

UNCLASSIFIED

PD-AAC-655-81 141e

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

JAMAICA  
PROJECT PAPER  
FISH PRODUCTION SYSTEM DEVELOPMENT

AID/LAC/P-021

Project Number: 532-0059

UNCLASSIFIED

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT PAPER FACESHEET

1. TRANSACTION CODE

A  
 C  
 D

A ADD  
C CHANGE  
D DELETE

PP

2. DOCUMENT CODE

3

3. COUNTRY ENTITY

JAMAICA

4. DOCUMENT REVISION NUMBER

5. PROJECT NUMBER (2 digits)

532-0059

6. BUREAU OFFICE

A SYMBOL B. CODE

LA 05

7. PROJECT TITLE (Maximum 40 characters)

FISH PRODUCTION SYSTEM DEVELOPMENT

8. ESTIMATED FY OF PROJECT COMPLETION

83

9. ESTIMATED DATE OF OBLIGATION

A. INITIAL FY 79 B. QUARTER 3  
C. FINAL FY 81 (Enter 1, 2, 3, or 4)

10. ESTIMATED COSTS (\$000 OR EQUIVALENT \$1 - )

A. FUNDING SOURCE	FIRST FY			LIFE OF PROJECT		
	B. FX	C. C	D. TOTAL	E. FX	F. L C	G. TOTAL
ADP APPROPRIATED TOTAL	2730	390	3120	3677	430	4107
GRANT	1370	10	380	1317	50	1367
LOAN	2360	380	2740	2360	380	2740
OTHER U.S. 1. Peace Corps 2.	25		25	420		420
HOST COUNTRY		116	116		4858	4858
OTHER DONOR(S)						
TOTALS	2755	506	3261	4097	5288	9385

11. PROPOSED BUDGET APPROPRIATED FUNDS (\$000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. 1ST FY 79		H. 2ND FY 80		K. 3RD FY 81	
		C. GRANT	D. LOAN	F. GRANT	G. LOAN	I. GRANT	J. LOAN	L. GRANT	M. LOAN
(1) FN	124 B	077	077	380	2740	300		687	
(2)									
(3)									
(4)									
TOTALS									

A. APPROPRIATION	N. 4TH FY		O. 5TH FY		LIFE OF PROJECT		12. IN-DEPTH EVALUATION SCHEDULED
	C. GRANT	P. LOAN	R. GRANT	S. LOAN	T. GRANT	U. LOAN	
(1) FN					1367	2740	MM YY 08 82
(2)							
(3)							
(4)							
TOTALS					1367	2740	

13. DATA CHANGE INDICATOR. WERE CHANGES MADE IN THE PID FACESHEET DATA, BLOCKS 12, 13, 14, OR 15 OR IN PRP F. FACESHEET DATA, BLOCK 12? IF YES, ATTACH CHANGED PID FACESHEET.

2 NO YES

14. ORIGINATING OFFICE CLEARANCE

SIGNATURE

*Jonathan Linn*

TITLE

Mission Director  
USAID/Jamaica

DATE SIGNED

MM DD YY  
06 27 79

15. DATE DOCUMENT RECEIVED IN AID 'W, OR FOR AID 'W DOCUMENTS, DATE OF DISTRIBUTION

MM DD YY

AGENCY FOR INTERNATIONAL DEVELOPMENT  
**PROJECT IDENTIFICATION DOCUMENT FACESHEET**  
 TO BE COMPLETED BY ORIGINATING OFFICE

1. TRANSACTION CODE

C  
 A = ADD  
 C = CHANGE  
 D = DELETE

PID

2. DOCUMENT CODE 1

3. COUNTRY/ENTITY

JAMAICA

4. DOCUMENT REVISION NUMBER

1

5. PROJECT NUMBER (7 DIGITS)

532-0059

6. BUREAU/OFFICE

A. SYMBOL  
LA

B. CODE  
05

7. PROJECT TITLE (MAXIMUM 40 CHARACTERS)

FISH PRODUCTION SYSTEM DEVELOPMENT

8. PROPOSED NEXT DOCUMENT

A.  2 = PRP  
 3 = PP

B. DATE  
 MM YY  
 06 79

10. ESTIMATED COSTS

(\$000 OR EQUIVALENT, \$1 = )

