.0 million will be moved by machine at a cost of J$0.28 per cubic yard, and 2.2 million by hand labor at J$1.33 per cubic yard. Hand labor requirements will create nearly 600,000 man days (m/d) of employment over the project's life and will be undertaken when possible during the dry season so as not to compete with labor requirements during crop production periods.

Efforts have been made to maximize the hand labor component in view of a GOJ interest in providing employment through this project. Several other factors weighed in that decision: (a) the cost element--manual labor is more expensive; (b) the time element--machine work will go faster; (c) the labor availability and management elements--labor is in relatively scarce supply considering the number of laborers needed; (d) the production element--the need is to treat the land quickly and put it back into production.

Experience gained by the Soil Conservation Unit during the past few years was used in determining yardage, man days required, equipment needs, and cost estimates. Soil depth and slope were used as the criteris in choosing soil conserva-

tion treatments. The acres to be treated by each of the specific treatments are summarized in Appendix 2. This appendix also indicates the cost of each of the different soil conservation treatments.

Differences in cost estimates for earth moved by machinery as compared to earth moved by hand labor are very significant. Earth to be moved by machine, estimated at 6,963,840 cubic yards at J$0.28/yd, costs J$1,949,875 as compared to earth moved by hand labor, which would cost J$2,890,692 for 2,173,453 cubic yards at J$1.33 per yard. This is almost a million dollars more, for less than one-third the yardage proposed to be moved by machinery. However, because of the large amount of steep land, only hand labor can be used on slopes above 30° to construct ditches and waterways and to follow up the work done by machinery, that is, to "clean up" the terracing work established by machinery.

IMPLEMENTATION

Preparatory Activities

After a comprehensive publicity campaign, the soil conservation staff of the project area should undertake the following preparatory work:

(a) Determine the priority areas or subwatersheds[1/] for implementation and eventually work out a yearly plan.

(b) Conduct a reconnaissance survey from existing air photos and field checks to determine requirements for taking care of water runoff from the soil conservation projects and from the roads in the priority areas.

(c) Together with extension officers, interview farmers on conservation and crop needs, and on labor supply and availability.

(d) Do farm planning to include soil conservation practices and crop planning, and set up small demonstration plots at the watersheds.

The soil conservation staff in the field should always attempt to treat relatively large and contiguous areas as one block, for efficiency's sake.

[1/] The UNDP/FAO project produced maps on subwatersheds and identified two pilot areas.

Layout and staking

Layout and staking of land treatments, waterways, and farm roads should be done continuously from farm to farm and must always be ahead of the tractor and farmers' work groups. The layout and staking work is particularly important, as it controls and streamlines the operation of the soil conservation activities.

A survey crew should on the average stake out at least 1.0 acre a day.

No construction work should be carried out without staking on the ground, to ensure the quality of the work.

Construction and Supervision

Machine Work

About 11,760 acres will be treated for various conservation measures by machine. The total soil to be moved by hand and machinery, including waterways and cisterns, is estimated at 9,137,293 cubic yards. The consultant on equipment has calculated that with eight tractors working about 3,000 hours per machine annually, 6.96 million cubic yards could be excavated so that terraces and other treatments could be constructed on the approximately 11,760 acres during the four-year period. This would leave a balance of 2,173,453 cubic yards to be excavated by manual labor. Each tractor should work 12 hours a day, 6 days a week over an average 9-month period to account for the rainy seasons, with two operators for a machine, each working a 6-hour shift.

The supervision work, therefore, should also be 12 hours in two shifts a day for each of the eight machines. Two headmen for each machine should be sufficient. They should be equipped with hand levels. The team's field assistant, while proceeding to stake out other land, should come back from time to time to help check final gradients. The output per day per machine should be 1.0 to 1.5 acre on the average. Only a skeleton supervisory staff will be needed on the sixth day if the work is staked ahead of time.

Hand Construction

Manual labor will be used for treating about 6,000 acres of land totaling 2,173,453 cubic yards of dirt. Assuming one man in one day could cut and fill four cubic yards, a total of 543,363 man days are needed in the four-year project period, averaging 566 men per day working in the two watersheds for 240 days per year.

The finishing and riser protection (grass planting) work for machine-built treatments is estimated at a total of 93,295 man days. This will need another 97 men [1] per day. Including this, the grand total for soil conservation is 663 men needed daily on a 240-day basis. Most of the hand labor will work a 5-day week, but jobs will be laid out so that payment is based on work accomplished.

For supervision of manual construction work, one headman looks after 24 to 28 persons. Twenty-four headmen from 12 manual work teams could supervise 570 to 670 persons.

Where possible, the manual labor required for these activities will come from residents of the region. In particular, the farmer whose land is being treated will be given the opportunity to work on his land and be paid a minimum wage. This will provide the farmer with an alternate source of income while his land is out of production.

It is also possible to offer the farmer the option of carrying out the treatment without the use of machinery; that is, the surveyors can survey and stake his land, and then agree on the treatments to be undertaken, on the amount of earth to be moved, and on a cash reimbursement per cubic yard of earth moved. Several variations of this scenario are possible, including a combination of machinery and manual labor. The point is, a fixed amount reimbursement approach is feasible, it gives the farmer an opportunity to carry out and be paid for all or a portion of the soil conservation measures, and also puts a ceiling on reimbursements to keep costs down.

Machine and Worker Arrangements

The working sequence of the machines should be planned sufficiently in advance of the real operation to maximize the use of the machines. Access roads should be cut before the actual implementation of the conservation work. The farmers in the proposed treatment area should agree on the schedule of the operation and they should be well organized to do manual work. If laborers are brought from other sources, as the case may be, transportation or camp facilities should be provided.

Period of Implementation

The project is planned for four years, plus six months pre-project for planning and training.

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[1] This figure can be reduced to about 30 men per day if hand rollers and seeding machines are used.

Incentives for the Staff

The staff recruited for the project, including all field staff, should be given incentives. Since the success of the project will depend chiefly on staff morale, they should be offered such incentives as:

- An increased salary or upward reclassification
- Permanent employment status
- Pay for overtime work
- Special allowances
- A lump-sum annual bonus based on performance
- Housing
- Compensatory time off

MAINTENANCE OF CONSERVATION WORK

It cannot be overemphasized that maintenance work should be properly sustained after land treatments are completed. The first two years are critical, especially during rainy seasons. Thereafter, the soils are more settled and maintenance is much easier. Failures of soil conservation efforts in other countries and in Jamaica have seldom been due to inadequate design or construction; they have come from poor maintenance and negligence.

The Government will organize special inspection teams to oversee maintenance work. During construction, riser compaction and stabilization will have to be emphasized. The techniques of using soil-binding chemicals and hydro-seeding on terrace risers should be fully developed to keep maintenance work to a minimum.

One lesson from other countries' experience is that terraces being intensively cultivated are usually maintained maintained much better than those left fallow for a period of time. With crops on the terraces, the farmer sees them frequently and he tends to detect and repair small breaks as soon as they occur, not waiting until serious damage occurs. This tendency should be taken into serious consideration when cropping systems or farm plans are developed.

Loans will be made available during the first two years to provide for necessary maintenance. Of the actual costs of the soil conservation treatments, 25% will eventually be paid by the farmer. Any necessary loans for maintenance work during the first two years should be added to that for eventual repayment.

INSTITUTIONAL REQUIREMENTS

Soil Conservation Unit

In 1973 the Soil Conservation Unit was established in the Min Ag under the Agricultural Engineering Division. According to its 1976 annual report, the unit has 87 positions, of which the following 66 have been filled:

1 Chief soil conservation officer
3 Professional staff
22 Subprofessional staff
40 Headmen

However, the unit must be greatly expanded to carry out increased responsibilities. The accent will be on the following:

(a) Training: The proposed Integrated Rural Development project will assist in building up the Soil Conservation Unit by offering training both in-country and abroad, and by recruiting more professional staff, particularly in the following fields:

Soil conservation engineers: small structures
Agricultural economists: land use and soil conservation
Agricultural engineers: irrigation of sloping land
Soil conservationists: farm and watershed planning.

(b) The project will help establish a permanent organization in the Min Ag. The Soil Conservation Unit will be enlarged and possibly established as a division or department in the Min Ag, to carry on work in other watersheds when this project is completed.

(c) Since the major portion of the proposed project is soil conservation, the unit will play a key role in implementing the project's operations.

Field Offices in the Project Area

In view of the limited number of trained personnel with experience in soil conservation in the Min Ag's Southern Region, a soil conservation unit will be established in that region. This unit will establish two field offices (one in each watershed) that in turn will direct project activities. The unit will be guided by a special committee including representatives from the Southern Region and from local institutions. Every effort will be made to involve the local people in the planning process, including the selection of

areas to be treated, with consideration given to farmers' needs and willingness to participate. The temporary field offices will operate only for the duration of the project, and then move to other watersheds.

To carry out a complex task quickly and efficiently the soil conservation unit and its field offices will need a large degree of autonomy. The unit should be self-contained and responsible for all administrative matters such as payroll, machinery scheduling, and maintenance.

The following main tasks need close supervision to carry out this kind of conservation work:

Farmer interviews
Farm planning
Layout and staking of area to be treated
Supervision of construction
Maintenance inspection

Each machine should be operated in conjunction with a soil conservation team of eight people, comprised as follows:

1 Soil conservation officer (subprofessional)
1 Field assistant (using surveying level)
2 Headmen (one for each shift)
4 Surveying crewmen (chain man, rod man, etc.)

There should be eight machine teams. For manual work, twelve teams to supervise about 600 manual laborers daily are needed. Team personnel should be able to supervise both machine and manual work since both types of work will be carried out in the same area simultaneously.

Total conservation staff needed for 20 teams are therefore estimated as follows:

1 Project director (chief soil conservation officer)
2 Senior soil conservation officers (one for each watershed)
20 Soil conservation officers (team leaders)
20 Field assistants
40 Headmen
80 Survey crewmen (permanent senior laborers)
4 Supporting staff (secretary and clerk)

Staff should be recruited, trained, and assigned specifically to this project. However, the technical officers of the Central Soil Conservation Unit will also assist the project as required.

Personnel can be partly drawn from the unit's present staff. For any new recruits, the project should give priority to those with previous training.

TRAINING IN SOIL CONSERVATION

Local Staff Training

At the beginning of the project, two training courses will be conducted at Smithfield. One will be a four-week intensive course for soil conservation officers who have no previous experience. The other will be a two-week practical training course for headmen.

Both types of courses have been conducted since 1971. Lecture notes are available and the courses will need little additional preparation by the trainer.

Farmer Training

Training courses for farmers should be carried out in the watersheds from time to time, particularly on the following subjects:

- Terrace construction by manual labor
- Protection and maintenance of terraces and waterways
- Terrace cultivation (if small machines or tools pulled by draft animals are to be introduced) and conservation farming

These courses or field days should be conducted after the staff is trained. They can also be incorporated with other subjects--for example, farming systems, improved planting technology, marketing, and agricultural credit.

The goal is to train every farmer in these two watersheds in conservation farming. Special training opportunities should be given to the young people and some of them should be hired by the project to do part-time work after training.

Training Abroad

Two senior conservation officers and several outstanding sub-professional conservation officers should receive training abroad. In addition, fellowships should be given to professional staff at headquarters who will assist in the project.

The Min Ag should use this opportunity to establish a soil conservation organization for similar work in other watersheds. Therefore, the Ministry should recruit and train a permanent staff for headquarters and for the field, expecting them eventually to form a solid core for the future expanded

conservation organization.

Fellowships in the following fields are suggested:[1/]

Soil conservation engineering	18 months
Agricultural economics: land use and soil conservation	18 months
Irrigation (sloping land)	18 months
Watershed conservation and farm planning	18 months
Agronomic conservation measures	18 months
Integrated watershed and rural development planning	18 months
Soil conservation administration and legislation	6 months
Soil conservation district organization	6 months
TOTAL	120 months or 10 man years

In addition, short observation tours to other countries should be organized to observe similar work. Usually a three-month tour will be ample.

LIGHT EQUIPMENT AND SUPPLY REQUIREMENTS

Each watershed will require a movable field office (Port-a-Camp) which can be relocated as necessary as work progresses from one subwatershed to the next. This unit is a self-contained, collapsible house/office trailer that can be transported on a low-boy trailer.

Cost:

2 units @ US $20,000	US $ 80,000
Freight at 15%	12,000
Inflation/contingency @ 10%	8,000
TOTAL	100,000

[1/] Amount of total training will depend on overall project priorities.

Surveying equipment needed for planning and implementing the soil conservation program is estimated as follows:

80 Hand levels	US $110 ea	For 20 officers, 20 assistants, and 40 headmen
30 Dumpy levels	$200 ea)	For 20 teams, one each; the other 10 for related activities or for spares
30 Rods	35 ea)	
30 Steel tapes	30 ea)	
30 Soil augers	20 ea)	
500 Plastic surveying flags	$250 total	
10 Hand-operated rollers	$200 ea	For 8 machine teams and two spares
10 Shoulder jet-seeders	$375 ea	For seeding risers and two spares
20 Pocket stereoscopes	$ 15 ea	One for each team
20 Pocket compasses	$ 15 ea	One for each team

Cost:

Equipment total	US $ 24,000
Shipping @ 15%	3,600
Inflation @ 10%	2,400
Contingency a/	36,000
TOTAL	US $ 66,000

a/ For additional equipment--hand tools, etc.

APPENDIX 1. SUMMARY OF TREATMENTS AND COSTS

	Total Acres	By machinery[a/] Acres	Cubic Yds/ac	Cubic Yards	Excav Cost	By hand Acres	Yd/ac	Yards	Excav Cost	Total yards
Bench Terraces	4,600	3,995	1,162	4,642,190	J$ 1,299,813	605	774	468,270	J$ 622,799	5,110,460
Orchard Terraces	1,005	485	425	206,125	57,715	520	425	221,000	293,930	427,125
Hillside ditches and basins	10,763	7,000	253	1,771,000	495,890	3,763 5,382	160 104	602,080 559,728	800,766 744,438	2,932,808
Pastures with hillside ditches	1,350	280	250	70,000	19,600	1,070	160	171,200	227,696	241,200
Waterways	(17,718)[b/]			68,525	(19,187)[b/]			146,175	(194,441)[b/]	214,700
Cisterns (200) (dugouts)				206,000	57,680			5,000	6,650	211,000
TOTALS	17,718	11,760		6,563,840	J$ 1,930,688	5,958		2,173,453[c/]	2,696,279	9,137,293

a/ Needs 93,295 m/d for finishing work including compacting and grass planting on risers; that is, 97 men per day. That figure can be reduced to about 30 men per day if hand rollers and seeding machines are used.

b/ Not added. Total cost of finished waterways includes dirt moving, materials, seeding and planting of grass waterways, and labor. Total cost of waterways is about J$2.5 million.

c/ Hand labor: 2,173,453 at 4 cu yd/m/d = 543,363 m/d for 4 years, or 135,840 m/d/yr, or 566 men per day.

APPENDIX 2 SOIL CONSERVATION TREATMENTS, NUMBER OF ACRES, COSTS AND LABOR REQUIREMENTS FOR CONSTRUCTION AND MAINTENANCE ON THE TWO MEETINGS AND PINDARS WATERSHEDS. (All costs in J$.)

1. BENCH TERRACING COST ESTIMATE

A. Machine Work Cost Estimate

Acres	3995 (1162 cu yds/ac)[a/]
Cubic yards	4,642,190
Cash per yard	$0.28[b/]
Cost	$ 1,299,813
Cost per acre	$ 325.36

B. Hand Labor Cost Estimate

Acres	605
Cubic yards	468,270
Cost per yard	$1.33[c/]
Cost	$622,799
Cost per acre	$1,029.42

Hand Labor required 117,067 m/d

C. Labor for final preparation including vegetation protection of riser 15 m/d $79.50

-more-

a/ In implementation the slope and soil depth of each piece of land should be checked and measured and the treatment determined by using the Specification Tables For Soil Conservation Treatment (per acre basis).

b/ US $0.23 equals J$0.276. Use J$0.28.

c/ Average used of 4.0 cu yds/man/day at J$5.30 per day or J$1.33/cu yd.

ESTIMATED COST PER ACRE

A. Machine-built

14 ft wide on 18° slope	$ 325
Labor final preparation and grass planting (15 m/d)	79.50
Stepped waterway	350
Total cost per acre	J$ 754.50

B. Hand-made

8 ft wide on 24° slope including riser protection	$ 1029
Prefabricated waterway	220
Total cost per acre	$ 1249

2. ORCHARD TERRACING COST ESTIMATE

A. Machine work cost estimate

Acres	485 (425 cu yd/a
Cubic yards	206,125
Cost per yard	$0.28
Cost	$ 57,715
Cost per acre	$ 119

B. Hand labor cost estimate

Acres	520
Cubic yards	221,000
Cost per yard	$1.33
Cost	$293,930
Cost per acre	$565.25
Hand labor required	55,250 m/d

-more-

ESTIMATED COST PER ACRE

A. Machine-built

8 ft wide on 20° - 25° slope	$ 119
Labor for finishing (10 m/d)	53
Prefabricated waterway	220
Total Cost	$ 392

B. Hand-made

6 ft wide on 25° - 30°	565
Prefabricated waterway	220
Total Cost	$ 785[a]

3. HILLSIDE DITCHES AND MINI-CONVERTIBLE TERRACES AND INDIVIDUAL BASIN COST ESTIMATE

A. Machine Work Cost Estimate

Acres	7000
Cubic yards	1,771,000
Cost per yard	$0.28
Cost	$495,880
Cost per acre	$70.84

B. Hand Labor Cost Estimate

Acres	3763 (160 cu yds/ac)
Cubic yards	602,080
Cost per yard	$1.33
Cost	$800,766
Cost per acre	212.80
Hand labor required	150,520 m/d

-more-

[a] If grass waterways, $650/acre.

C. Individual Basins

Hand labor cost estimate:
Average 400 basins of 6 ft diameter, average 0.26 cu yds per basin

Acres	5382 (104 cu yds/ac)
Cubic yards	559,728
Cost per yard	$1.33
Cost	$744,438
Cost per acre	$138.32
Hand labor required	139,932 m/d

ESTIMATED COST PER ACRE

A. Hillside Ditches Mini-Convertible Basin

Machine Built

11 ft wide on 15° slope spacing (253 cu yd)	$70.84
Individual basins	138.32
Labor for Finishing (4 m/d)	21.20
Prefabricated Waterway	220.00
Total Cost	$450.36[a]

B. Hillside Ditches-Basins

6 ft wide on 22° - 25° slope, spacing 37 ft (160 cu yd)	$212.00
Prefabricated waterway	220.00
Individual Basins	138.32
Total Cost	$571.32[b]

[a] If grass waterways, $315.36/acre.

[b] If grass waterways, $435.32/acre.