FUNDING SOURCE		HA85E89
A. AID APPROPRIATED		4107
B. OTHER U.S.	1. Peace Corps	420
	2.	
C. HOST COUNTRY		4858
D. OTHER DONOR(S)		
TOTAL		9385

9. ESTIMATED FY OF AUTHORIZATION/OBLIGATION

a. INITIAL FY 79

b. FINAL FY 81

11. PROPOSED BUDGET AID APPROPRIATED FUNDS (\$000)

A. APPRO- PRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. FIRST FY 79		LIFE OF PROJECT	
		C. GRANT	D. LOAN	F. GRANT	G. LOAN	H. GRANT	I. LOAN
(1) FN	124 B	077	077	380	2740	1367	2740
(2)							
(3)							
(4)							
TOTAL					2740	1367	2740

12. SECONDARY TECHNICAL CODES (maximum six codes of three positions each)

029

310

13. SPECIAL CONCERNS CODES (MAXIMUM SIX CODES OF FOUR POSITIONS EACH)

BS

DEL

IX

NUTR

TECH

TNG

14. SECONDARY PURPOSE CODE

114

15. PROJECT GOAL (MAXIMUM 240 CHARACTERS)

Increase food production.

16. PROJECT PURPOSE (MAXIMUM 480 CHARACTERS)

17. PLANNING RESOURCE REQUIREMENTS (staff/funds)

18. ORIGINATING OFFICE CLEARANCE

Signature

*Dorinda M. Levin*

Title

Mission Director  
 USAID/Jamaica

Date Signed

MM DD YY  
 06 27 79

19. DATE DOCUMENT RECEIVED BY AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION

MM DD YY

FISH PRODUCTION SYSTEM DEVELOPMENT PROJECT

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Capital Development Office

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## I. PROJECT DESCRIPTION

### A. Summary

1. The goals of the Fish Production System Development Project are to increase food production, income, employment, improve nutrition in rural areas, and to assist the Government of Jamaica to mitigate its foreign exchange problems. The project purpose is to develop the capacity of GOJ institutions to increase freshwater fish production throughout the country, primarily through assistance to small farmers.

The proposed four-year project will build upon the accomplishments of the AID funded Inland Fisheries Development Grant (532-0038) which established a knowledge base for conducting freshwater fish production activities in Jamaica and developed institutional capabilities for the production of fingerlings and the extension of fish farming techniques to farmers. The project will be supported by the U.S. Peace Corps which will provide Volunteers to help train fisheries extension officers and facilitate a more rapid expansion of the program during the take off phase.

2. The major outputs of the new project will include: i) the establishment of a fish hatchery/demonstrational facility with 20 acres of ponds at Ferris Cross, ii) the expansion of the research ponds at Twickenham Park from five to 10 acres; iii) an annual production of 13 million fingerlings; iv) the strengthening and expansion of the Inland Fisheries Unit (IFU) with 116 new personnel assigned full time, 24 of which will be at the professional level and will have received formal and practical training in fish production; v) the establishment of in-country and Caribbean Regional fish production training programs which result in:
  - a. the training of 920 farmers in fish farming through the IFU, Ministry of Agriculture (MOA);
  - b. the training of up to 90 extension agents, fish farm managers, and professional fisheries personnel from Jamaica and the greater Caribbean area receive training through IFU sponsored (annual) regional workshops, conducted with technical assistance;

- c. the training of 45 students in fish culture at the Jamaica School of Agriculture, (JSA) who will enter the fish culture profession with the IFU or the MOA extension service, large scale GOJ or private sector fish farms, and other regional Caribbean countries;
  - d. the training of up to 20 students in aquaculture at the University of the West Indies (UWI) who will enter the profession at the research, educational, and/or administrative levels, in Jamaica or other regional Caribbean countries;
- vi) the establishment of a country-wide fisheries extension program with 1280 farmers participating, with 1100 surface acres of water in production and six million pounds of fish produced annually by 1983.

To achieve these outputs the project will provide the following inputs to the GOJ, JSA, and the UWI through USAID Loan (\$2,740,000)\* and Grant (\$1,367,000) funds for the following:

- a. 10 person-years of long-term technical assistance in aquaculture production, research, training, and extension;
- b. 9 person-months of short-term technical assistance to assist in establishing training programs and regional workshops in fish production at IFU, and for project evaluations;
- c. 66 person-months of long-term training for four aquaculture specialists;
- d. 60 person-months of short-term training for 12 fisheries agents;
- e. 30 vehicles for transporting fish, personnel, equipment and supplies, 20 trailbikes for fisheries extension agents; and three small bulldozers for pond construction;
- f. Feed, fertilizer, equipment and supplies to support the expanded levels of production;
- g. Upgraded and expanded hatchery facilities;

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\*All currency figures in the project paper are in U.S. dollars unless otherwise stated. The exchange rate used to convert Jamaican currency to U.S. currency is US\$1 = J\$1.78

- h. 30 months of training in aquaculture for two faculty members from JSA and 9 months of training for a UWI faculty member;
- i. Minor equipment such as microscopes, sampling nets, and water quality test kits to UWI and JSA to allow them to add aquaculture to their curricula.

The GOJ will provide \$4,858,000 for the following purposes:

- a. salaries and in-country costs for personnel, up to a level of 160 people by 1983;
- b. salaries and international travel for trainees;
- c. operational maintenance cost of two fingerling production facilities and a country-wide extension program and,
- d. establishment of in-country and regional training program/workshops for fish farmers, extension agents, fish farm managers, and professional fisheries personnel.

The Peace Corps will provide 25 Volunteers to work with and train counterparts as fisheries extension agents and hatchery managers.

B. Budget Summary

The project will be implemented within four calendar years of loan signing. Total project costs are estimated to be \$8,965,000 of which AID will finance \$4,107,000 (\$2,740,000 Loan<sup>1/</sup> and \$1,367,000 Grant) and the GOJ \$4,858,000. AID and GOJ funds will be allocated as follows:

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<sup>1/</sup> Repayment of the Loan will be in U.S. dollars within 20 years from the date of first disbursement of the Loan, including a grace period of not to exceed ten years. Interest, to be paid in U.S. dollars, will commence from date of first disbursement of the Loan at the rate of (a) 2 percent per annum during the first ten years, and (b) 3 percent per annum thereafter, on the outstanding disbursed balance of the Loan and on any due and unpaid interest accrued thereon.

Table 1. Budget Summary  
(U.S. \$000)

	AID		GOJ	Total
	Grant	Loan		
<u>Technical Assistance</u>				
Long Term	900	--	8 <sup>2/</sup>	908
Short Term	54	--	--	54
<u>Participant Training</u>				
Long Term	52	86	9	147
Short Term	--	84	37	121
<u>Commodities</u>				
Vehicles	10	554	--	564
Equipment	30	211	--	241
Fertilizer & Feed	--	900	--	900
Facility Improvement	--	380	450	830
Salaries	--	--	1,480	1,480
Maintenance & Operation	--	--	1,656	1,656
Contingency	53	111	182	346
Inflation	<u>268</u>	<u>414</u>	<u>1,036</u>	<u>1,718</u>
TOTAL	1,367	2,740	4,858	8,965

C. Rationale

Jamaica has always relied heavily on imports to meet its food needs. For example, from 1973 to 1978, food imports averaged \$151 million per year, 18.6 percent of all imports for that period. These imports have contributed to the serious balance of payment deficit which has risen from \$69 million in 1972 to \$284 million in 1978. Resulting from deficits in locally produced food, Jamaica imported 40 million pounds of fish per year from 1968 to 1976, of which 30 million pounds would be competitive with freshwater

<sup>2/</sup> GOJ contribution to Peace Corps

fish. Restrictions on imports due to foreign exchange shortages reduced the amount of fish imported to 21 million pounds in 1977 of which 9 million pounds would be competitive with freshwater fish. The increased domestic production of freshwater fish, 6 million pounds/year by the end of the project, would thus have a favourable effect on the food deficit and on foreign exchange expenditures. Foreign exchange savings are estimated to be as high as \$6.9 million over the life of the project.