4. HILLSIDES DITCHES FOR PERMANENT PASTURE COST ESTIMATE

A. Machine Work Cost Estimate

Acres	280
Cubic yards	70,000
Cost per yard	$0.28
Cost	$19,600
Cost per acre	$70.00

B. Hand Labor Cost Estimate

Acres	1070
Cubic yards	171,200
Cost per yard	$1.33
Cost	$227,696
Hand labor required	42,800 m/d

ESTIMATED COST PER ACRE

A. Machine-built

11 ft wide on 15° slope spacing 38 ft	70.00
Labor for finishing (4 m/d)	21.20
Prefabricated waterway	220.00
Total Cost	$311.20 a/

Hand-made

6 ft wide on 22° - 25° slope, spacing 37 ft	$213.00
Prefabricated waterway	220.00
	$433.00

a/ If grass waterways, $176.20/ac

5. WATERWAYS [a]

A. Machine work cost estimate to construct waterways

Cubic yards (6' x 1' x Total L.F.)	68,525
Cost per yard	$0.28
Cost	$19,187
Cost per acre (17,718)	$1.08

B. Hand labor cost estimate to construct waterways

Cubic yards	146,175
Cost per yard	$1.33
Cost	194,413
Cost per acre (17,718)	$11.00
Hand labor required	36,544 m/d

C. Stepped Waterway (concrete block structures)

Estimated cost per acre $350

D. Prefabricated Waterway (high velocity concrete channel)

Estimated cost per acre $220 [b]

E. Grassed Waterway (on slopes below 9°)

$85 [b]

[a] Weighted cost of waterways for the 17,718 acres is J$142.00/ac.

[b] Including material and dirt moving cost.

6. WATER CATCHMENTS

A. Machine work cost estimate

Number	200
Size 30 ft x 75 ft x 10 ft deep sloped 4:1 at one end	
Cubic yards per catchment	1030
Cubic yards	206,000
Cost per yard	$0.28
Cost	$57,680
Cost per catchment	$288.40

B. Hand labor cost estimate

Number	200
Cubic yards per catchment	25
Cubic yards	5000
Cost per yard	$1.33
Cost	$6650
Cost per catchment	$33.25
Hand labor required	1250 m/d

TOTAL ESTIMATED COST OF CATCHMENTS

Lining Material	$10,000
Machine work	57,680
Hand labor	6,650
Total Cost	$74,330
Cost per catchment	$371.65

7. LABOR REQUIREMENTS FOR ANNUAL MAINTENANCE

SOIL CONSERVATION TREATMENT	TOTAL ACRES	ANNUAL MAINT. M/D	TOTAL LABOR (M/D)
Bench Terraces	4,600	20 a/	92,000
Orchard Terraces	1,005	4	4,020
Hillside Ditches and basins	10,763	4	43,052
Pastures with Hillside Ditches	1,350	4	5,400
Catchments (200)	--	4	800
TOTAL	17,718		145,272

a/ Including waterways. This can be reduced greatly if compacting and seeding of risers are well done.

APPENDIX 3. SPECIFICATIONS AND APPLICATIONS OF SIX CONSERVATION TREATMENTS

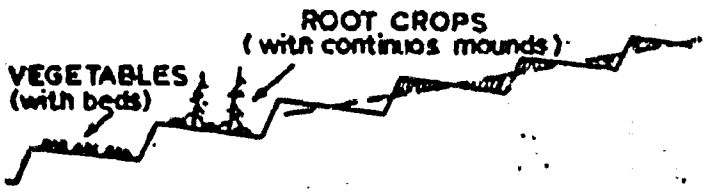
Kind	Specifications					Applications		
	Width of Bench (Flat Part)	Length	Horizontal Grade	Reverse Grade	Riser Slope	Land Slope	V.I. 1/ or Spacing	Auliliary Treatments 2/
1. Bench Terraces								
a. Hand made	2.5-5.2 m (8'-17')	<100 m (<330')	1%	5%	0.75:1	7°-25° (12-47%)	$\frac{S \times Wb}{100-S \times .75}$	-
b. Machine built	3.4-8.2 m (11'-27')	<100 m (<330')	1%	5%	1:1	7°-20° (12-36%)	$\frac{S \times Wb}{100 - S \times 1}$	-
2. Hillside ditches	1.8 m (6')	<100 m (<330')	1%	10%	0.75:1	< 25° (<47%)	a S + b	Contour planting Close planting Mulching Cover cropping
3. Individual basins	1.5-2.1 m (5'-7')	1.5-2.1 m (5'-7')	-	10%	0.75:1	< 25° (<47%)	Planting distance of crops	Hillside ditches Orchard terraces Mulching Cover cropping Contour planting
4. Orchard terraces	1.8-2.5 m (6'-8')	<100 m (<330')	1%	5-10%	0.75:1	25°-30° (47-58%)	±6m (±20') along slope	Grass cover Individual basins
5. Mini-convertible terraces	3.4 m (11')	<100 m (<330')	1%	5%	1:1	7°-20° (12-36%)	a S + b	Grass cover Individual basins Mulching
6. Hexagons								
a. Terraces and operation routes	3.4 m (11')	<100 m (<330')	1%	5%	1:1	7°-20° (12-36%)	±6m (±20') along slope	Grass cover Individual basins
b. Enveloped or branch road	3.4 m (11')		<7° (<12%)	5%	1:1	7°-20° (12-36%)	-	Grass or marling Cross drains

1/ V.I. is verticle interval between two succeeding terraces that determines space.

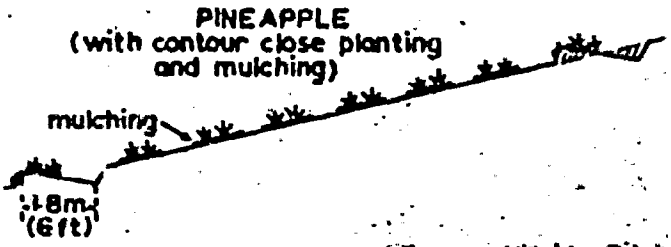
2/ To be applied mostly in between the terraces or on basin surfaces.

APPENDIX 4. CROSS SECTIONAL VIEWS OF SIX MAJOR LAND TREATMENTS

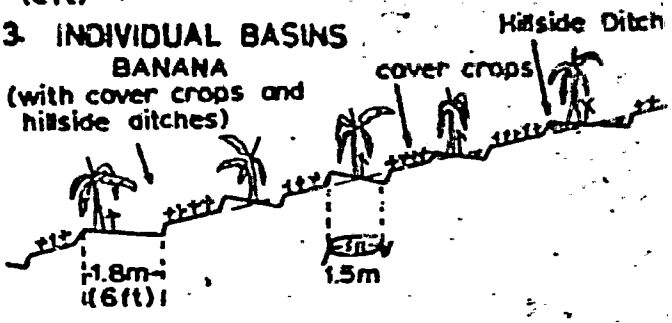
1. BENCH TERRACES



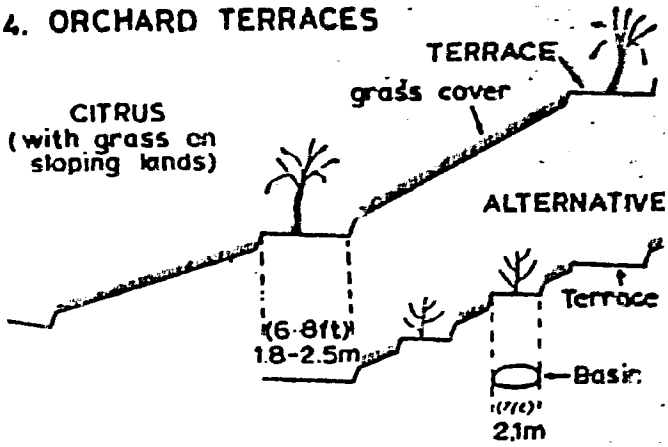
2. HILLSIDE DITCHES



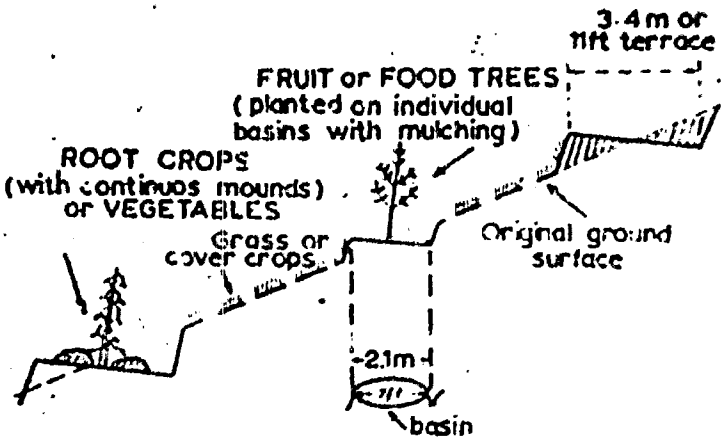
3. INDIVIDUAL BASINS



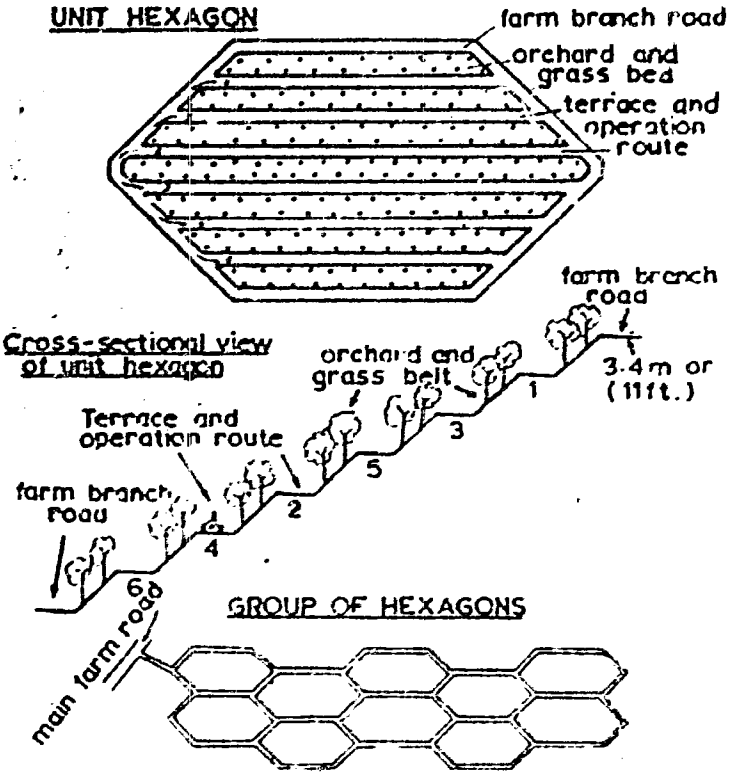
4. ORCHARD TERRACES



5. MINI-CONVERTIBLE TERRACES



6. HEXAGONS

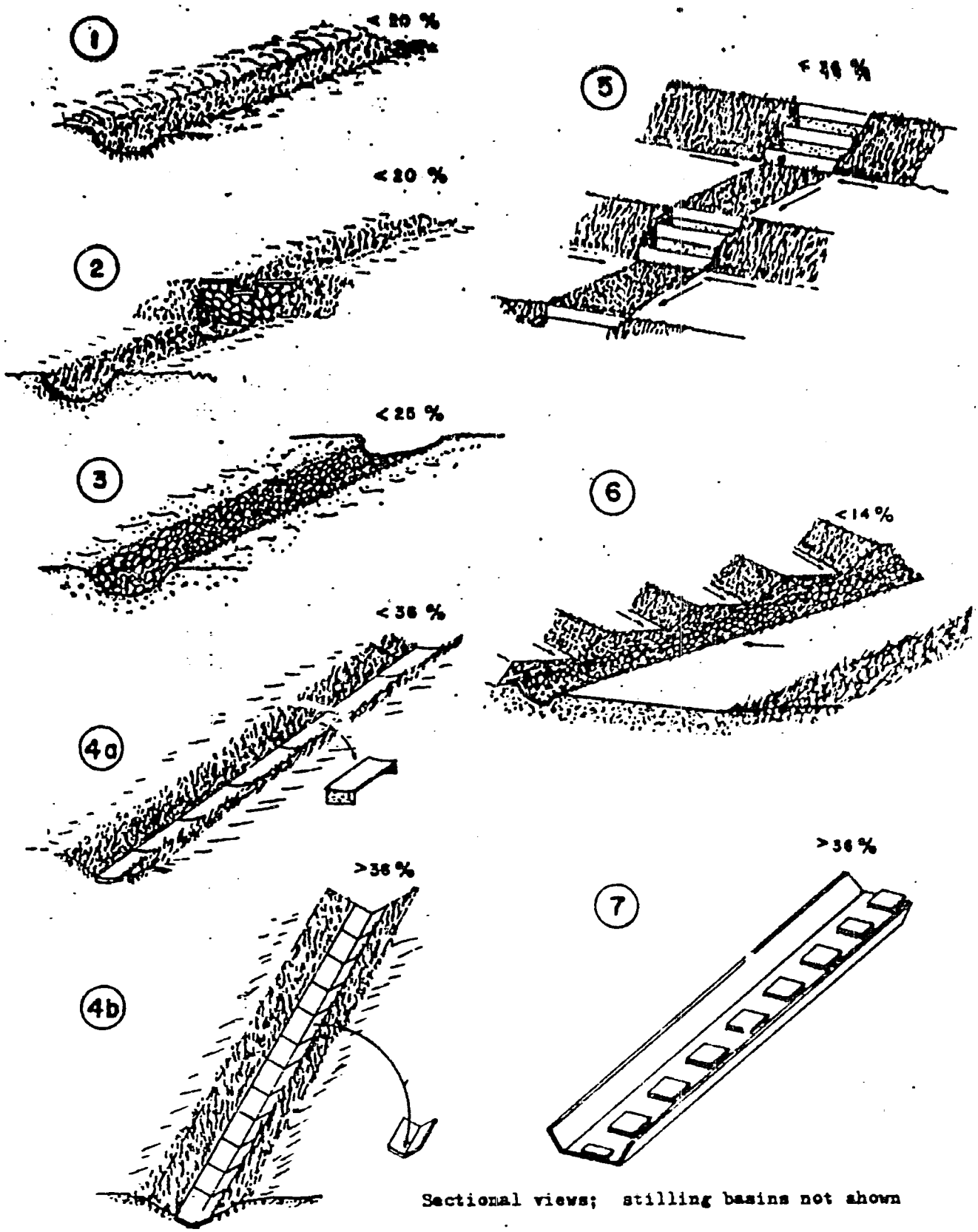


APPENDIX 5. MAJOR TYPES OF WATERWAYS: THEIR USES AND LIMITS 1/

Type	Shape	Channel Protection	Velocity Limit	Slope Limit	Uses
1. Grassed Waterway	Parabolic	By grass	1.8 m/sec (6'/sec)	<11° (20%)	For new waterway or uniform sloped depression
2. Grassed waterway with drop structures	Parabolic	By grass and concrete or masonry structures	1.8 m/sec (6'/sec	Between two structures: 3%, overall slope <11° (20%)	For discontinuous type of channel
3. Ballasted waterway	Parabolic	By stones or by stones and wire mesh	3 m/sec (10'/sec	<15° (26%)	Where stones are available
4. Prefabricated concrete waterway					A stilling basin is usually needed at the end
a. Parabolic waterway	Parabolic	By concrete structures and grass	-	<20° (36%)	Where rainfalls are frequent and flows constant
b. V-notch chute	90° V-notch	By concrete structures and grass	-	>20° (36%)	Same as above and on very steep slopes
5. Stepped waterway	Parabolic and rectangular	By grass and concrete or masonry drops	On grass part: 1.8 m/sec (6'/sec	Overall slope <20° (36%)	For 4-wheel mechanization & in the middle of bench terraces
6. Waterway and road ditch complex	Parabolic	By grass and stone ballasting	3 m/sec (10'/sec	<8° (14%)	For tractor crossing & 4-wheel mechanization
7. Foot-path and chute complex	Trapezoid or rectangular	By concrete or masonry structure	-	>20° (36%)	For paths on small farms & on very steep slopes

1/ These limits are approximations for general reference. In practice, the volume and velocity of runoff and site conditions should all be taken into consideration for determining the type of waterway needed. Most of these types of waterways handle a few hectares of runoff.

APPENDIX 5. MAJOR TYPES OF WATERWAYS: Sectional views



Sectional views; stilling basins not shown

THE REFORESTATION PROGRAM

A Proposal for Forestry Development on Private Lands

A special socio-economic survey of the areas earmarked for forestry should be undertaken before project implementation to identify the tenure, distribution by area, and owner response. This information will be important in the planning for forestation activities, particularly with respect to land acquisition, resettlement, transport, and nursery needs.

Arising out of the survey will be an indication of:

(a) The area(s) to be purchased by government either outright or by deferred payment. This would include critical areas for protection of soil and water resources, areas actually offered for sale, and those sites purchased to straighten existing boundaries or for resettlement.

(b) Privately owned areas to be reforested. Land owners who do not wish to sell land to government will be encouraged to take part in the reforestation scheme by a vigorous extension program supported by grants/subsidies and loans.

Loans/Grants/Subsidies:	Technical advice, seedlings, training. A grant or loan of up to 40% of the agreed planting cost.
Tax Exemption:	Land tax exemption on all land developed in forest plantations.

Within the area delineated by the survey and planned for forestry development, the government will contract with private land owners to purchase the forest crop at maturity at prices to be agreed on at signing. These prices are likely to be 50% of the value of the crop at current market rate.

It would be illegal to cut any trees planted in the project area without the approval of the Watershed Authority to be set up. A cash incentive amounting to approximately 5% of the cost of establishing an acre of plantations will be offered to those land owners who join the scheme within six months of its announcement and operation.

Since there are already substantial acreages of Government-owned forest plantations, the added plantations will provide scope for the establishment of one or more wood-based industries--sawmilling and/or particle board. Particle board production is recommended because of a shorter gestation period and technical and economic feasibility.

ESTIMATED COST PER ACRE FOR REFORESTATION a/

ESTABLISHMENT

Labor:

Clearing land	J$ 65	)	
Digging holes	34	)	
Carrying seedlings	20	)	38 m/d b/
Planting seedlings	31	)	
Weeding first year	53	)	
Materials: Seedlings	34		
Transport: Seedlings from nursery to site	7		
TOTAL	J$ 244		

MAINTENANCE

Labor:

Weeding second year	J$ 53	)	20 m/d
Weeding third year	53	)	
Pruning sixth year	21		
Thinning eighth year c/	70		
TOTAL	J$197		

a/ Based on 680 pine trees per acre
b/ Labor at J$5.30 per day
c/ For lumber only; thinning not needed for pulp.

FORESTRY SUB-PROJECT

COSTS (J$000)

	Year 1	2	3	4	5	Total
GOJ						
Survey & Studies						50
Land Acquisition a/	100	100	100	-	-	300
Private Subsidies b/	-	120	120	160	-	400
Maintenance of reforested public land	-	55	110	110	55	330
Sub-total						J$1,080
AID						
Forestation - public	250	250	250	-	-	750
Forestation - private	-	150	150	200	-	500
Sub-total						J$1,250
Sub-total						J$2,330
Inflation at 20%						460
TOTAL COSTS						J$2,790

ACREAGE

	Year 1	2	3	4	5	Total
Public lands	1000	1000	1000	-	-	3,000
Private lands	-	600	600	800	-	2,000
TOTAL ACRES						5,000

a/ At $100/acre

b/ At $200/acre

ENGINEERING WORKS PROGRAM

Introduction . . . . . M 2

General Requirements . . . . . M 2

Road and Bridge Construction . . . . . M 2

Flood and Erosion Control Structures . . . . . M 5

Stream Erosion . . . . . M 6

Lanslides and Gullies . . . . . M 7

The Cost Estimate . . . . . M 7

New Construction Standards . . . . . M 8

Road Reconstruction Standards . . . . . M 8

Engineering Works Summary . . . . . M 9

ENGINEERING WORKS PROGRAM

INTRODUCTION

The engineering works requirements are based on recommendations of the UNDP/FAO report, which focused on the most urgently needed erosion control measures and new road construction to increase agricultural production.

GENERAL REQUIREMENTS

The project consists of the improvement and development of two pilot areas and of those structures of an urgent nature needed in the remainder of the two watersheds. In general the work will consist of improving existing facilities as well as developing hillside areas for improved and increased agricultural production. To accomplish the overall objective, it will be necessary to construct a few secondary roads and to improve others. There will also be a requirement for the extension, improvement, and, in some areas, the development of stream contiol facilities, crossdrains, and ditches.

ROAD AND BRIDGE CONSTRUCTION.

All road and bridge construction will be under the direction of the Min PW. The design and supervision of construction and repair will be this agency's responsibility. The design and specifications for this work will be in accordance with the standards used by the Min PW. The new road construction will be of the type of secondary road the Min PW is now constructing and it is expected to be surfaced with one inch of asphalt and chips to prevent rapid deterioration in rough terrain. Other roads that will be scheduled for repair and/or improvement involve resurfacing with improved drainage in heavy traffic areas, improving maintenance, filling potholes, and otherwise being made suitable for vehicular traffic. Culverts, retaining walls, bridges, and other structures directly associated with the maintenance of a viable road net will come under the responsible supervision of the Min PW.

The following tables summarize the road density and erosion findings.

ROAD DENSITY: PINDARS RIVER WATERSHED

Kind of road	Subwatershed	Total watershed
Main road	2.80 mi	22.95 mi
Secondary roads	4.73 mi	47.79 mi
Tracks	23.91 mi	142.09 mi
Total length	31.44 mi	212.83 mi
Density main & secondary	2.11 mi/mi^2	2.36 mi/mi^2
Density all roads	8.83 mi/mi^2	7.10 mi/mi^2

Notes:

The road density (main roads plus secondary roads) of the watershed is high when compared to the national figure of 1.6 mi/mi^2. Adding the density of tracks, it becomes extremely high.

While the main roads are mostly in good shape except for a portion in the subwatershed near Reckford and at Crofts Hill, the secondary roads have much more serious erosion problems due to poor sites or lack of maintenance. Many secondary roads at the eastern portion of the watershed near Kentish are unmotorable at present.

Track erosion is very serious, especially near Reckford. Many tracks become deep gullies on even gentle slopes because of soil types and the action of hooves of donkeys.

Conservative estimations of erosion rates are shown below.

ESTIMATION OF RATES OF ROAD EROSION IN PINDARS RIVER WATERSHED

Kind of road	Mileage	Average annual erosion per mi (yd^3)	Total (yd^3)	Remarks
Main roads	22.95	40	918.0	Mostly stabilized and good surface
Secondary roads	47.79	100	4,779.0	Most road surfaces are not protected
Tracks	142.09	160	22,734.4	Av. erosion 1.5 in/yr
TOTAL	212.83		28,431.4	

ROAD DENSITY: TWO MEETINGS WATERSHED

Kind of Road	Subwatershed	Total watershed
Main road	7.48 mi	24.90 mi
Secondary road	8.09 mi	40.26 mi
Major tracks	7.40 mi	54.86 mi
TOTAL	22.97 mi	102.02 mi
Density main and secondary roads	4.94 mi/mi^2	4.17 mi/mi^2
Density all roads	7.29 mi/mi^2	7.63 mi/mi^2

The road density in this watershed is very high, especially in the pilot subwatershed where density of main and secondary roads is 4.94 mi/mi^2

The stability and condition of the main roads is generally good. The problem is sheet erosion from the bare cut banks. The critical section is from the Water Treatment Plant to the village of Moravia where many unstabilized banks and slips were observed. The work of scraping vegetation along road banks and ditches has created more harm than good.

The parochial, feeder or Parish Council roads are mostly poorly constructed and maintained, causing considerable erosion, especially those roads at Pattoo Gully in the pilot subwatershed and those near Bronte and Bullocks. Road gradients are steep, drainage systems lacking, bank slips common. Generally speaking, roads north of Yankee River have fewer problems.

The most serious erosion observed is on tracks. They are the source of quick and highly silt-laden runoff to the streams during heavy showers. Many of them are located up and down slopes. Over decades of trampling by people and

animals, these tracks have become gullies. Abandoned tracks have always been found here and there within a short distance of the new ones.

ESTIMATION OF RATES OF ROAD EROSION IN TWO MEETINGS WATERSHED

Kind of road	Mileage	Average annual erosion per mile (yd^3)	total (yd^3)	Remarks
Main road	24.90	40	996.0	Mostly stabilized and good surface
Secondary road	40.26	100	4,026.0	Most road surfaces are not protected
Tracks	54.86	160	8,777.6	Average erosion 1.5 in/year
TOTAL	120.02		13,799.6	

Two road erosion surveys were carried out in Two Meetings watershed, the first in June-July 1973 covering the pilot subwatershed 2A and the second in December 1974 in the remaining watershed area. There are a total of 168 places in need of improvement of protection; 53 in the pilot watershed and 115 in the remaining area.

FLOOD AND EROSION CONTROL STRUCTURES

The control of flood waters and erosion as well as the extension, elimination or rehabilitation of tracks will be under the direction of Min Ag. This agency will be responsible for the construction of these projects through all phases of the work. The design and specifications used on the construction of these works will be those provided by the Ministry and approved by AID. The type of structures that will be constructed in this phase of the work includes improvement of channels, construction of drops to retard the flow of water; these will be both earth and masonry structures, ripraping of banks, construction of chutes, as well as the building of ditches and drains. Within certain areas of the projects sedimentation control may be a requirement in some of the larger streams. To accomplish this it may be necessary to build at designated locations check dams either of the rock-fill or masonry variety, depending on the height required, the flow and the width of the stream.

STREAM EROSION

PINDARS

Streams	Erosion class	Description
Pilot area Bull Head River	1	Incipient erosion
Junction Bull Head and Pindars River area and tributaries	2.5	Between accelerated and severe erosion
Pindar River-South and SW section	3	Severe erosion
Black and Crawle Rivers	2.5	Between accelerated and severe erosion
Pindar River-East and South sections	3.5	Severe to very severe erosion
Juan De Bolas River	3	Severe erosion
Back River	3	Severe erosion

TWO MEETINGS: CAVE RIVER/PATTOO GULLY SUBWATERSHED ONLY

Streams	Sub-divisions	Erosion class	Description
Cave River	Upper Main	1	Incipient erosion
	Air Strip Branch	1	Incipient erosion
	Lower Main	2	Accelerated erosion
Pattoo Gully	Main	3	Severe erosion
	Branch	2	Accelerated erosion

Erosion at Pattoo Gully where the Water Treatment Plan is located is particularly serious.

Streambank Erosion and Sediments

Stream cuttings have been found in many subwatersheds. However, their size is rather limited and the damage can be controlled. Besides those old cuttings which are more or

less stabilized at the present, five active cuttings were noted. They are located at Two Meetings, lower Cave Main and upper Yankee.

Heavy silt and boulders have been a continuous threat to the Water Treatment Plant. The source of these sediments was identified as being Pattoo Gully proper. The watershed of Pattoo Gully is very badly eroded and its channel gradient is very steep--80 ft. per 1,000 ft. During the rainy season, the Treatment Plant has to stop pumping many times because of heavy silt-laden water and choking of the intake. For instance, a total stoppage of 302 h or an approximate loss of 9 million gal of water occurred in 1973 for this reason.

It has also been found that a large quantity of big boulders of 3 to 4 ft. diameter is presently filling in a section of the channel just below the dam of the Treatment Plant. These boulders may have originated from Pattoo Gully and may have been flushed out when the sluicegate of the dam was lifted during flood time. The continuous moving of the boulders downstream would not only cause bank cuttings along the channel but also endanger the proposed new installations at Two Meetings.

Landslides and Gullies

There are not many serious landslides in the watershed. Two small landslips at the western part of the pilot subwatershed in the yellow limestone area were observed. These are slips due to improper drainage from the cultivated fields above. Each slip could be improved and stabilized by a diversion ditch at the head to divert the runoff to protected waterways. A third slide which is a bank slip at the streamhead close to the airfield was also inspected. Bananas were grown in the streambed and the streamflow has been obstructed and deflected causing bank slides. Cultivation should be corrected in the first instance. If the streambank is protected by structures, slides like this could be gradually stabilized or prevented.

The Cost Estimate

The cost estimates prepared for construction of the structures under the engineering phase of this project cover only the two designated pilot areas in detail and only those other structures, lying outside the pilot areas, that were considered

to urgently need improvement. Any other structures that will be required outside the pilot areas will have to be included in another paper before these areas can be prepared for rehabilitation. The cost estimates presented herein are based upon preliminary surveys made several years ago. Since that time heavy rains accompanied by flooding has visited this area and as a consequence it well may be that when the implementing survey is made, it will be found that priorities have changed and some reallocation of funds may be required.

New Road Construction Standards

These are secondary roads and will have a twenty foot width to the ditch edges. The road surface is to be twelve (12) foot wide and the shoulders are four (4) foot wide. The subbase is designed to be six inches thick and the base course is also six inches thick. The subbase and base courses extend to the edge of the shoulders. There are three separate processes in laying the surfact. The first course is a primer (sealing) course and this is followed by a 5/8 inch asphalt slurry course using asphalt and stone chips. The final course is a 3/8 inch slurry using asphalt and a fine grade of stone chips.

Considering the area in which these roads are being constructed this type construction should make for a good road if regular annual maintenance is provided.

Road Reconstruction Standards

The other three types of road rehabilitation called for in the cost estimate are all substantially the same. Some will have asphalt surfacing while other will not. However, in all cases there will be a requirement to first fill the pot holes, clean the ditches and provide for cross drainage. These operations will be followed by grading (shaping), resurfacing with aggregate, rolling (compacting), watering, and finally putting on the specified finish course--in some cases asphalt. The specifications for this type of road reconstruction are adequate for conditions in Jamaica.

ENGINEERING WORKS SUMMARY

	Pindara			Two Meetings		Total Area	
	Cost Unit J$	No. Units	Total Cost J$	No. Units	Total Cost J$	No. Units	Total Cost J$
Road Construction[a/]							
New roads	90000	5.3 mi.	477000	1.9 mi	171000	6.2	648000
Resurfacing and drainage	45000	5.12	230400	3.2	144000	8.22	374400
Shaping and drainage	12000	4.3	51600	1.0	24000	5.3	75600
Rehabilitation	66000	2.2	145200			2.2	145200
Retaining walls[a/]	40	97 yds	16400	33 yds	6800		23200
Drains							
Side[a/]	4.5	5000 LF	27000	3,520 yds	47250		74250
Cross	6	810	4820	750	4462		9282
Tracks							
Relocation	2	1950 yds	3900	2,283 yds	4566		8466
Treatment	8.6	1950	16790	8,490	73099		89889
Stream Control							
Rockfill check dams	2.35	581 cu.yds.	1395	1,200 cu.yds.	2820		4215
Masonary check dams	246.41	36	8754	42	3520		12274
Chutes	12.59	275	3462	350	4407		7869
Earthern waterways	8.7	5,500	47850	4,415	38410		86260
Bridges[a/]		1	30000	1	30000		60000
River embankment		725 cu.yds.	555				555
Filter beds and gabions				870 ft.	23577		23577
	Subtotal		1065096		577911		1643007
					Inflation (10%)		164301
					TOTAL		1807308[b/]
					Say: J$1 8 million		

a/ Carried out by Min PW; all others by Min Ag

b/ Cost shared 75:25 by AID:GOJ

c/ New roads

Note

The unit cost figures and cost estimates for the engineering features shown on Tables AA4.3.1 and AA4.3.2 of the UNDP/FAO report have been modified somewhat for the following reasons (all figures in J$):

(1) The costing shown on these tables was derived from preliminary surveys. The quantities and costs shown are therefore order of magnitude estimates and for this reason cost estimates have been rounded off for the most part.

(2) The cost estimates for the road construction have been compared briefly with the ongoing prices now being used in the Public Works Department and for the most part have been accepted. The only substantial change was in the unit cost for road shaping. While FAO used $9300 per mile it is believed that a unit cost of $12000 per mile for the type of terrain in the subject area is more realistic.

(3) The cost estimates related to soil erosion, flood control, etc. were not changed since the Ministry of Agriculture official considered the work to be performed to be adequate for this phase of the work. The unit costs shown appear to be within reason except the unit cost for Earth Embankment Construction. This cost was raised from 10 cents to 60 cents and the cost of this item raised to $555.

(4) It will be noted that the bridge construction estimate has been raised to $30000. Normally a bridge of this type could perhaps now be built for about $10000. However, this is rough terrain, construction materials, such as sand, may be difficult to get as well as the difficulty and expense of rerouting of traffic. Moreover, since the original estimate was made up there has been serious flooding in the area so that it is quite possible that other bridge repairs may have to be made. It was, therefore, desirable to increase this estimate to $30000.

CONSTRUCTION EQUIPMENT AND MACHINERY REQUIREMENTS

Area . . . . . N 2

Equipment . . . . . N 2

Procurement . . . . . N 2

Work Schedule . . . . . N 3

Technical Assistance . . . . . N 3

Repair Facilities . . . . . N 4

Communications . . . . . N 4

Transportation . . . . . N 4

Management . . . . . N 5

Tables . . . . . N 6

CONSTRUCTION EQUIPMENT AND MACHINERY REQUIREMENTS

AREA

The two watersheds are estimated to encompass 29,189 acres; of this total, 17,718 will be subject to bench terracing, orchard terracing, and hillside ditching for permanent pasture and individual basins. The project's machine work is expected to bring 4,429 acres a year into readiness for finishing by manual work.

The soil appears to be a red sandy clay with very few small rocks. Some of the hillsides have brush and a few trees.

These steep hillsides and slopes seem to be excellent for a soil conservation project utilizing bench terracing. Jamaicans have in the past done soil conservation work in areas similar to this district--though on a slower scale for lack of proper equipment; their capability for the work proposed has thus been demonstrated.

EQUIPMENT

As the hillsides are steep, only track-equipped tractors with bulldozers and front-end loaders are recommended; rubber-tired (wheeled) tractors are not recommended. Crawler tractors in the 75 to 140 HP range are suitable.

Most of the heavy excavation should be done with bulldozers and front-end loaders. No heavy strain on the equipment will be incurred, just normal wear and tear; the equipment should outlast the project.

The GOJ suggested using or renting equipment already on the island. This possibility exists at the beginning of the project when only a few pieces of machinery will be required. However, machinery of the necessary quantity and of the correct specifications is not widely available in the public or private sectors.

PROCUREMENT

Basic equipment recommended will be purchased competitively with special emphasis to be placed on available maintenance capabilities of manufacturers' representative in Jamaica.

Out of the project budget's US$111,338 for spare parts, a US$50,000 letter of credit with Caterpillar Tractor Company should be reserved for tractor parts.

Maintenance equipment is essential and should be purchased at the same time the machinery is ordered.

WORK SCHEDULE

Considering Jamaica's annual climatic conditions and hours of daylight, it is recommended that the machinery can operate 6 days per week or about 288 work days per year. The machines should work 12 hours per day. Two operators should be assigned to each machine, each working a 6-hour shift: as it is warm in Jamaica, an operator will tire rapidly after 6 hours. Hourly work of this type has been carried out with success in other countries under similar conditions; the more hours you work the machine, the more production is accomplished at lower cost.

Terracing excavation is an ideal dirt-moving project if the machines are well maintained according to manufacturer's recommendations; hence, they should operate approximately 8,000 hours with only an engine overhaul. That means only one engine overhaul to each machine in the four-year project. After the four years each machine should have a general overhaul and be put into good condition for any new project assigned by the Soil Conservation Unit.

TECHNICAL ASSISTANCE

It is recommended that one technical assistance maintenance advisor be employed for this project for 6 to 12 months. A Jamaican counterpart assigned by the Soil Conservation Unit should work with the advisor full-time and be ready to carry on the maintenance program on his own. Together, they will set up a training program for operation, maintenance, and repair of equipment; safety of operators and machinery; and record systems and parts usage records. It will be important to train backup operators beyond the two-per-machine, double-shift program suggested above, to cover operator absences due to illness, accident, or vacation. At least one extra operator for each four machines would reduce the loss of production time of an expensive machine.

Many qualified Jamaican operators are now available due to curtailed construction work. Hiring experienced operators at the start would be a great asset to the project. It has been the pattern in similar work that one is likely to achieve the

productivity the machines are designed for if an experienced operator is paid a good salary to encourage him to remain with the project and with his machine.

REPAIR FACILITIES

Rural areas of Jamaica have very few repair shops for any type of heavy equipment. For this project to function properly, it must have good field repair facilities. A portable machine shop is recommended for the project. For any repair that cannot be done in the portable shop, the machine should be loaded on a low-bed trailer and sent to Jamaica Tractor and Equipment Company, Kingston, where permanent repair facilities exist.

In Christiana the soil conservation officers work out of a Min Ag compound, which has a building approximately 40 ft x 60 ft that would make a good spare parts warehouse for this project. This compound would be the central location of the portable repair shop.

Through the Soil Conservation Unit, diesel fuel, grease, and oils can be stored in this compound for the project and supplied by the oil companies. Therefore, no diesel fuel transport equipment has been recommended for the project.

Two truck-mounted lubrication units are recommended for daily lube service to each machine.

COMMUNICATIONS

A good communication system is essential to a project of this size. Good communication facilities will save many miles of driving and many hours of downtime. There should be two base radio stations, one in the Christiana compound and the other at Sandy River, and two-way radios in the two pickups used to service the tractors.

TRANSPORTATION

Transporting equipment in Jamaica is expensive: 20¢ a ton mile empty and 40¢ a ton mile loaded. Since a low-bed trailer is not always reliably available, a 20-ton low-bed has been recommended for the project. When it is not moving equipment, it can transport other materials such as cement, pipe, tile, or bricks.

MANAGEMENT

Good equipment management, a good maintenance system, and concentration of equipment in as small an area as possible will bring about better supervision and control.

All equipment purchased for the project will be assigned to the project until completion.

ESTIMATED HOURLY PRODUCTION OF MACHINE WORKING TWO 6-HOUR SHIFTS PER DAY, OR 12 HOURS PER DAY.

D6	90 cu yd/hr 12 x 90	1,080 cu yds
	(1) 26 12-hr shifts/month	28,080 cu yds
	(2) 9 months/yr	252,720 cu yds
	(3) 4 machines/yr	1,010,880 cu yds
	(4) 4 units, 4 yrs	4,043,520 cu yds
D4	55 cu yd/hr 12 x 55	660 cu yds
	(1) 26 12-hr shifts/month	17,160 cu yds
	(2) 9 month/yr	154,440 cu yds
	(3) 2 machines/yr	308,880 cu yds
	(4) 2 units, 4 yrs	1,235,520 cu yds
955	Front-end loader with 2 cu yd bucket	
	75 cu yds/hr 12 x 75	900 cu yds
	(1) 26 12-hr shifts/month	23,400 cu yds
	(2) 9 months/yr	210,600 cu yds
	(3) 2 machines/yr	421,200 cu yds
	(4) 2 units, 4 years	1,681,800 cu yds

Total yardage to be excavated on the two projects in 4 years	9,137,293 cu yds
Estimated total yardage excavated by the above machines in 4 years	6,960,840 cu yds
Remaining yardage for manual labor	2,176,453 cu yds

ESTIMATED WORK TO BE COMPLETED IN FOUR YEARS' SOIL CONSERVATION PROJECT

Of the approximately 29,189 acres in the total project, there will be excavation on only 17,718 acres: 5,958 acres will be excavated by hand and 11,760 acres will be excavated by machine. In addition, machinery will be used to excavate 200 individual cisterns (water-holding dugouts); machinery will excavate 206,000 cu yds and manual labor will clean up the cisterns and excavate only 5,000 cu yds.