Of the 1.5 million acres designated as farm land in the 1978 GOJ Five Year Agricultural Sector Plan, one-third is classified as marginal and/or unused. This under-utilization of farm land is listed in the Five-Year Plan as a major reason for poor production performance by the agricultural sector. Freshwater fish production would allow productive utilization of marginal and ruinate land.

On such land, small farmers with quarter-acre ponds could easily produce 1,500 pounds of fish per year with an investment of \$430 in variable costs for freshwater fish production. The net income from this production would be \$280/year, a substantial (22 percent) addition to the average small five acre farm earnings of \$1,300 in 1977. Earnings from fish production would thus present an \$1120 per acre income utilizing land which is currently not in production as compared to the average per acre income of \$260.

In addition to the food deficit, the foreign exchange shortage, poor land utilization, and low rural incomes, Jamaica has a problem in the area of nutrition. Local and regional nutritional surveys focusing on the lower income groups have uncovered deficiencies, not only in the area of the overall energy (calorie) intake, where a 1974 survey found the per capita caloric consumption of the poorest 70 percent of the population to fall short of the FAO/WHO Recommended Daily Allowance (RDA) by 26 percent, but also of the per capita protein intake of the same group which falls short of the RDA by 14 percent. Production of freshwater fish will make available, especially to the rural sector where fish protein has traditionally not been available, a supplemental source of protein which is highly price competitive with existing sources such as poultry and legumes.

This project will also encourage Regional Cooperation in the Caribbean by serving as a model for similar programs. Other countries which wish to initiate freshwater fisheries

programs can draw upon and participate in the research and training provided for under this project.

D. Strategy

Among the Government of Jamaica's Five Year Agricultural Sector goals which this project will address are: (a) the production of food and raw materials to meet requirements for domestic food consumption at satisfactory nutritional levels; (b) the reduction of dependence on imports; (c) ensuring optimal utilization of land; (d) increasing rural income; and (e) expansion of employment opportunities. In supporting these goals the Mission's strategy emphasizes helping small farmers on farms of one to ten acres to achieve sustained increases in production. Approximately 1020 small farms are included for inland fish production under this product. The project also includes approximately 260 medium to large farms, mainly cooperatives, to enhance food production and foreign exchange benefits.

Building on experience gained during the AID-financed Inland Fisheries Development Grant, the project will be implemented by the IFU. It will strengthen IFU's capacity to extend inland fish production to farmers on a national basis and strengthen educational institutions in providing future technical expertise in aquaculture to both Jamaican and Caribbean personnel. Participating farmers of all sizes will receive technical advice, training, fish fingerlings, and small farmers will also receive assistance in pond construction.

The Fish Production Systems Development Project will further benefit from and contribute to several other USAID--GOJ development projects currently underway or in the planning stage. These projects are:

- (a) The \$26 million Integrated Rural Development Project is improving farming and living conditions among hillside small farmers living in severely eroded watershed areas.
- (b) The \$6.6 million Agricultural Planning Project which will upgrade the MOA's capacity to

collect and analyze data, manage the training of its personnel to design, plan, implement and, evaluate projects and to develop, interpret and analyze government policies as they affect agricultural and rural development.

- (c) The Agricultural Marketing Project, now in the design stage which will upgrade the marketing and distribution of locally produced agricultural commodities including freshwater fish.

#### 1. Beneficiaries

The major beneficiaries of the project will be small farmers who will benefit from increased income through utilization of marginal land for fish production and improved diet through access to fish protein which has not been traditionally available in rural areas. Of approximately 1280 farmers to receive assistance in fish production, 1020 are expected to be small farmers located in the interior areas and characterized by an average farm size of five acres. Farmer beneficiaries will also include approximately 260 medium to large farms, included in the project to enhance production and foreign exchange benefits. About 74 percent of the large fish farms will be cooperatives or government farms comprised of small and/or landless rural inhabitants. Even "large" individual fish farms will be modest in absolute terms with an average of 30 acres of land and a three-acre pond.