Bench terraces	4,642,190	cu yds
Orchard terraces	206,125	cu yds
Hillside ditches and basins	1,771,000	cu yds
Pasture with hillside ditches	70,000	cu yds
Waterways	65,525	cu yds
Cisterns	206,000	cu yds
TOTAL	6,960,840	cu yds

Yardage to be excavated by machinery	6,960,840	cu yds

ESTIMATED HOURLY COST TO OPERATE THE SOIL CONSERVATION EQUIPMENT THAT HAVE BEEN RECOMMENDED TO DO THE EXCAVATION ON THE TERRACES AND HILLSIDE DITCHES IN THE CHRISTIANA AND SANDY RIVER PROJECTS

D6 Caterpillar Tractor 140 HP with bulldozer and ripper

1)	Fuel 6 U.S. gal per hour, 35¢ per gal.	$ 2.10
2)	Lubricant, filter grease, hydraulic oil	.68
3)	Spare parts for tractor per hour	2.25
4)	Spare parts for bulldozer and ripper	1.10
5)	Operator per hour	2.00
6)	Transportation per hour project to project	1.10
	U.S.	$ 9.23

D4 Caterpillar Tractor 75 HP with bulldozer and ripper

1)	Fuel 4 U.S. gal per hour, 35¢ per gal.	$ 1.40
2)	Lubricants, filter grease, hydraulic oil	.48
3)	Spare parts for tractor	1.90
4)	Spare parts for bulldozer and ripper	.70
5)	Operator per hour	2.00
6)	Transportation per hour, project to project	1.10
	U.S.	$ 7.58

955 Caterpillar Front End 130 HP Loaders with 2 cu. yd bucket

1)	Fuel 5 U.S. gal per hour, 35¢ per gal	$ 1.75
2)	Lubricants, filter grease, hydraulic oil	.56
3)	Spare parts for tractor	2.00
4)	Spare parts for bucket and ripper	1.10
5)	Operator per hour	2.00
6)	Transportation per hour, project to project	1.10
	U.S.	$ 8.51

D3 Caterpillar Tractor 62 HP with cultivation equipment

1)	Fual 3 US gal/hr, 35¢ per gal	$ 1.05
2)	Lubricants, filters, grease, hydraulic oil	.28
3)	Spare parts for tractor	1.10
4)	Spare parts for cultivation equipment	.30
5)	Operator per hour	2.00
6)	Transportation/hr, site to site	1.10
	US	$ 5.83

Operating expenses for other vehicles calculated as follows:

40 vehicles (pickups or station wagons) at J$0.25/mile, 10,000 miles per year over a four-year period = J$ 400,000.

TRACK-TYPE TRACTORS FOR THE PROJECT SHOULD BE EQUIPPED WITH THE FOLLOWING:

Group	Item	No. of Units	Description	Unit Price FOB US$	Total Cost US$
1	1	4	Caterpillar model D6 tractor, series D, 74-in gauge diesel engine minimum 140 HP and power shift transmission, alternator, 50 amp, crankcase guard and front pull hook, engine upper guard, final drive guard, radiator hinged type guard, precleaner, track roller guard, rain cap, extreme service tracks shoe 20", cap lock oil filler, oil dipstick cap lock, fuel tank cap lock, hydraulic tank cap lock, 6 track rollers per side, reversible fan, automatic shutdown on engine oil pressure and cooling system, bulldozer angle blade with hydraulic tilt cylinder, rear-mounted ripper with 3 shanks with replaceable tips on ripper shank, canopy top open type and backup alarm, 3-way hydraulic control valve for control of bulldozer, tilt cylinder and hydraulic ripper simultaneously.	$ 80,895	$ 323,500
1	2	2	Caterpillar Model D4D 60-in diesel engine minimum 75 HP and power shift transmission, alternator 50 amp, crankcase guard and front pull hook transmission guard, upper engine guard, precleaner, radiator hinged type guard, rain cap, track shoe 16", oil dipstick cap lock, fuel tank lock, hydraulic tank lock, radiator cap lock, blower type fan or reversible fan, bulldozer straight blade with hydraulic tilt cylinder, 3-way hydraulic control valve for control of bulldozer, tilt cylinder and hydraulic ripper simultaneously. Automatic shutdown on engine oil pressure and cooling system, canopy top open type and backup alarm, rear-mounted ripper with 3 shanks with replaceable tips on ripper shank.	42,446	84,892
1	3	2	Caterpillar model 955 series L track front-end loader, 68-in gauge diesel engine minimum 130 HP and power shift transmission, alternator 50 amp, crankcase guard and front pull hook, upper engine side guard, radiator hinged type guard, precleaner, fuel tank cap lock, hydraulic tank lock, radiator cap lock, reversible	66,027	132,054

			fan, track roller guard, 6 track rollers per side, transmission guard, automatic shutdown on engine oil pressure and cooling system. Bucket: general purpose type 2 cu yds, with bolt-on teeth with replaceable tips on teeth, rear-mounted ripper with 3 shanks with replaceable tips on ripper shank, canopy top open type and backup alarm.		
1	4	2	Caterpillar model D3 56-in gauge diesel engine minimum 62 HP, planetary-type power shift transmission, alternator 50 amp, crankcase and front hook transmission guard, precleaner, radiator hinge type guard, rain cap, track shoe 12", oil dipstick cap lock, fuel tank lock, hydraulic tank lock and radiator cap lock, pull type fan, track roller guard, 5 track rollers per side, automatic shutdown on engine oil pressure and cooling system, canopy top open type and backup alarm, hydraulic control tool bar for operating/furrowing wing plow 2 disc ridgers and 3 disc ridgers.	22,421	44,842
2	1	3	Truck Pickup 4x4 - 3/4 ton with mechanical body, GVW 1,800 lbs, wheel base, 130 inches, tires with tubes 750 x 16 6 ply.	6,000	18,000
2	2	2	Truck with 6-passenger crew cab body 4x4, GVW 7,800 lbs, wheel base 130 inches. Tires with tubes 750 x 16 6 ply.	7,000	14,000
2	3	35	Vehicles for extension and soil conservation officers (utility vehicles and station wagons)	6,000	210,000
3	1	2	Truck-mounted lubrication units 4x4 GVW 29,000 lbs wheel base 160 inches, tires with tubes 10,000 x 20 12 ply, diesel engine minimum 170 HP with 600 US gal. fuel tank, 5 hose reel for grease and oil, 1 air hose reel.	36,000	72,000
3	2	1	Truck Tractor - Tandem axle, with fifth wheel, 6x4 GVW 38,000 lbs, wheel base 170 inches, tires with tubes 10,000 x 20 12 ply, diesel engine minimum 225 HP	35,000	35,000

3	3	1	Low-bed trailer, goose-neck type, capacity 20 ton tandem-axle, tires with tubes 10,000 x 20 12 ply.	14,000	14,000
4	1	1	Mobile machine and repair shop mounted on low-bed trailer, goose-neck type, tires with tubes 10,000 x 20 12 ply. Single rear axle and single front axle	80,000	80,000
5	1	2	Base radio stations for main offices in Sandy River and Christiana	8,000	16,000
5	2	3	Two-way CB radios to be installed in the mechanical pickups working from the mobile machine and repair shop in the field	500	1,500
			One year's supply of fast-moving spare parts to be purchased at the same time the equipment is purchased and shipped with the equipment	50,000	50,000

It is estimated that 12% of the FOB value will be needed, not including the $50,000 fast-moving parts, over the four-year period to keep the machines operating. It is estimated that this project will be completed in four years.

Total equipment cost FOB	US$	1,095,788
Spare parts, 12%		131,494
Freight, 15%		164,368
Inflation (one year at 10%)		109,579
Contingency,		90,000
TOTAL	US$	1,591,229
Rounded	US$	1,600,000

AGRICULTURAL CREDIT AND FARMER ORGANIZATIONS

Agricultural Credit..... O 2

The People's Cooperative Banks..... O 3

Credit Use and Attitudes of Project Area Farmers..... O 4

Rural Organizations..... O 5

Jamaica Agricultural Society..... O 5

Cooperatives..... O 6

AGRICULTURAL CREDIT AND FARMER ORGANIZATIONS

Unlike many developing countries that have only recently begun to establish agricultural credit institutions and grassroots farmer organizations, Jamaica has a long, rich history in both. Credit institutions serving the agriculture sector are in fact probably too numerous in Jamaica. The major farmer organization has been around so long that it is apparently hamstrung by tradition; it has failed to keep up a dynamic leadership role in the past two decades' rapidly changing economy.

AGRICULTURAL CREDIT

Agricultural credit in Jamaica is channeled through a variety of Government institutions, commercial banks, merchants, cooperatives, and individuals. Most agricultural credit is funneled through a dozen Government or quasi-Government institutions, some administering multiple lending schemes. This group of publicly supported or administered credit institutions includes the Jamaica Development Bank (JDB), Agricultural Credit Board (ACB), People's Cooperative Banks (PC Banks), seven different commodity boards (sugar, banana, coffee, tobacco, cocoa, citrus, and coconut), and Project Land Lease. This maze of credit institutions has led to confusion among many farmers, since rates of interest range from 4% to 14%, and inconsistency prevails regarding eligibility requirements, loan terms, and repayment schedules. Moreover, the fragmented structure of institutional credit sources for agriculture has dissipated human and administrative resources in redundant services. Serious consideration and debate within the GOJ has been continuing over the past several years to consolidate these many credit services into one entity--perhaps by creating an agricultural credit bank --thereby allowing more rational credit planning, establishing a more manageable agricultural policy tool, and increasing administrative efficiency. While no decision has yet been reached, some action is anticipated soon that will at least reduce the current number of Government-controlled agricultural credit institutions, though stopping short of absolute consolidation.

Total agricultural production credit loaned by existing Government institutions is approximately J$80 million annually. Most of this credit is drawn by larger farmers and by estates, usually dedicated to livestock operations or export crops. The small farmers, who are

basically responsible for domestic food crop production, usually do not receive credit. Traditionally, the People's Cooperative Banks (PC Banks) have been the only source of institutional credit for small farmers. In 1973, a special loan fund was established within the JDB which expanded credit availability to smaller farmers; it is known as the Self-Supporting Farmer Development Program (SSFDP). This special fund is, however, limited to farmers with at least 5 and less than 20 acres and annual incomes of not less than J$900. Most hillside farmers are excluded by these eligibility criteria.

Small-farmer credit needs were addressed under the Emergency Production Plan announced by the GOJ in June 1977; J$20 million was earmarked for credit to food crop farmers cultivating less than 5 acres. This emergency credit program is the responsibility of the Min Ag. The parish manager approves the farm plans and loan amounts that are developed by the local extension agents. The PC Banks actually disperse the funds but Min Ag extension agents perform most of the field work necessary to solicit and verify credit applications, as well as do supervision and collection. While this credit scheme seems to be correctly targeted, its immediate effect will be limited since it was announced after this crop year's planting season had already begun. Moreover, many GOJ officials believe the administrative structure of the emergency credit program is neither appropriate nor sustainable since the technical assistance functions of the Min Ag will be diminished; substiantial loan delinquencies are anticipated. In any case, there is currently only one well-established institutional credit source for small farmers--The People's Cooperative Banks.

THE PEOPLE'S COOPERATIVE BANKS

The People's Cooperative Banks, a cooperative established in 1911, currently have 115 local branches in Jamaica with 130,000 member farmers. This long-established institution has some features of proven value in successful credit institutions around the world, particularly the concept of a committee of community farmers to determine applicant eligibility. Another sound feature is a share-purchase and savings plan for borrowers and members, though average member share deposits are very small and all together account for less than 10% of the banks' J$11 million assets. The PC Banks are dependent on the Agricultural Credit Board for their capital, and can be viewed as an ACB subsidiary notwithstanding their cooperative structure. Under the agreement between the ACB and the PC Banks, local banks may grant loans up to J$1,000; loans of greater amounts may be granted only after ACB approval. The PC Banks have an established maximum loan limit of J$20,000.

The People's Cooperative Banks are the only public credit institution that routinely accepts loan applications from food crop farmers with less than 5 acres and for amounts less than J$1,000. The majority of PC Bank loans are secured by land mortgages, although officials of the banks emphatically deny that land mortgages are required by policy. Since the PC Banks are the primary source of institutional credit for small farmers in Jamaica, it is not surprising that over 90% of their memebers farm less than 10 acres of land.

The People's Cooperative Bank in Spaldings, located in the Pindars area, is one of the largest and best local operations in the PC Bank system, with 4,500 members and an outstanding loan portfolio of about J$600,000. The Spaldings operation has two paid staff who work under the close supervision of the Board of Management, who in turn rely on the local ACB credit office for technical expertise. Applications for loans are reviewed weekly at the regular meeting of the loan committee; applications approved are referred to the credit supervisor for review and farm inspection. Loan requests of less than J$1,000 may be reviewed and approved for disbursement within ten days or two weeks. For larger amounts or for those applications otherwise referred to the Agricultural Credit Board for review, actual disbursement may take several weeks or even months. This delay is a source of dissatisfaction among many farmers.

The Spaldings PC Bank received approximately 1,000 loan applications in 1976 in the amount of J$379,000; of these applications 433 loans were granted, totaling J$334,000. As these data show, less than one-fourth (23%) of the bank's members applied for loans and only about one in ten (9%) of the total membership actually received loans. This near-standstill by the bank was occasioned by lack of funds; besides its own equity resources, the bank used all monies allocated by the ACB. Local bank officials estimated that at least J$1,200,000 would have been loaned last year if funds had been available.

The Spaldings PC Bank staff reported that loan delinquency was not a major problem: about half of the borrowers repay promptly, 30% require follow-up collection action, and 20% are problem accounts.

CREDIT USE AND ATTITUDES OF PROJECT AREA FARMERS

Analysis of interviews among small farmers in the Two Meetings and Pindars project areas shows that 75% of the farmers received no credit for agricultural purposes last year. One farmer in seven (15%) received agricultural credit in 1976 from a People's Cooperative Bank; the ACB and the JDB were the source of credit for 3% of the farmers; and the remaining 7% reported using credit last year from

"other" sources including credit unions, merchants, higglers, and friends. These data establish the PC Banks as the predominant institutional source for agricultural credit in the project area and total credit use as low.

When questioned about the need for agricultural credit, 16% of farmers interviewed said that credit was essential, 16% indicated they had no credit needs, and the remaining 68% gave qualified responses indicating credit needs under "satisfactory terms."

Regarding agricultural credit availability, one out of four (25%) farmers surveyed reported they "could not get a loan." One farmer in six (18%) felt that loan security requirements were unreasonable, and only about 6% said the interest charged on loans was too high. The most frequent specific complaint voiced by small farmers in the project area centered on credit institutions' general practice of requiring a land mortgage as loan security. Tardiness in loan approval and "too much red tape" were also frequent complaints aimed, for the most part, at PC Banks. As indicated earlier, the eligibility criteria for loans from other Government credit institutions preclude most small farmers.

According to the survey, most small farmers (84%) in the Two Meetings and Pindars areas would borrow money for agricultural purposes if it was available in a timely manner and if "the terms were satisfactory"; the remaining 16% indicated they didn't need credit or were unwilling to borrow money in general.

RURAL ORGANIZATIONS

Jamaica Agricultural Society

The Jamaica Agricultural Society (JAS) is the oldest and only island-wide farmer organization. Established in 1895, the JAS currently has some 900 local chapters accounting for about 80,000 members. The JAS has traditionally been a professional society open to any farmer or other individual interested in agricultural and animal husbandry, and in this capacity contributes to the general welfare of farming and rural life. The society continues to be especially active in the dissemination of knowledge among farmers, and plays an important role in focusing public attention on particular problems and achievements of the people engaged in agriculture. The JAS can be justly proud of its claims to have sired and initially nurtured several of the key institutions serving modern Jamaican agriculture, including the Agricultural Extension Service, the Cooperative movement, and almost all the specialized commodity boards.

It has been the policy of the JAS to use its strength to promote the creation of service institutions for agriculture when required, but to avoid direct administration of these services for long periods. Among regular JAS activities is sponsorship of the annual Jamaica Agricultural and Livestock Exhibition at Denbigh, a major opportunity to demonstrate new technology, recognize outstanding farmers, and provide an exciting social event for the rural population. In JAS chapters, guests are frequently invited to speak and local problems are informally discussed.

Within the Two Meetings and Pindars project area, the JAS claims about 3,000 members distributed evenly among 33 local chapters. Local groups of the JAS vary in leadership capacity and thus in frequency, enthusiasm, and duration of activities. Some of these JAS groups will quickly grasp this project's concept and will become important channels for project elements requiring joint farmer participation. Other local groups will need substantial organizational assistance, especially in leadership development.

One activity launched by a few JAS local chapters within the past two years is an attempt to organize a more efficient marketing arrangement for selected commodities during harvest and initial assembly. In cooperation with the AMC, these JAS farmers together grade, clean, and pack their produce according to AMC specifications, and agree to have specific volumes of produce ready at certain dates and locations. In return, AMC pays a premium price for the commodities. This limited experiment is still in the "shakedown" phase, but is conceptually sound. Further, it is an example of the kind of role JAS chapters can play in integrated rural development such as that proposed in this PP. The JAS organization could be harnessed to facilitate input distribution, provision of production credit, and dissemination of technical advice, besides improved product marketing.

Cooperatives

Jamaica has a total of 280 legally constituted cooperatives serving 275,000 members and covering economic activities from farming to fishing. The cooperative movement is dominated by credit unions, which account for more than one third of all co-ops and 95% of total share capital. Strong production or marketing cooperatives are the exception in Jamaica and growth is slow, outside of credit unions. It is important to note that People's Cooperative Banks, notwithstanding their name and structure, are not officially recognized cooperatives and fall under the supervision of the Agricultural Credit Board.

With the exception of credit unions, cooperative organizations in the Two Meetings and Pindars project area are limited to three agroindustries.

The Christiana Potato Growers Cooperative is an impressive organization with 8,000 members, serving farmers in a 15-mile radius. It is a multipurpose cooperative providing agricultural supply services as well as marketing services for potatoes, hogs, and broilers. It operates a refrigerated warehouse leased from AMC and has plans for constructing one of its own. It has lines of credit established with the JDC, the ACB, and Barclays Bank. Members' equity builds up through a 10¢/cwt deduction from sales of members' potatoes; the deduction is invested in shares. This institution seems to be a sound example of the benefits possible from well-managed farmer-owned cooperatives. The Christiana cooperative may be able to expand its range of services to meet the needs of many target group farmers in the Two Meetings area.

The Ritchies Boxing Cooperative, in the Two Meetings area, is a highly specialized organization for essential marketing-related services to export banana growers: grading, washing, trimming, treating, and packing bananas for export. Given its highly specialized and single-purpose structure, this cooperative holds little promise for expanding to serve other farmer needs in the area. Nevertheless, it may serve as a conveniently located "real-world model" that can help persuade project area farmers to attempt similar cooperative operations for their crops.

The Northern Clarendon Development Corporation was organized some years ago with the guidance and encouragement of extension officers in the Southern Regional office of the Min Ag. The corporation processes pawpaw, pineapple and citrus, produced by its members into candied peel and fruits, and sells them to Grace Kennedy and Company, distributors. Local labor is employed under a young plant manager and the plant operates the year around. This is a more sophisticated operation than the banana boxing cooperative and appears to be a very successful rural enterprise.

PROPOSED PROJECT FOR PINDARS RIVER
AND TWO MEETINGS WATERSHEDS
Integrated Rural Development

ANNEX F

AGRICULTURAL MARKETING ANALYSIS

Market Channels.....P 2

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AGRICULTURAL MARKETING AN' 'S

Jamaica's agricultural marketing system has a dualist structure: relatively well-coordinated market channels for the major export crops on the one hand, and, for domestic consumption on the other hand, highly fragmented channels dominated by thousands of very small traders ("higglers"). Government policy and action have had limited successes in narrowing the range of seasonal price fluctuations and avoiding periodic gluts. These modest achievements, however, have cost the Jamaican government millions of dollars annually, and have probably done little to change the fundamental marketing structure for domestic food crops.

MARKET CHANNELS

Higglers and Parish Markets

In Jamaica a "higgler" is a special kind of trader or merchant characterized by (1) no permanent or long-term place of business, typically renting space daily in a public market, (2) having a small inventory of goods sufficient to last one to five days, and (3) having little or no capital equipment such as display shelves, vehicles, and storage space. Higglers may be observed trading in a wide range of consumer items including food crops, meat, fish, clothes, shoes, cosmetics, housewares, baskets, and jewelry. An estimated 20,000 higglers are currently operating in Jamaica. Higglers who trade in domestically produced food crops number about 13,000.[1/] The typical food crop higgler is a woman more than 45 years old who has engaged in higglering for at least 10 years. Most higglers have no other occupation, work about three days a week, live in households that average five persons, and are most likely to live in a parish other than Kingston or St. Andrew. Usually, food crop higglers buy directly from the farmer for cash, transport these commodities by bus to one or more parish markets, and sell directly to the consumer.

The weekly farmgate purchases of the typical higgler amount to less than J$100. The higgler will spend an additional J$20 on transport, handling, and other services. Net weekly earnings, though widely varying, are estimated to range between J$15 and J$40 for most higglers.

1/ All quantitative description of higglers cited here comes from an unpublished analysis of a survey of 1,000 higglers conducted by the Ministry of Agriculture in 1977 in collaboration with the IDB.

It is important to note here that some significant variations exist among higglers. While the typical higgler accounts for the majority, there is a group of "city higglers" principally in Kingston who do not purchase at the farmgate but are served mainly by large-volume "country higglers." In this way a certain amount of wholesaling is performed at the parish markets. The Agricultural Marketing Corporation (AMC) is also a minor but important source of supply for some city higglers.

There are 100 parish markets in Jamaica, 9 in the Kingston/St. Andrew area and 91 in the rural areas. The size of these markets, measured by the number of higglers attending, varies considerably and ranges from 2 higglers in the smallest market to 1800 in the largest one. The major function of these markets is retail sales. It is estimated that over 80% of all local food crop production is distributed through these markets.

Parish markets are very crowded since most were built at least 30 years ago, and the increased volumes, especially in the last decade, are more than these facilities were designed to handle. Substantial market activity occurs in open areas surrounding the markets, therefore, and has given rise to so-called "curbside" or "free" markets. There are now over 200 curbside locations, located mainly in Kingston.

The Agricultural Marketing Corporation

The Government-owned Agricultural Marketing Corporation (AMC) is the only significant alternative to higglers for farmers selling their crops. The AMC is estimated to account for 10% to 20% of farm gate sales of food crops.

The Corporation is empowered to buy and sell agricultural produce; provide for the transport, handling, packing, grading, and processing of such produce; and import and export agricultural produce. The formal objectives of the AMC include a list of worthwhile goals--for example, assuring a market for local farm production at fair prices, protecting the interests of consumers, contributing to improved nutrition, and ensuring an even distribution of food islandwide. At the same time as it carries out this multifaceted group of objectives, the Corporation is also supposed to be a commercial operation using commercial banks and remaining financially viable.

The work of the Corporation is carried out from a main office in Kingston, seven branch offices, 144 buying stations, and 17 retail stores. Overall policy of the AMC is set by a board of directors, appointed by the Minister of Industry and Commerce. The board in turn appoints a general manager to direct the activities of the Corporation, which has a staff of 935 persons.

As a matter of operational policy the AMC usually stands ready to buy all produce offered by farmers, and for 17 specific crops the Corporation maintains guaranteed minimum prices as an incentive for production. Farmers may bring their produce to any AMC branch office for sale or to one of the 144 buying stations, which the AMC operates one day a week in various parts of the island.

The AMC reviews buying prices every week and changes them within the constraints of its set minimums as the supply and demand relationships vary over the year.

The prices paid by AMC are generally known and are an important determinant of prices paid by higglers. In general, during times of tight supply the higglers will offer farmers prices slightly higher than those offered by the Corporation. Conversely, in times of abundant supply, higglers pay slightly less than the AMC. As a result, the AMC often cannot buy enough to meet its usual retail and institutional client requirements or is left with substantial quantities of produce for which there is no market demand. While this activity is generally favorable to the farmer, it has serious effects on the financial viability of the Corporation. In 1976/77 the AMC lost about J$4.5 million on total purchases of about J$11.0 million. A contributing factor to the substantial losses of the AMC is the high volume of physical losses by spoilage, waste, and pilferage. It is estimated that physical loss accounts for about 25% of the total volume of goods purchased. Another area of consistent loss for the Corporation is among the retail stores and so-called "basic shops" operations. The AMC performs least well as a retailer, and the basic shops are admittedly a kind of welfare program in low-income neighborhoods where the cost of selected foods is 20% below prevailing retail prices.

In general, the AMC appears to be overextended in its range of activities and beset with conflicting policy objectives, compounding the problems of an already thin management corps.

The complaints about the AMC most frequently voiced by the small farmers include low prices and the grading system, which results in rejection of some proportion of crops offered to the AMC. On the other hand, farmers like AMC's ability to buy larger quantities than higglers can, and the fact that AMC is a reliable buyer when higglers are not.

The financial performance of the AMC is a growing concern of the GOJ and debate continues over alternative measures to improve its performance. Within the past year a new general manager was appointed and apparently enjoys full support in the highest policy circles in the GOJ to take steps necessary to reduce financial loss and assist the Emergency Production Plan. There are indications that the Corporation is beginning to put more emphasis on primary assembly and wholesale functions, and relatively, less emphasis on retail functions.

In addition, the AMC has recently announced sharp increases in the minimum guaranteed prices for 17 basic commodities. These prices are expected to make the AMC more competitive with higglers at the farmgate and allow it to play a bigger role as a food wholesaler and institutional supplier of domestically produced food.

Supermarkets and Retail Stores

Supermarkets and small retail stores in Kingston are the major sources for consumer purchases of staples and processed food. Most of these stores are supplied by a small group of full-line wholesalers that are well integrated with domestic and foreign food processors. Nevertheless, the small retail stores typically handle no fresh produce, and the supermarkets' volume of fresh produce is estimated to be less than 1% of total unprocessed food crops. We can conclude that these stores are currently an unimportant channel for most domestically produced food crops.

Agroindustry

With the exception of livestock feed, the agroindustry/food processing enterprise that rely on domestically produced raw supply tend to be small-scale. Agroindustry here suffers from the unreliability of supply, and processors have in the main, failed to contract effectively with farmers or to achieve any real degree of integration with production. It is not uncommon for processing firms to import substantial volumes of foreign commodities. Still, plant capacity is underutilized in most cases. Up to now, agroindustry has been an unimportant purchaser of small farmer production, although the potential for large volumes seems to exist.

MARKETING CONSTRAINTS

A major constraint to a more rational and less costly food marketing system in Jamaica is the scattered production pattern. Typically, the small hillside farms that produce the bulk of foods are not specialized by crop; they grow a variety of commodities and the marketable surplus of any one kind is small. Hence, the production of any given product is scattered over a wide area. The implications of this geographic dispersion are several. First, the farmer may not be growing those crops best suited for his soil and climate. Second, assembly of the marketable surplus is complicated and costly. Third, the marketable surplus in any area may be too small to support specialized marketing services. Fourth, since the small market volumes in many areas, especially those with difficult access, attract few higglers the local market structure may become oligopolistic.

Another major constraint to improved food marketing in Jamaica is the fragmentation of market channels: farmers, higglers, and other traders find it difficult to establish stable, routine sales and supply relationships. Innovations such as grading, handling, and packing improvements could raise overall efficiency, but they go unadopted because individuals are unable to realize sufficient benefits to make them worthwhile. Such innovations are usually adopted where product market channels have a strong, financially sound institution (e.g., cooperative, large wholesaler, processor) that provides leadership. No such institutions have yet evolved in Jamaica in food marketing.

Under existing market structure and practices in Jamaica the transaction costs in food marketing are high. Lack of standard weights, measures, and grades forces traders to personally inspect each lot at each point of exchange. For example, oranges and other citrus fruits are sold by count. Therefore, when a higgler, the AMC or a processor purchases citrus at the farmgate, each fruit is counted, whether the quantity is 10 oranges or 10,000 oranges. At each succeeding point of resale the fruits are counted again. A single fruit may be inspected and counted from two to six times on its way to the consumer. This practice of inspecting individual pieces for quantity and quality at every exchange requires inordinate amounts of time and is therefore costly. In addition, the need for personal inspection implies a fairly low volume that any single trader would physically be able to manage per day or week.

Physical handling and movement of food crops is expensive in Jamaica as a result of inefficient work methods, inadequate product packing, inappropriate transport equipment, and high levels of spoilage and theft. These are basically management shortcomings perpetuated by a lack of training for market traders.

Finally, dynamic and innovative elements appear to be missing from the food marketing system in Jamaica. The structural conditions for competition are generally fulfilled: thousands of small firms (higglers) are competing, making small profits, and facing few barriers to exit or entry. Yet these competitive conditions do not seem to result in improved efficiency and better management practices. Rather, they tend to bring about increasingly conservative and traditional business practices. The food marketing channels for domestically produced crops appear to be caught in a low-level equilibrium where innovation by any single trader is accompanied by unacceptably high risks of business failure.

Part of the explanation for this riddle lies in the high incidence of underemployment in traditional food crop marketing. It is apparent that many higglers, especially in Kingston, drift into food marketing when no alternative employment is available, even though they frequently have net earnings of less than minimum wage. This is true even though their margins may be high, because with low volumes the absolute profits are low. For this reason individual higglers are among the lowest-paid workers in Jamaica; yet the aggregate effects of the higgler system are high food marketing costs and substantial risk to any single firm or trader attempting to innovate.

MARKETING SITUATION IN THE PROJECT AREA

In the Two Meetings and Pindars River areas, the small farmers are served by the same elements of the marketing system as described earlier. Higglers are the dominant outlet for farm sales; a large number of small-volume transactions is the usual pattern. The Agricultural Marketing Corporation is also active in the area and is estimated to account for about 20% of farm sales.

One knowledgeable observer of the two areas estimates that between 100 and 150 higglers regularly trade there. The AMC has at least 10 buying stations within the project areas in addition to a major branch office in the Two Meetings area at Christiana.

Of the two areas, Two Meetings appears to be better off from a marketing point of view than Pindars. For one thing, Two Meetings seems to have a better all-weather road system. The presence of the AMC branch office in Christiana is another advantage for farmers in Two Meetings. In addition, the Christiana Potato Growers Cooperative in Two Meetings is one of the few successful agricultural marketing cooperatives in Jamaica and serves about 4,000 members, many of whom live in the project area. The point here is that the success of this one co-op may facilitate the founding of similar marketing co-ops in other commodities--yam, sweet potato--when economic justification permits.

The marketing constraints in the two project areas are those described earlier as general to Jamaica. Crop specialization is not practiced, with the notable exception of the Irish potato. Salable surpluses tend to be small, dispersed, and erratic. Little forward contracting is practiced. Usually no product grading or packing is carried out at the farm. Produce is simply dumped in bulk near main roads for eventual sale to passing higglers, who often use fiber sacks for packing. An experienced AMC field buyer expressed the opinion that farmers often don't know the optimum stage of maturity for harvest. For example, certain root crops may be dug "too small," while cucumbers are sometimes picked "too old." The result is lower acceptance by the consumer and lower prices. This anecdote seems to indicate many small farmers would benefit from marketing extension assistance.

In general, small farmers in the project areas are able to find a market for their surplus production. The question is then not so much assuring a market as improving marketing practices and arrangements so the farmers can increase their earnings.

Increased farmer earnings depend, simply stated, on either increased prices received or increased volume sold, or some combination of the two. One way to increase prices received in a competitive market like Jamaica is to perform more of the marketing services at or near the farm--assembly, storage, grading, packing, and cleaning. Economic performance of these services usually requires a larger volume of product than any single farmer in the area harvests, and some kind of coordinated group action among farmers is most appropriate. As indicated earlier, the Christiana Potato Growers Cooperative is a successful example. In other commodities, such as yams, a few local Jamaican Agricultural Society (JAS) groups are cooperating in an experiment with the AMC to assemble, grade, and pack their production as a group. This relieves the AMC of a time-consuming and expensive task and rewards the farmers involved with a slight price premium.

The JAS/AMC experiment is new and some problems have been voiced by both parties, but it is certainly a move in the right direction and should be encouraged as part of the proposed project activity.

Regarding assistance to increase the volume of market produce, it is clear that improved agronomic practices will be the key element. Nevertheless, marketing arrangements can play a crucial role in persuading farmers to adopt improved production practices. For example, it is believed that existing food processing firms would be willing to forward contract at guaranteed prices for selected crops if they could be assured of sufficient volume, timely delivery, and dealings with only one or two agents. Likewise, AMC has expressed its strong desire to enter contracts with producers of economically significant size. If the selling price is known in advance, then it is reasonable that the small farmers would be more inclined to risk the probable investment to increase farm production.

A precondition for improved marketing in the project area would seem to depend on farmers acting in concert--be it as a cooperative, a society, or an association.

PROPOSED PROJECT FOR PINDARS RIVER
AND TWO MEETINGS WATERSHEDS
INTEGRATED RURAL DEVELOPMENT

ANNEX Q

CROPS ANALYSIS

Crop Production and Ecological Factors Affecting Production

July 1977

Productivity . . . . . Q 2

Rainfall and Temperature . . . . . Q 2

Factors in Land Use . . . . . Q 5

Food Crops . . . . . Q 6

Perennial Crops . . . . . Q 10

Spices . . . . . Q 13

CROPS

PRODUCTIVITY

Table 1 shows fruit and vegetable production in Jamaica and fruit and vegetable imports with their estimated value. Most of the vegetables and certain of the fruits produced locally are consumed in the country; many of the bananas, citrus, and pineapples are exported as fresh fruits and fruit juices. The information demonstrates a shortage of vegetables and fruits that could and should be produced in Jamaica to reduce or eliminate the heavy costs of food imports, estimated to total J$200 million per year.

A visit to the Two Meetings and Pindars River watersheds makes it clear that increasing the production of vegetables and fruits on the presently existing small farm holdings is a good possibility. The main objective should be to increase efficiency of production on these small farms. More efficient cropping systems are required to attain this, particularly multiple cropping and intercropping with appropriate levels of technology and better management of crops and soils. Results of the cropping systems research being carried out by the Ministry of Agriculture (Min Ag) and the Interamerican Institute of Agricultural Sciences (IICA) project in Allsides will be useful for this purpose, but more research should be done--on a greater variety of vegetables and fruits and at different altitudes and in various soils. Additional work on conservation practices will have to be carried out, as well.

RAINFALL AND TEMPERATURE

One of the most important factors for production in small-farm areas is the seasonal distribution and annual amount of rain. Rainfall determines the types of crops and their planting and harvesting times during the year; farmers have adjusted their cropping systems thereby. Figure 1 shows annual rainfall amount and distribution in the two watersheds. They are in general very similar, with two peaks of high rainfall, one in April and May, the other, normally higher, in October and November. Of the low rainfall periods, the longer is from December to March and the shorter from June to August.

According to the farmers' calendar, short season crops (maize, beans, Irish potato, cabbage, tomato) have two planting seasons, the spring crop in March and April (as the rains

Q 3

TABLE 1. PRODUCTION AND IMPORTS OF SELECTED AGRICULTURAL CROPS, 1974-1975

	Production		Imports			
	1974 (lbs)	1975 (lbs)	1974 (lbs)	1974 (J$)	1975 (lbs)	1975 (J$)
Vegetables						
Beans, peas, lentils	13,580,000	13,840,000	4,340,122	1,355,156	5,639,572	1,239,728
Potatoes	32,200,000	30,200,000	13,089,366	1,442,457	7,132,225	776,264
Onions	3,020,000	4,780,000	7,032,230	3,238,288	7,806,150	1,600,609
Garlic 1/	NA	NA	230,100	159,025	331,100	168,971
Spices						
Black pepper	0	0	640,477	397,155	694,382	474,505
Cinnamon	0	0	3,627	4,917	4,678	6,538
Nutmeg	0	0	4,932	8,662	22,425	28,597
Ginger	1,720,000	1,880,000	835	3,932	1,826	12,223
Coffee 2/	3,040,000	3,120,000	1,187,228	549,806	250,793	163,987
Corn	21,660,000	3,580,000	232,781,362	14,628,081	258,400,390	16,790,277
Rice	489,000	1,621,900	86,995,492	22,313,124	109,356,249	25,639,000
	J$ Totals		J$	44,100,603	J$	46,900,699

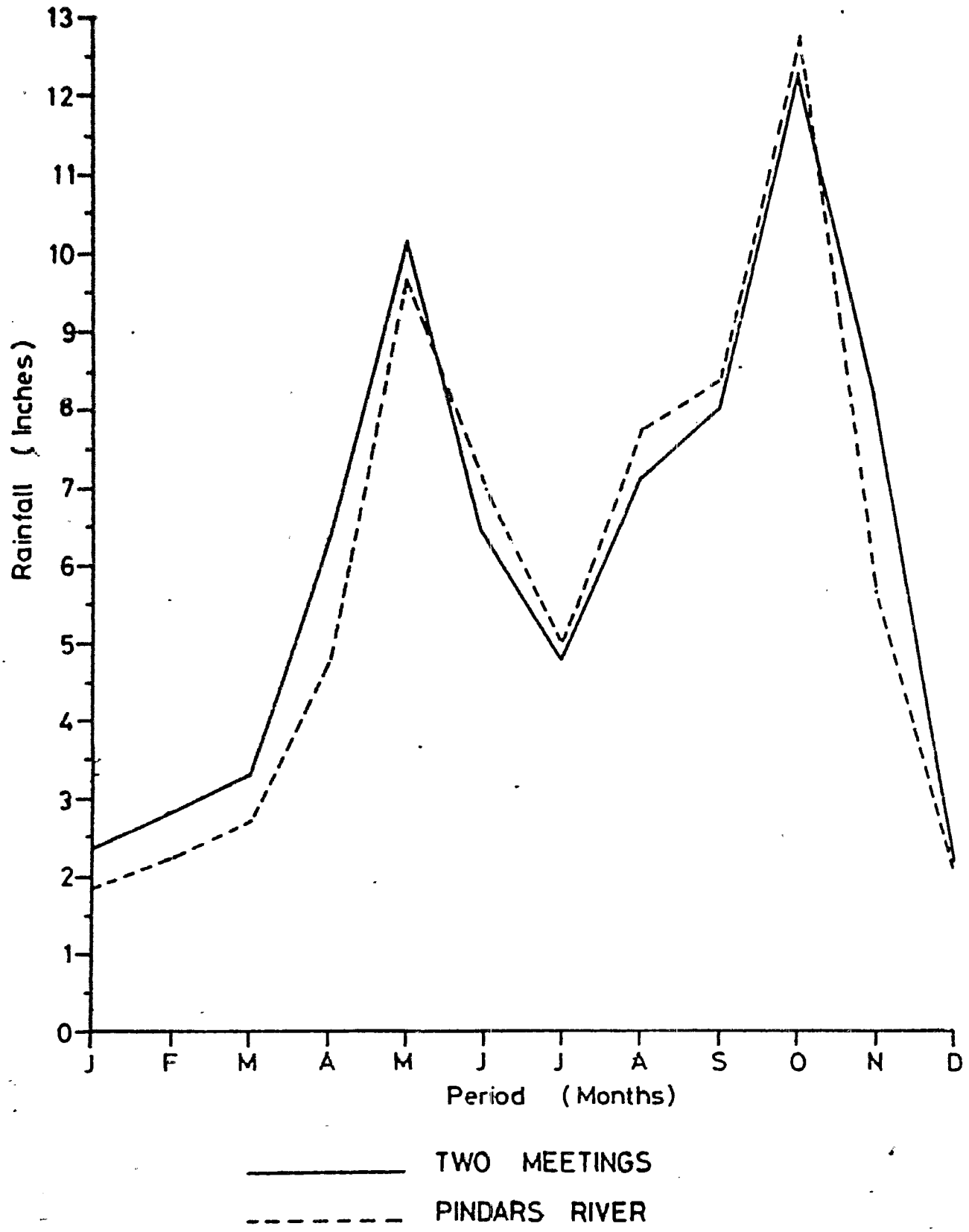
Source: Statistical Yearbook of Jamaica 1976

1/ Garlic is produced in Jamaica. Acreage and yield data are not available.

2/ Jamaica has a record of exporting more than 10 million pounds of washed coffee in peak years, and of exporting consistently over a long period more than 5 million pounds a year.

FIGURE 1.

RAINFALL GRAPH FOR PINDARS RIVER AND TWO MEETINGS WATERSHED



start), the fall crop from September to November. The fall is best for cool-temperature vegetables (onions, Irish potatoes, carrots, lettuce, celery, cauliflower, broccoli, beets, green peas, tomatoes). Harvesting of most of these crops is done in the two low-rainfall periods.

Another important climatic factor for crops is temperature. Altitude above sea level and time of year influence the average temperatures. These in turn determine the crops most adapted to different altitudes. Some crops--Irish potato, red peas, cabbage, lettuce, broccoli, cauliflower, carrot, celery, beet, and sweet pepper--do better at altitudes above 2,000 feet and in the fall/winter season. Other crops--yam, coco yam, cassava, sweet potato, maize, cow peas, pigeon peas--do better at lower altitudes and can be grown year around.

FACTORS IN LAND USE

Land Slope

With the exception of small areas in the valleys, the land under cultivation in the two watersheds is on slopes of differing gradients. The figures below show that the Two Meetings watershed has less steep slopes than that of Pindars River.

SLOPE DISTRIBUTION (in percents)

	<7°	7-15°	15-20°	20-25°	25-30°	>30°
Pindars River	9	23	21	13.5	15.5	18
Two Meetings	7.5	32.5	24.5	15	12	7

Source: UNDP/FAO Technical Report 13, Vol. I.

Soil conservation practices are needed in both watersheds, but they are particularly important in Pindars. Food crop agriculture is practiced on more than 34% of the land available in the Pindars area and on 29% in the Two Meetings area. However, since recommended terracing practices are unlikely to be implemented soon on all farms, other types of soil conservation practices should be studied to suit the present cropping systems and economic conditions of the small farmers. It would be advisable to do contour strip cultivating, using the hillside ditch approach with permanent crops on slopes steeper than 30°. Along the borders of the contour, edible or common bamboo could be grown as soil retaining fences.

Soil Types and Fertility

According to the Soil Technical Guide Sheets of the Ministry of Agriculture, the Pindars River area has several soil types; predominant is #34, called Diamonds, gravelly clay loam, occurring in steep to very steep topography.

Depth goes from shallow to medium, which promotes serious erosion of top soil under annual crop cultivation. Fertility is moderate (N low, P medium, K medium) with neutral reaction and rapid internal drainage. Soil conservation practices for soils under food crops are necessary.

In the Two Meetings watershed, there are also several soil types, predominantly Wirefence clay loam (type No. 32), occurring in gentle to steep slopes. It is a deep soil, moderately well drained, but with a tendency for waterlogging in heavy rain periods, causing surface runoff and severe erosion of land in annual crops. Fertility is low in N and P and moderate in K; reaction is acid. Soil conservation practices are necessary.

Present Land Use

In the Pindars River watershed, 36% of the land is fallow, the highest proportion of land use of the area. Ruinate and bamboo is second with 27%. Mixed food and forest trees are the most common agricultural use (15.4%), sugar cane is the most important single crop (11%), and food crop agriculture comprises 8% of the land.

In the Two Meetings watershed, the largest proportion of land (46%) is fallow. The second largest is under agriculture (29%), of which bananas occupy 19%. The rest of the land (22%) is in ruinate and bamboo, which, added to fallow land, makes around 68% of the land unproductive.

FOOD CROPS

Tubers and Roots

Yellow yams and other yams (negro, white, etc.) of the species Dioscoria are the most important food crops in Jamaica and are grown in various soil types and slopes. All these are cultivated under mixed or intercropping systems, in association with other tuber species or with maize, red peas, and some vegetables. Yellow yam is the most important crop in the cropping system. Yields of yellow yams are relatively

low; the main limiting factors are nematodes, poor seed, and low fertility of the soils. The other yams, too, have low yields due to nematodes, anthrachnose, and poor seed.

Cocoyams (Xantomona) and dasheens (Colocasia esculenta) are cultivated with yams and other crops as intercrops. Sweet potato (Ipomoea batata) and cassava (Manihot ultissima and M. palmata api) also are very important crops, well adapted to Jamaica's ecological conditions and valued as high-calory foods. Pests, diseases, and low soil fertility limit their yield.

To improve production, research is needed on introducing and testing new high-yielding, better quality varieties with resistances to diseases (cassava) and to nematodes (yams). These varieties should be included in the cropping systems research trials at Allsides and at additional new sites. More economical fertilizer formulations and density of plantings should also be included in the cropping systems research to produce technological packages more acceptable to small farmers.

The Irish potato is produced in the Two Meetings watershed at altitudes above 1,800 feet. Yields are low as compared to other local crops and to potato production in ecologically better suited areas. The main limiting factors are lack of adequate conditions for optimum production and the continuous presence of pests and diseases. This crop, using the present varieties, is poorly suited for further improvement of yields. Variety trials should be made with new clones now being developed by the International Potato Centre (CIP) for lowland tropics.

Legumes

Red peas (Phareolus vulgarus) are the main vegetable protein food source in Jamaica. Beans are planted twice a year (March-April and August-September) as a mixed crop with maize, yam, Irish potato, and cassava. Yields are very low due to diseases, pests, poor ecological adaptation, and lack of resistant varieties. If this crop is to be maintained because of tradition, tests with new red and black early varieties from CIAT, dates and densities of planting, and fertilizer trials in cropping systems should be made to search for better yielding types. Beans intercropped with cassava, maize, and sweet potato (beans planted one month earlier) have produced excellent yields in Costa Rica. There are several black bean varieties that could give better yields than the common red beans.

Cow peas (*Vigna unguicularis*) of a black-eyed variety are grown to some extent in Jamaica. This is a great potential crop to replace red peas as a main protein source in areas below 2,000 feet with high rainfall. It is more adapted to wet conditions and also will tolerate dry conditions better than do common beans and is less affected by diseases and pests. There are new high-yielding cow pea varieties (Centa 101, VITA-2 and others) that should be introduced and tested to be included in the cropping systems of the Jamaican small farmers, eventually to replace the low-yielding red peas.

Gungo peas (*Cajanus cajan*) are a common legume in small farmers' holdings of both watersheds. This species would be more suited to the ecological conditions below 2,000 feet. The varieties used at present are apparently light-sensitive, grow tall, and yield only in short-day periods (end of the year). Gungo beans are planted in pure mixed croppings and are used also for shading new cacao and coffee plantings. New short-stem, light-insensitive varieties should be tested and distributed to small farmers. Introductions from ICRISAT, Puerto Rico, and Trinidad should be tried.

Cereals

Maize is the most important grain cereal grown in the two watersheds. It is planted twice in the year as an intercrop with beans, Irish potato, yams, and cassava. The main limiting factors are poor varieties, pests and diseases, and low soil fertility. Improved, open-pollinated varieties (Tuxpenoi--short plant), pest and disease control, and fertilizer recommendations in cropping systems should be studied to improve corn production.

Sorghum and millets are very seldom grown in Jamaica. Research should be done to introduce varieties that could be grown in the fall planting season and harvested in the December to March dry spell.

Vegetables

Most of the vegetables grown in Jamaica are used fresh for local consumption; some go to processing plants. They are produced by small farmers with traditional technology, characterized by low use of agrochemicals, the use of unselected varieties, and poor crop management.

Crucifers: Cabbage, lettuce, broccoli, celery, cauliflower

Cabbage gives two crops in the year and does better at higher altitudes and lower temperatures. It is a good crop for small farmers. The main limiting factors are lack of adapted varieties, insect and disease attacks, and poor quality. Good technological knowledge on managing fertilizers and controlling pests and diseases is scant. Lettuce, broccoli, and cauliflower are also grown at high altitudes, mainly in the fall/winter; they cannot be successfully cultivated all the year. Production and quality are apparently low. For all these crucifers, research is needed on new varieties (from Taiwan, Japan, California, Florida), fertilizers, and insect and disease control; adequate storage and marketing facilities are also needed.

Solanaceae: Tomato, peppers, eggplant

Tomato, the most important of these crops, is planted all year around in single stands at intermediate and high altitudes. A relay crop of tomato planted between rows of maize stalks to support the tomato is being practiced successfully in El Salvador. Tomatoes are planted at the time when corn ears are bent and begin to dry out. Similarly, cucumber is relay-cropped with maize. Tomato production is mainly for fresh consumption. Jamaica imports paste for the canning industry.

Production could significantly increase with new varieties for fresh use and for processing, to be produced all year around; better management of fertilizers, weeds, and pest and disease control would also help. Field testing of nematode- and blight-resistant varieties is urgently needed, as well as research on land rotation practices to minimize buildup of diseases and pests.

Sweet and hot peppers and eggplant have good potential for improved production with new varieties and research on the best planting and horticultural practices.

Cucurbits: Cucumber, pumpkins, squashes, chocho

Cucumbers, pumpkins, and squashes are grown by small farmers both as intercrops and as single stands. Production is low. Chocho (*Sechium edule*) is a common vegetable grown as a backyard crop up to an altitude of 3,000 feet; it has good

export market potential. Yields of all these crops could be improved by adaptation trials.

Onions

Onions are another important crop for small farmers of the hillsides. Production is concentrated in the first half of the year and the product becomes scarce and expensive the other part of the year. Selection and adaptation of late rot-resistant varieties to expand the harvesting period is needed. Education on proper drying and storage is needed. Introductions from Taiwan, Japan, and California should be tested. Also, weed control and fertilizer recommendations should be studied.

Carrots

Carrots are also produced by small farmers on the hillsides all the year around, as an intercrop or alone. New varieties could help improve production.

Other vegetables

Radish is a crop that has lent itself to very efficient production, intercropped between maize rows when planting both crops at the same time. Radishes are reaped 30 days after planting and benefit from the fertilizer applied to the maize. They provide a rapid return and do not affect the maize production. Spinach varieties should be tried in the fall period at altitudes above 2,000 feet similar to those for lettuce and cauliflower. At lower altitudes amaranthus is a good green vegetable.

PERENNIAL CROPS

In the Pindars River watershed, the important perennial crops are sugar cane, citrus, cacao, coffee, and other food/fruit trees. In the Two Meetings watershed, bananas are the most important semiperennial crop, followed by citrus, coffee, cacao, and other food/fruit trees.

Sugar cane is planted at various altitudes and on various slopes around Pindars River. Yields are low, but it has a good sugar content. This is a crop that protects soil from erosion and will be kept by the farmers until there is an acceptable substitute. Since farmers will resist shifting from sugar cane, a better use of the area should be encouraged: intercropping cow peas (or red peas) immediately after planting or after

harvesting. Beans are sown in the interrows of sugar cane and in 60 to 90 days the crop is harvested without affecting sugar cane growth. Beans benefit from residual fertilizers used on sugar cane. This practice can substantially increase the acreage of pulse production for small farmers.

Coffee is produced on small farms, but the yield is very poor due to the variety used (Arabica typica), old age of the plantings, wide spacing, and inadequate management of shade and fertilizers. Yields could be almost doubled by replanting the same areas with new high-yield varieties of Arabic coffee (Caturva, Bourbon, Villalobos) or some rust-resistant varieties. Replanting does not necessarily mean cutting off all the old coffee plants. The new plants should be established in rows between the old coffee trees, planted at 3 feet in the row, 4 feet between rows. Hillside ditch terraces or orchard terrace systems for individual plants should be used. Gradual pruning and removal of the old coffee trees should be made to open light and space for the new plants. Good fertilizer and disease control should be given to the young plants. The total removal of the old coffee plants might take three or four years, leaving a complete new high-yield, full-bearing stand. Shade trees should be removed or cut back to a minimum. Under these conditions and with good management, coffee production could realize 600 to 800 pounds of dry beans per acre.

Cacao is another crop that has very low yields due to age, excessive shade, rat damage, and black pod disease. Old plantings could be replaced by new ones by a method similar to that suggested for coffee, using hybrid seedlings. In young plantings, a good management of shade and opportune control of black pod could significantly improve production. This is a good crop for soil conservation. Bananas are good to use as medium-term intercrop plants in both coffee and cacao plantings. Perennial trees--all food/forest trees, for instance--can be planted as permanent shade.

Of citrus types, orange, grapefruit, lemon, lime, and ortanique are the species most common in the two watershed areas. Yields apparently are low, but citrus could be increased substantially with better fertilizer treatments, prunings, and weed, insect, and disease control. The good market for fresh fruit and the presence of canning industries for juice export are an impetus to increase citrus plantings. Citrus could be grown even on slopes up to 30° on small farmers' lands, using terracing methods. Small tangerine plantings could be increased above a 2,000-foot altitude on the hillsides.

Avocado is an economical and potentially good crop for export. For this purpose small plantings could be made with budded clones of local Antillean selections for the lowlands and Guatemalan clones for altitudes above 2,000 feet. They could be planted on hillside lands, with adequate soil conservation practices, good fertilizer, and good horticultural management. Using an appropriate series of varieties, it should be possible to have avocado in production most of the year.

Mango is another species that offers good economic possibilities for export as canned juice, pulp, or even as fresh fruit if selected varieties are planted. Mangoes are predominant among the food-trees in the landscape of the Pindars River and Two Meetings watersheds. They are unselected seedlings of little market value. Trials should be made with buddings of new commercial varieties on basal suckers or low branches of old mango trees; this process could slowly raise high-quality mango production. Once the buddings have been established, gradual or partial removal of the adult trees should be encouraged. Small plantings with budded plants of improved mango varieties should be promoted in hilly land.

Plantains should be maintained for their economic value. Plantain presently has good export possibilities and plantings should be expanded provided that nematode control is practiced.

Pineapple, pawpaw (papaya), guava, and ackee also have a good economic potential if tied to agroindustry. All these crops are suited for small farmers' hilly lands, under appropriate soil conservation practices.

Jamaica has an acute shortage of edible vegetable oil. Oil palm could be an economic crop for small, medium, and large farmers if an oil extracting and processing plant could be established. It is a labor-intensive crop that might grow up to 1,000 feet above sea level in both watersheds. Isolated plants were observed in several locations in the Pindars River area. Field and adaptation tests should be made with hybrid seeds introduced from Nigeria, Ivory Coast, or Malaysia. These hybrids start bearing in 3 to 4 years; in the meantime food crops could be grown between palm rows. Contour plantings under soil conservation systems could be used.

Pejibaye (Guilielma gasipaes) or peach palm tree produces good yields of edible fruits rich in Vitamin A and carbohydrates and containing up to 3% protein. Besides the fruit production, the best economic value of this species is as heart of palm for canning. The species is adapted to acid and neutral soils, withstands excess water and brief water shortages. It grows well at altitudes from sea level up to 2,000 feet and could be planted on intermediate slopes.

Macadamia nuts have an excellent market potential for export, and the tree should be tested in both watersheds at altitudes from 1,000 to 3,000 feet. If adapted, it could be established on gentle hillside slopes. Production starts 6 to 7 years after planting, but rows could be intercropped with coffee, pineapples, or even annual crops.

Passion fruit (Passiflora edulis) also has a good economic potential for small farmers if tied to agroindustry: it is suited to small farms on hilly land, under appropriate soil conservation practices. Reportedly, it grows well in Jamaica, but people do not accept the flavor. If production were tied with a canning industry, it could become a valuable crop for small farmers as high yields can be obtained in small areas. There are several varieties available in Venezuela and Brazil.

Naranjilla (Solamun quitoense) is a fruit that could grow well at altitudes above 2,000 feet in hilly lands of both watersheds. It is a semiperennial crop of high-yield potential, but economic marketing would require a canning industry.

SPICES

Jamaica is a traditional exporter of pimento, ginger and nutmeg. Ginger is still being produced on hillsides, often intercropped with yams and other tuber crops or as a pure stand. However, farmers have been advised not to continue planting ginger on steep slopes because of the severe erosion it incurs. A good market exists for this spice and ginger production should be encouraged on terraced or flat or slightly undulating land.

Most of the pimento or allspice (Pimenta officinalis) produced presently in Jamaica comes from old backyard trees. No organized pimento orchards are reported and people claim that this crop has not been promoted because the trees take a long time to bear. However, there are reports that by budding selected material on young seedlings, earlier production could be obtained. This approach is very practical and has been successful with other long-cycle crops. Pimento production could be increased by setting budded plants as living fences at borders of properties or as small orchards on steep slopes near farmers' homes. Research is needed on selection, vegetative propagation techniques, and disease control. It is quite possible that budded trees will branch at levels closer to the ground, making reaping easier.

Nutmeg has also a good export market and plantings could be expanded on hillside areas, provided the soil is deep. Small orchards could be set on flat land or, by contour planting, on slopes.

Black Pepper (Piper nigrum) is another spice with a good international market that could be grown by small farmers on terraces and gentle slopes. It is a labor-intensive crop and climbs on poles like yams. Research will be needed to test varieties for production, disease control, weeding, and fertilizer practices.

Annatto (Bixa orellana) grows well in the two watersheds and has a good export market potential. It could be grown with contoured hillside ditches or orchard terracing. Varietal, disease control, and fertilizer trials should be made. Intercropping with annual food crops (maize, red peas, cow peas, sweet potato) could be done during the first two years in the interrow spaces until the tree canopy closes.

SOCIOLOGICAL ANALYSIS

SUPPLEMENTAL SAMPLE SURVEY OF ROLE OF WOMEN

To define more clearly the role of women in this project, additional information was collected by interviewing a 10% sample of spouses from the farmer survey, for which tables are presented. The following five tables summarize the available data on the role of women, as compared to similar questions in the general survey.

TABLE 1. MARITAL STATUS*

	Farmer Survey - Males		Women Survey	
Response	No.	%	No.	%
Single	629	20.3	-	-
Married	1,768	57.1	2,259	63.2
Widowed	134	4.3	-	-
Divorced	6	0.2	-	-
Common-Law	528	17.0	548	15.3
Other	-	-	765	21.4
Not stated	33	1.1	-	-
TOTALS	3,098		3,572	

* Of the 3,121 male operators, 3,098 had "spouses." The single, widowed, divorced and not stated could be included under common-law when union status is considered.

TABLE 2. MAJOR DECISIONS ABOUT FARM OPERATIONS

	Farmer Survey - Males		Women Survey	
Response	No.	%	No.	%
Mostly I	730	23.6	1,035	29.0
Mostly my spouse	74	2.4	1,046	29.3
My spouse and I together	1,480	47.8	1,280	35.8
The whole family together	36	1.2	105	2.9
Other	-	-	107	3.0
No response	778	25.1	-	-

TABLE 3. CONSULTING WITH SPOUSE WHEN CHANGES ARE MADE ON THE FARM

	Farmer Survey - Males		Women Survey	
Response	No.	%	No.	%
Consult with spouse (Spouse does not consult)	2,011	64.9	2,325	65.0
Agree right away	(328)	-	(293)	
Agree only after careful thought	(1,663)	-	(1,838)	-
Care very little	(11)	-	(89)	-
Disagree	(10)	-	(0)	-
Other	(0)	-	(105)	-
No response	(9)	-	(0)	-
Do not consult (not consult)	294	9.5	1,246	34.9
No response	793	25.6	-	-

TABLE 4. FARM INCOME CONTROL

	Farmer Survey - Males		Women Survey	
Response	No.	%	No.	%
I take charge and decide how to spend	420	13.6	1,248	34.9
My spouse takes charge and decides how to spend	368	11.9	499	14.0
My spouse and I plan together	1,520	49.1	1,665	46.6
Other	6	0.2	160	4.48
No response	784	25.3	-	-

TABLE 5. TRAINING OF SPOUSE FROM FARMER SURVEY

Response	No. of Farmers	%
Field days	157	5.1
Training division of Ministry of Agriculture	28	0.9
On-farm training	1,997	64.5
Long-term formal training	0	0
Other	77	2.5
No response	839	27.1

PROPOSED PROJECT FOR PINDARS RIVER AND TWO MEETINGS WATERSHEDS
Integrated Rural Development

ANNEX S

TECHNICAL ASSISTANCE AND TRAINING REQUIREMENTS

Scopes of Work . . . . . S 2

Horticulturalist . . . . . S 2

Farming Systems Specialist . . . . . S 2

Soil Conservation Engineer . . . . . S 3

Agricultural Extension Advisor . . . . . S 4

Marketing/Agroindustry Specialist . . . . . S 4

Agricultural Credit/Farmer Organizations Specialist . . . . . S 5

Agricultural Production Economist . . . . . S 5

Characteristics of Team Leader . . . . . S 5

Short-Term Assistance . . . . . S 6

Technical Assistance Costs . . . . . S 6

Training Requirements and Costs . . . . . S 7

TECHNICAL ASSISTANCE REQUIREMENTS

SCOPES OF WORK

Horticulturalist

This specialist should have a very good practical knowledge of tropical agriculture. He should be a generalist to the extent that he has experience with tree crops such as coffee and cocoa, but have more specific knowledge of tropical root crops such as yams and cassava, and of pulse cultivation in the tropics. He must also be knowledgeable about banana production, both in pure and mixed stands with intercropping of coffee and other crops. He should have experience working with small farmer operations rather than with plantation agriculture. A minimum of 10 years' experience working under tropical or subtropical conditions should be required. This specialist should have experience in and be capable of developing and evaluating research projects with a minimum of assistance and technical backstopping. He should have worked as an extension specialist or directly with result-oriented applications of his specialties. He should be a cooperative person and able to develop an outreach program in cooperation with the other specialists and the agricultural extension personnel. A person in this position will be required for three years.

Farming Systems Specialist

The person recruited to fill this position will play a unique role in the development of the project. He should have wide experience in tropical agricultural development as it relates to small farm activities. Training in farm management is essential. The ability to combine agronomic and economic information into a single technological package will be necessary. This specialist should have experience working with multiple cropping and intercropping systems under situations similar to Jamaica. He should have experience developing agricultural systems for use on bench terraces and other soil conservation structure. Experience working with fertilizer trials and determining optimal economic applications for various crops under tropical conditions will be required. This specialist will work closely with the extension service and with the other members of the technical assistance team. He will be required for three years.

Soil Conservation Engineer

This specialist will be in charge of the overall supervision of the entire soil erosion control program. He will work with the local engineers and soil conservationists to carry out the project as originally planned in the UNDP/FAO report. Improved waterways and other structural designs should be developed by him to reduce the cost of program implementation. This person should have experience working with both machine and manual construction of bench terraces, hillside ditches, and orchard terraces on land with slopes up to 30°. The average land holdings in this project are under three acres, so this scientist must know how to develop a program with small land holdings. Since the project consists of total treatment of two watershed areas, knowledge of erosion control and watershed management overall will be required. Because the project's approach is integrated, the soil conservation engineer must work closely with the horticultural, agricultural extension, and farming systems advisors. He will advise the project director on all aspects not only of soil conservation but also of other engineering matters such as stream bank protection and road erosion control. This specialist will be required for four years.

Agricultural Extension Advisor

The person selected to fill this position should have wide experience creating agricultural extension programs in developing countries. He must have designed and developed implementation activities that were related to small farmers. This specialist should have helped develop local group participation in programs involving drastic technological changes that cover all facets of production such as new crops and varieties, fertilizer use, agricultural credit, and marketing. This officer should be experienced with the use of audiovisual aids and their production under less than ideal conditions. Experience with programs involving soil conservation would be useful but not critical.

The agricultural extension advisor will organize all the extension activities in the project area and will report to the project director and the Southern Region director. He will coordinate his program with the respective parish managers and keep them informed about routine extension matters, including those not directly related to the project. He will work closely with the other members of the TA team, both in terms of implementing programs for improved technology and also organizing farm groups for marketing,

supplies, and agroindustry links. He will be required for four years.

Marketing/Agroindustry Specialist

This person, as the title implies, will play a dual role. The primary concern would be to help improve the existing marketing system and develop changes where required. He will work with the local JAS chapters to organize marketing groups. Present industries using agricultural products will be assisted in getting a more certain supply of raw materials. New industries will be developed as the need arises and as they are identified.

The holder of this position should have experience working with tropical agricultural produce. He should have worked with small-farmer organizations in developing countries. Knowledge of the handling and storage of perishable tropical fruits and vegetables will be essential. This position should be filled on a full-time basis for two years in the second and third years of the project.

Agricultural Credit/Farmer Organizations Specialist

The specialist selected to fill this position must have overseas experience working with small farmers in developing countries. He should be well informed on credit delivery systems and the organization of local lending institutions. Experience in situations where innovative credit systems such as group or cooperative lending have been tried is desirable. This person should have a good knowledge of agricultural cooperatives in general but particularly of their organization for serving the small farmers. He should be able to help train local credit institution staff as well as local cooperative managers.

The person selected for this position will work closely with the local JAS groups and organize them to provide inputs for their members. He will work closely with the agro-industry/marketing advisor and help develop marketing cooperatives where required. He will work with the several PC Banks that serve the project area to develop a viable and timely credit system for the small farmers. He will be required during the first three years of the project.

Agricultural Production Economist

This scientist will be extremely important, in both the implementation and the evaluation of the project. He will work with the other members of the TA team to determine cost/benefit ratios of various agricultural enterprises. He will work with the farming systems specialist to determine farm production costs and the value of the products. He will work with the Data Bank and Evaluation section of the Min Ag to monitor the progress of the project and help identify changes that might be required.

A person with overseas experience should be selected, but professional capability should be given the greatest emphasis. He should have a strong background in farm management from an applied rather than an academic approach. The ability to analyze various alternative cropping systems and to determine their relative economic feasibility will be of prime importance. This advisor will be needed for two years.

CHARACTERISTICS OF TEAM LEADER

This individual will have other duties as either the agricultural extension or soil conservation advisor. No specific field of training or expertise can be indicated for this individual. He should have a general knowledge of all phases of tropical agriculture. Experience working with and knowledge of agricultural extension, agricultural credit, and farmers' organizations, as well as soil conservation programs, would be most helpful. This person should have worked with agricultural development programs in developing countries. This experience should include administrative roles dealing with people of different cultures. His leadership capability will be extremely important.

The person in the position of team leader will work directly with the project director and in effect will be the codirector. He will report directly to the rural development officer of USAID/J and keep him fully informed of the project. He will also work directly with the various sections of the Min Ag involved in the different stages of project implementation. He will be responsible for the activities of all the members of the TA team, and help to coordinate to achieve maximum results. He will be responsible for monthly progress reports and the implementation and control of any record-keeping system required by AID. He will also help identify and schedule short-term assistance as required under the TA contract.

SHORT-TERM ASSISTANCE

Under the TA portion of the project, a total 60 man months of short-term assistance will be provided during the life of the program. Specialties will include but not be limited to the following fields: small group organization (6 months), heavy equipment operation, maintenance and inventory control (6 months) specialized horticultural and agronomic areas (12 months) livestock and dairy production (6 months), tropical pasture development (3 months), rural housing (6 months), agroindustrial development (6 months), food storage and processing (6 months), home economics and nutrition (3 months), and plant pathology and entomology (6 months).

TECHNICAL ASSISTANCE COSTS

Position	Term (Yrs)	Yearly Cost	Total Cost
Project Officer	4	AID Direct Hire	
Soil Conservation Engineer	4	US $60,000	US $240,000
Ag Extension Advisor	4	60,000	240,000
Horticulturalist	3	60,000	180,000
Farming Systems Specialist	3	60,000	180,000
Marketing/Agroindustry Specialist	2	60,000	120,000
Ag Credit/Farmer Organizations Specialist	3	60,000	180,000
Ag Production Economist	2	60,000	120,000
Subtotal			US$ 1,260,000
Short-term advisors	60 months	US$ 4500/ month	270,000
Total TA Requirement			US $1,530,000

TRAINING REQUIREMENTS AND COSTS

The immediate manpower requirements for this program have been considered in the organizational framework and staffing pattern suggested by the GOJ (Annex U). Medium and long term requirements and related training needs are presented below, with a view toward manpower requirements in the final years of the project and requirements for program replication. The list is illustrative of the types of people needed and will be finalized prior to any disbursements of participant training funds.

TRAINING REQUIREMENTS AND COSTS

No.	Field of Study	Time (Mos)	
2	Soil conservation engineering	18 each	
1	Land use and soil conservation	18	
1	Integrated watershed and rural development planning	18	
1	Agronomic conservation measures	18	
1	Soil conservation administration and legislation	6	
1	Soil conservation district organization	6	
2	Tropical horticulture	18 each	
4	Agricultural extension	18 each	
2	Farming systems specialty	18 each	
2	Agricultural economics - production	18 each	
2	Agricultural economics - marketing	18 each	
1	Entomology	18	
1	Plant pathology	18	
1	Tropical pastures	6	
1	Agroindustry development	18	
1	Agricultural cooperatives	18	
1	Soil fertility	18	
1	Soil structure	18	
2	Agricultural credit	18 each	
2	Data analysis and evaluation	12 each	
	Participant training costs		US $ 410,000
	Local training costs (Specialized in-country seminars)		60,000
	TOTAL		US $ 470,000

ANNEX T

PROPOSED PROJECT FOR PINDARS RIVER AND TWO MEETINGS WATERSHEDS
Integrated Rural Development

MACRO-ECONOMIC SURVEY

1977 Economic Situation..... T 2

Causes and Consequences of
Jamaican Economic Problems..... T 7

Economic Strategies for
Assistance to Jamaica ..... T 10

ECONOMIC OVERVIEW

I. 1977 Economic Situation

In recent years the Jamaican economy has suffered from severe internal and external disequilibria, as manifested in a growing chronic balance of payments gap, a large and growing fiscal gap, a growing rate of unemployment and underemployment, and declining rates of growth in all sectors except the government sector. Highly dependent upon foreign financing and the import sector, Jamaica's increasing isolation from traditional sources of foreign credit has -- by mid 1977 -- placed the island's economy in a position where even short-run survival is questionable unless massive international support becomes available almost immediately.

A brief look at some of the key economic performance indicators gives a general idea of the magnitude of Jamaica's current problems.

A. Balance of Payments and Foreign Exchange Reserve Position

Jamaica's overall balance of payments situation has deteriorated significantly over the past several years. By mid-year, 1977, its net foreign exchange reserve position had dropped to an estimated negative $US200 million, with gross reserves estimated at approximately $16 million, the equivalent of approximately ten days of imports. (It should be noted, however, that because part of the gross reserves are composed of SDRs and other statutory requirements, it is possible that, for all intents and purposes, its gross reserves are close to zero).

1. Current Account

Table 1 shows Jamaica's balance of visible trade from 1966 through 1976, demonstrating the increasing deficit.

Table 1
Jamaican External Trade, 1966-1976
(in thousands of J$)

Period	Imports	Exports	Balance of Visible Trade	Ratio of Imports: Exports
1966	233,706	162,873	-70,833	1.43
1967	252,579	163,314	-89,265	1.55
1968	320,346	183,003	-137,343	1.75
1969	363,301	211,780	-151,521	1.71
1970	437,839	284,832	-153,007	1.54
1971	459,754	282,704	-177,050	1.63
1972	493,165	300,758	-192,407	1.64
1973	604,499	354,719	-249,780	1.70
1974	850,781	664,446	-186,335	1.27
1975	1,027,100	719,471	-307,629	1.43
1976	829,785	561,623	-268,162	1.48

SOURCE: Department of Statistics, EXTERNAL TRADE

It will be noted that imports and exports have grown on a fairly parallel basis, as witnessed by the lack of major unexplained variations in the ratio of imports to exports.[1/] This can largely be explained by the fact that there is a high ratio of imported goods to production in Jamaica. In the manufacturing sector, including the bauxite/alumina industry, for example, the ratio of imported raw materials to gross value of output is estimated to be 0.39. Any increase in exports, then, is tightly tied to increased imports.

1. The apparent exceptions are: 1968 and 1969, when imports for the bauxite industry were extraordinarily high, and 1971-73 when tourist infrastructure investments were at a peak.

It is, nonetheless, true that excess liquidity in the economy during the past few years, combined with a lack of parity between Jamaican currency and the so-called "hard" currencies,2/ created a high import propensity for consumer goods. At the same time, agricultural output was declining, giving rise to increased demand for food imports. Finally, the increased world prices for petroleum and petroleum based products -- upon which Jamaican industry is heavily dependent -- added a considerable excess burden to the overall import bill.

On the export side, there has been a declining trend in the last few years; in 1975 exports grew at a considerably lower rate than imports (8% compared to 20%), a trend which was diminished, but nonetheless maintained in 1976 when imports fell by 19% and exports fell by 22%. Prospects for exports for 1977 are cautiously qualified as "better", due to increased bauxite/alumina production and prices, but preliminary indications are that manufactured exports may be down as much as 50%.

At the same time, the tourist industry has not lived up to its expected potential as a foreign exchange earner. Hotel room occupancy rates are currently running between 35 and 40%, and net receipts (tourist inflow minus amounts spent by Jamaicans abroad) are not expected to exceed $65 million in 1977.

In keeping with austerity measured announced in February, 1977, the GOJ has instituted a new system of import licensing, and originally anticipated maintaining the line at a vastly reduced overall import bill of $J650 million. Currently, GOJ officials expect that this will eventually rise to an estimated $J860; exports could amount to $J660, if current bauxite/alumina projections are correct. A current account shortfall of about $200 million is thus anticipated in 1977.

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2. In May, 1977, the GOJ announced that the Bank of Jamaica had adopted a dual exchange rate system under which a Basic Rate (based on the prevailing rate of J$0.91 = US $1) will prevail for government transactions, transactions of the bauxite/alumina sector and the import of essential goods, whereas a new Special Rate of J$1.25 = $1 would be used in other transactions. The Special Rate signifies a devaluation of 37.5% over the Basic Rate, and was expected to have a devaluation of 37.5% over the Basic Rate, and was expected to have a deflationary influence on non-essential imports while at the same time giving a greater comparative advantage to locally-produced goods and stimulate the flagging tourist industry.

2. Capital Account

On the capital account side, the picture is even less bright, as little (if any) new capital inflows have been attracted. By rolling over some bilateral loans, principally $25 million received from Canada as balance of payments support in late 1976, the GOJ has not yet experienced a net negative position on its official capital account; on the private capital account, however (including direct investment, government-guaranteed borrowing and other pricate capital transactions), outflows exceeded inflows in 1976 and the same trend has continued through the first half of 1977.

3. Summary

Jamaica's 1977 balance of payment picture is not bright. Given an estimated $J200 million deficit on the current account, and a potential capital account deficit which could go as high as $50 million, Jamaica's alternatives are extremely limited. Up to the present the GOJ has honored its government and government-guaranteed debt commitments, using trickles of new foreign credits as well as rolling over previous commitments, but if the present picture continues it is likely that the GOJ will have to begin to default on at least the government-guaranteed debt, thus putting Jamaica officially in arrears.3/

B. Public Finance

A growing fiscal gap has occurred in Jamaican public finance in recent years, occasioned by increased government expenditures (including priority social welfare employment programs and subsidies), and a diminishing tax base. In 1975/76 the total deficit was J$106.7 million; in 1976/77 this grew to J$366.8; the current 1977/78 approved budget calls for net public expenditures totalling $1.273 million, compared to estimated internal current and capital receipts of $669.4 million. Assuming $126.6 million in transfers to the Treasury from the Capital Development Fund, a total of $478 million will be needed to finance the gap.

3. For some time payments due on the private external debt have been postponed through the simple mechanism of BOJ's not authorizing foreign exchange remittances abroad.

In the past years, the standard procedure for the GOJ was to cover that part of the gap not financed from external sources (primarily institutional loans) by deficit financing through the BOJ, creating an expansionary monetary trend. By creating an excess liquidity situation during a period in which actual productivity was falling in most sectors, serious disequilibria were created between purchasing power and productive capacity. This, in turn, increased the propensity to import, thus exacerbating the overall balance of payments problems outlined above.

A precondition to Jamaica's receiving IMF support over the coming months will be its ability to deal with the fiscal gap through other means than BOJ deficit financing.

C. Industrial Productivity

Overall production declined markedly during 1976 in nearly all key manufacturing sectors, causing some GOJ officials to estimate that GDP may have dropped by as much as 10% during the year. The biggest declines registered in 1976 were in bauxite production (an estimated -25%), alumina (-45%), steel (-10%) and cement (-15%), with increases noted in flour (20%), animal feed (10%), cornmeal (32%) and electric sales to industry (17%). The principal factors behind the generally poor performance were persistent labor problems (strikes and go-slow conditions), as well as a generalized uncertainty on the part of investors as to future political and economic directions of the country.

The outlook for 1977 includes an expected upturn of the bauxite/alumina industries, fostered by an improved world market outlook, but still lower production (based on 1976) levels for most other sectors. Investor uncertainty is still a critical factor (BOJ officials noted that new loan applications for new or expended productive activities were practically nonexistent during the first half of the year), but this has been compounded by the foreign exchange squeeze. While most major industries have sufficient inventory stocks to maintain production 4 to 6 months, once stocks are depleted the industry must either import or stop production.

D. Agriculture Sector Performance

As indicated in section , the performance of the agriculture sector has been disappointing in recent years. Basic infrastructure has been largely ignored, credit channels are cumbersome and are not effective in reaching small farmers on a timely basis; the marketing system lacks basic infrastructure and rests largely upon a disjointed system of 'higglers', or commercial middlemen who reap the bulk of the profits. Few incentives have been provided the farmer with the result that rural-urban migration has been accelerated (especially among the younger rural inhabitants recently entering the labor force), and idle capacity has been increasing to the point where an estimated one-third of potentially productive agricultural land is not currently under cultivation.

A key element in the Emergency Production Plan is the revitalization of the agricultural sector, through the provision of basic infrastructure, credit, and reorganization of the marketing system. The Plan calls for a 30% increase in basic food production during 1977. While it appears doubtful that this goal can be reached in the time frame originally established, given capital and manpower limitations at the planning level, the ambitious goals are nonetheless indicative of the growing concern among GOJ officials that Jamaica must act quickly to reverse the actual declining trends in the sector.

II. Causes and Consequences of Jamaican Economic Problems

A. Causes

While it is difficult -- as well as dangerous -- to point to any one or two factors as being the principal causes of Jamaica's current economic problems, it is nonetheless useful, in terms of long-range economic development planning, to try to identify the major causal links which underlie poor economic performance.

Perhaps the major cause of Jamaica's current problems has been its apparent inability to scale down its lifestyle to a level consistent with its income. The 1960's was a decade of intensive investment in the bauxite/alumina and tourist industries, and the 1970's was to be the decade when the fruits of these investments were to

be reaped. During the investment stage, members of the agricultural work force were drawn to construction sites and employment opportunities in north coast tourist complexes and in the extractive phase of bauxite mining. Income levels were generally high, and the 'pull' of the urban industrial sector was probably more important than the 'push' from the agricultural sector. Higher wages in the urban sector caused a spiraling of trade union demands; excess liquidity in the system created an artificially high propensity to consume, which could not be met with local production, thus imports began to increase at a much higher rate than exports; while the government was certainly cognizant of its high rate of spending, as well as growing fiscal and balance of payment gaps, there remained an underlying confidence that anticipated economic growth of the 1970's would be sufficient to pay for the rapidly accumulating debt.

In short, Jamaica was gearing up for a decade of economic growth which never materialized. By the mid 1970's, there had occurred a major shift in the labor force, out of agriculture and into tourism, construction and bauxite/alumina, and consumption patterns -- both public and private -- had changed drastically to reflect impending prosperity.

The reasons for Jamaica's underachievement in terms of its economic growth objectives are complex, and involve a combination of political attitudes, social unrest, and fluctuations on the international commodities markets. At the risk of over-generalization, the following occurred:

-- lowered world demand for Jamaican bauxite/alumina caused a significant reduction in production over that originally anticipated. The Revere plant in Jamaica has been closed since 1975, and total Jamaican production of bauxite has dropped from 15 million tons a year to 10 million tons.

-- As the construction phase of the bauxite/alumina and tourist industries began to slow down, unprecedented unemployment occurred. In order to fill the employment gap, the GOJ resorted to heavy deficit financing to create new government jobs and public works programs.

-- Deficit financing through the Bank of Jamaica, in turn, created excess liquidity in the economy, initiating an inflationary spiral which the GOJ was unable/unwilling to bring under control.

-- The wave of violence and social unrest which accompanied increased unemployment spread quickly to north coast tourist complexes, and word spread -- often exaggerated -- to tourist agencies, cruise companies and potential tourists that "Jamaica is unsafe." Hotel room occupancy rates dropped, and tourist facilities began closing, thus exacerbating the unemployment problem. (In addition, since a large percentage of hotel facilities were built using government-guaranteed external financing, the GOJ has been saddled with debt service payments for non-revenue generating investments.

-- Whereas excess liquidity in the system strengthened demand for agricultural products, internal production began to drop markedly, a result of increased rural-urban migration.

A secondary cause of Jamaica's current inability to cope with growing economic problems is the high incidence of out-migration, especially in the professional and technical/occupational categories. The ultimate success of the Emergency Production Plan, and subsequent Five-Year Plan (due for publication in December, 1977) will depend heavily upon the human resources available to implement the plans -- agricultural and credit specialists, education planners and teachers, technicians skilled in small industry and agro-industry. Until recently it was assumed that out-migration from Jamaica was primarily a result of the 'pull' exerted by the developed countries -- greater job mobility and higher anticipated earning capacity. Of late, however, GOJ officials admit to the strong 'push' impetus emanating from Jamaica, caused by increasing urban violence and unrest as well as declining job opportunities.

B. Consequences

The consequences of Jamaica's recent economic problems include the following:

-- Major dislocations in the labor force, with too many concentrated in sectors which, because of the high dependency on foreign exchange, are the most likely to curtail, or even terminate, operations. At the same time, the agricultural sector, which must be revitalized if Jamaica is to experience medium to long term growth, has been left without a pool of human resource talent upon which it can draw;

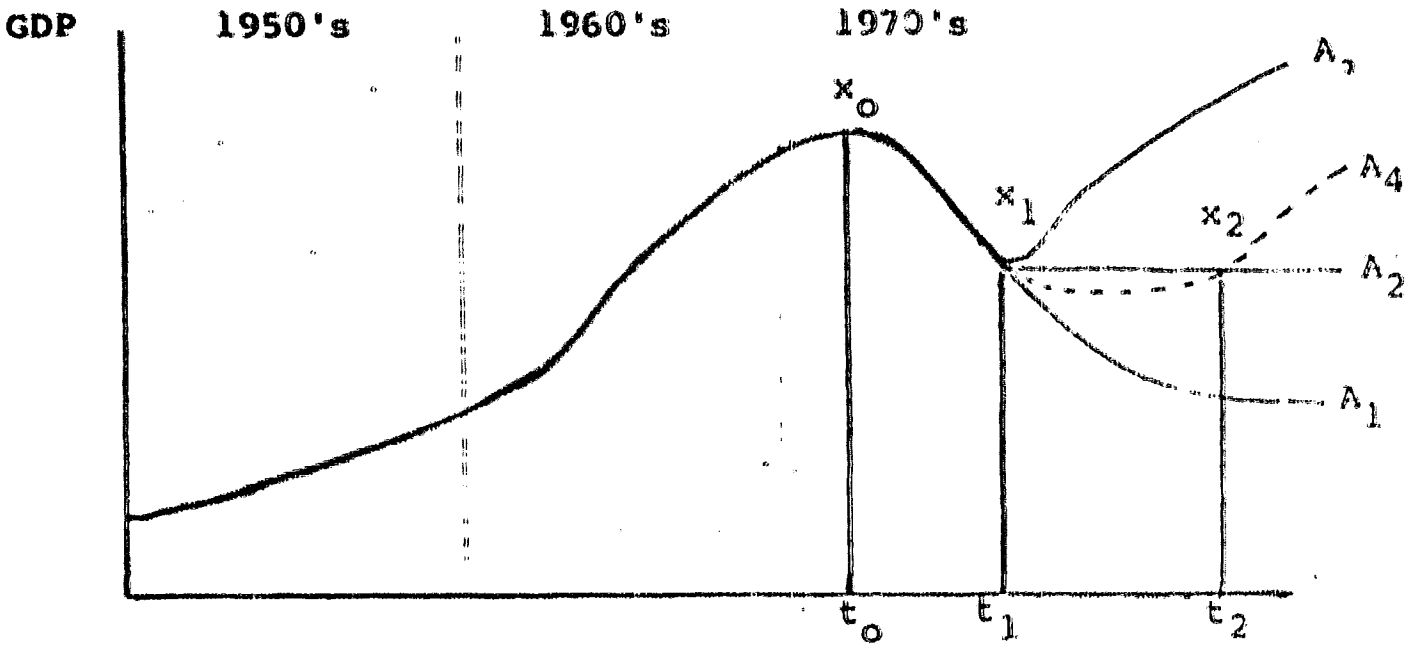
-- High rates of unemployment and under-employment, which can only grow higher as emergency economic measures -- including curtailing foreign exchange availability -- are implemented;

-- A real drop in GDP in constant price terms, estimated at about 10% for 1976, and unimproved during the first half of 1977.

III. Economic Strategies for Assistance to Jamaica

In developing a strategy for assistance to Jamaica, it is important to distinguish between: (a) short-term measures which are immediately necessary to address specific and identifiable problems affecting the economy; and (b) longer-term programs which address the deeper-seeded causes of the immediate problems. The former are readily identified, and are to some extent "bail out" measures necessary to prevent a collapse of the economic and productive system. The latter, longer-term, measures are those problem-specific programs and interventions designed to restore a structural equilibrium among the productive and human resource sectors of Jamaica's economy, to allow for the possibility of future economic growth.

The following diagram represents Jamaica's GDP curve over time. No actual monetary terms are given, and the time frame represented is simplified into three decades, the 1950's, the 1960's and the 1970's. t_1 on the time axis represents the present time, where GDP is at point x_1.



GDP which grew slowly throughout the 1950's began to ascend rapidly in the 1960's as a result of the investments in bauxite/alumina and tourism. The peak, point x_o on the diagram probably occurred about 1973; at that point, GDP began to drop for reasons outlined above.

Fourth growth alternatives, A_1 through A_4, are also graphically represented.

A_1 is the continuance of the current downward trajectory, and the probable consequences to the Jamaican economy if no remedial action were taken -- i.e. no external assistance and an inability to reorder internal disequilibria. A_2 represents a situation in which Jamaica would, in effect, bottom out on its current trajectory, and experience neither economic growth in real terms nor a situation any worse than

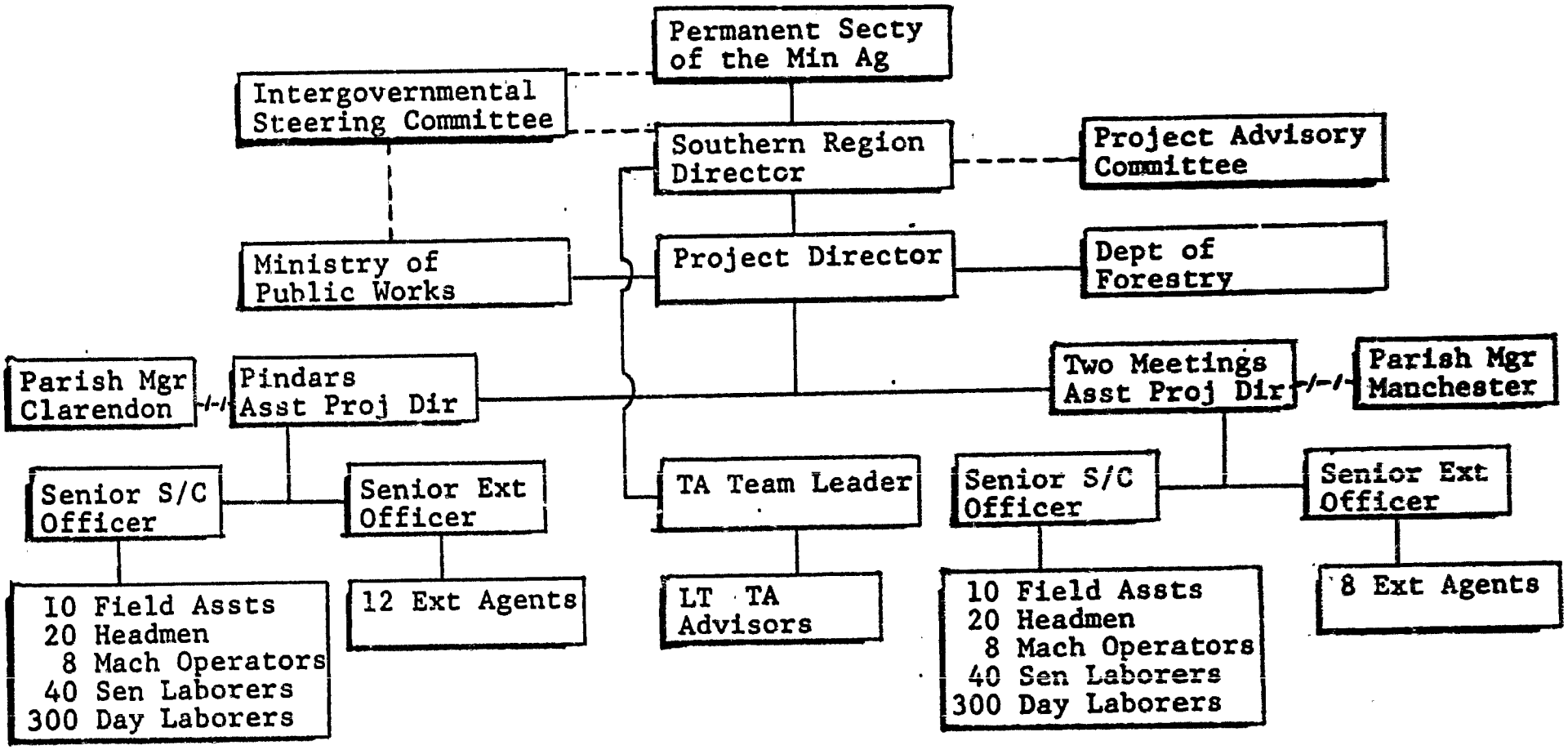
it already is. A_3, which is the ideal, is that a sudden about-face would occur, and economic vitality would be restored in the short run, bringing with it real increases in GDP. While this is the most attractive scenario, it is also the least probable of the alternatives outlined, since it presumes the possibility of growth without any restructuring of the productive sectors of the economy -- in short, it assumes that the current situation could be made viable without changing those factors which have contributed to the current decline. Realistically, this alternative would only be operative if a new unexploited resource were suddenly to be discovered or if the current world market situation for Jamaican exports were to suddenly experience a boom on the magnitude of recent petroleum upsurges -- neither being a probable phenomenon.

A_1, which is the suggested alternative in terms of AID strategy, would attempt to distinguish between short-term assistance, in the form of balance of payments and/or budget support, and longer-term development assistance. Short-term assistance is essentially needed to cover the distance between GDP points x_1 and x_2 (periods t_1 to t_2), providing 'emergency' type programs such as commodity import credits, P.L. 480 assistance, housing guarantees, etc. The actual <u>development</u> impact is likely to be minimal, as compared to assistance in the bulk of other LDCs, but it recognizes that the current Jamaican situation is such that the immediate economic emergency must first be dealt with if any future development assistance, <u>per se</u>, is to be effective. This is not to say that <u>no</u> development assistance should be provided during the short-term. During the period between t_1 and t_2, it is essential that Jamaica begin laying the groundwork for the strong development push, which can only begin once the emergency period has been passed, and AID can play a vital role in such areas as manpower training, education, and agriculture. Technical assistance in these key areas can add to the probabilities of success in Jamaica's subsequent push for long-range sustained economic growth.

When GDP reaches point x_2 -- a hypothetical point, the numerical magnitude of which must be determined by the GOJ itself and the actual timing of which is dependent upon the ability of local decision-makers to enforce both public and private discipline -- longer-term programs designed to accelerate economic growth become the appropriate tool of international assistance.

ANNEX II

PROJECT ORGANIZATION



----- Advisory function
-/-/- Administrative support function

PROPOSED GOJ STAFFING PATTERN

Abbreviations are Jamaica Government service titles.

I. PROJECT DEVELOPMENT COMMITTEE

(1) Regional Director (Southern) - SMGI
(2) Deputy Regional Director - NPS IV
(3) Director Forestry Extension - NPS III
(4) Chief Soil Conservation Officer - NPS III
(5) Director Planning and Policy Review - SMGII
(6) Director Data Bank - NPS IV
(7) Director Extension Services - SMG II
(8) Director of Research - SMG II

II. CONSULTANCY SERVICES - HEADQUARTERS - (LOCAL COUNTERPARTS TO OVERSEAS CONSULTANTS)

(1) Soil Conservation Engineer - NPSII
(2) Soil Conservation Economist - NPS II
(3) Conservation Farming Planner - NPS II
(4) Water Harvesting Engineer - NPS II

III. STAFF - PROJECT IMPLEMENTATION

(1) One Project Manager - NPS IV
(2) Two Snr. Soil Conservation Officers - NPS II
(3) Twenty Soil Conservation Officers - PST II
(4) Forty Headmen - TSS III
(5) Twenty Field Assistants - TSS III
(6) Eighty Senior Labourers - $6 p.d.

IV. EXTENSION AND FORESTRY

(1) Parish Manager - Manchester - PMA III
(2) Parish Manager - Clarendon
(3) Two Snr. Extension Officer - NPS II
(4) Twenty Extension Officers - PST II
(5) One Forest Officer - NPS II
(6) One Assistant Forest Supervisor/GN III
(7) Three Foresters - PST/GN II
(8) Eight Forest Wardens (Headmen) - LMO II

V. ADMINISTRATIVE SUPPORT SERVICES

(1) Executive Officer - CR V
(2) Project Accountant - FAA III
(3) Two Assistant Accountants - FAA I
(4) Two Secretary/Stenographers - ST III
(5) Four Typist - ST I
(6) Two Clerical Officer - CR II
(7) Store Keeper - CR II

VI. TECHNICAL SUPPORT SERVICES

(1) Eight Tractor Drivers - LMO IV
(2) Eight Assistant Tractor Drivers - LMO II
(3) One Driver-Mobile Repair Unit - LMO III
(4) One Driver-LowBoy - LMO IV
(5) Mechanical Mt. Supervisor - AIT III
(6) Two Assistant Mechanics - AIT I
(7) Twenty Pick-up Drivers - LMO III

COORDINATING COMMITTEES

INTERMINISTERIAL GROUP FOR POLICY COORDINATION

This group has been established at the Permanent Secretary level to provide an opportunity for discussion and decisions regarding programs that involve various ministries. The committee represents the interests of the Ministry of Agriculture, Ministry of Public Works, the Ministry of Finance, the National Water Authority, and other government groups. This group will continue to meet monthly and will have on their agenda problems relating to the operations of the Integrated Rural Development Project. This advisory group will insure that project coordination is a reality.

PROJECT ADVISORY COMMITTEE

This committee within the Min Ag will be a means of assuring the Project Director that his problems will have immediate and direct consideration. This group, chaired by the Permanent Secretary, will meet as required by the Project Director but at least monthly at the beginning of the project. This group will be responsible for resolving those problems that cannot be resolved by the Southern Region Director and the Project Director acting together. It will have a membership consisting of the Permanent Secretary, the Southern Region Director, the Forestry Director, the Technical Director of the Ministry, the Director of Extension, the Director of Planning, the Director of Research and the Director of the Data Bank and Evaluation. They will not involve themselves in day-to-day activities but will primarily be concerned in making general policy decisions affecting the project.

MINOR EQUIPMENT AND SUPPLIES

Audiovisual equipment and teaching materials to support promotion effort and agricultural extension work	US$ 10,000
Office equipment and furnishings for field office headquartered at Christiana	5,000
Office equipment and furnishings for Port-a-Camp offices (4 offices @ US$1,000	4,000
Equipment for demonstration centers including small hand-operated tractors, shovels, scales, weighing equipment (US$2,000 @ for 5 centers)	10,000
Subtotal	US$ 29,000
Contingency @ 20%	6,000
TOTAL	US$ 34,000

(Other equipment and supplies are shown under Small Farmer Services. They total J$110,000 /US$88,000/.)