Urban and rural consumers will also benefit through increased, more dependable, lower priced supplies of fish. Approximately 750 additional rural and urban dwellers will be employed in producing, processing, packaging, and marketing of fish. This represents, over the life of the project, 513,500 person-days of new employment. By the end of the project, employment amounting to 195,000 person-days per annum will be generated. Finally, the people of the Caribbean Region will benefit through the establishment of aquaculture in their respective countries as a result of the institutionilization of the aquaculture curriculum at JSA and the UWI.

#### F. Background

Jamaica has a long history of marine fishing activity; and fish, is a traditional staple of the Jamaican diet. Jamaica's marine fishing activity has been mainly based on canoe fishing because of a very narrow continental shelf and the relatively

infertile Caribbean Sea. The annual fisheries catch averaged 21 million pounds during 1968-78; however, Jamaica has had to import an average of 40 million pounds of fish per annum during this same period to meet the continued demand for fish. In recent years, due to a worsening economy and a balance of payments problem, imports have decreased to an average of 21 million pounds per annum. The annual marine catch has also been steadily declining. As a result of these conditions and the apparent limitation for increased marine fish exploitation of the infertile Caribbean, Jamaica has turned to the development of an inland fish production program to help meet its demand for fish products.

### 1. History of Fish Farming

The history of fish farming in Jamaica is rather brief. In the early 1950s, the Fisheries Division introduced Tilapia mossambica, an African perch that was being widely recommended and distributed for fish culture in the tropics, as a pond fish for the purpose of providing a source of fish to the people living in the interior of Jamaica. Through a small-scale research and breeding program, the fish was stocked in most of the country's rivers and ponds, and today they are considered a major "native" species. No fish husbandry developed until the initiation of the GOJ/USAID Inland Fisheries Development Project in 1977.

### 2. Current Status of Fish Farming

The IFU was created in 1977 to foster the development within the GOJ of the institutional capacity and technical expertise to design and implement a nation-wide fish production program.

The IFU received grant funded USAID project support in FY1977-79 to determine the technical and economic feasibility of freshwater fish production in Jamaica. This support enabled IFU to develop central office and support facilities at Twickenham Park, 12 miles west of Kingston. The Inland Fisheries staff presently numbers 44, of which 12 are professionals; in addition, two U.S. advisors and one Peace Corps Volunteer are assigned to the staff. Three of the professional staff have completed overseas training in aquaculture and three more are still abroad but are expected back by August 1979. The current annual operating budget of the IFU is \$340,000. At Twickenham Park, there are now: a service building with office, laboratory and space for equipment storage; 69 small ponds

covering 5.6 surface acres used for research and training; and a training facility under construction that will have a classroom and dormitory facility for 14 students/trainees.

In addition, 100 acres of land for development of a fingerling hatchery and food fish production ponds have been acquired at Mitchell Town, 40 miles west of Kingston near the south coast. At present IFU has 27 acres with 16 ponds in production and an additional 16 ponds totaling 53 acres are under construction. Production of fingerlings has now shifted from Twickenham Park to Mitchell Town and this has freed the Twickenham Park facilities to do more adaptive research and training.

IFU has also developed an extension program using seven of the professional staff members and one U.S. extension advisor; approximately 50 farmers have taken up fish farming as of May 1979. The initial expansion effort has provided the basis for evaluating the reception and economic success of fish farming among different types of farmers in south central Jamaica. The reception and economic success, even by small farmers with limited resources, have been favourable. Detailed information on production costs has been gathered from these farmers and eight production models are presented in Annex I.

The results of this early extension and production effort have been encouraging. The GOJ has demonstrated strong support for and interest in expanding fish production. There is a high level of interest shown by farmers (more farmers requesting IFU support than the Unit can provide) due to the benefit/cost ratio of 3.5:1 for average small farmers.

As manifested by its budgetary and personnel decisions, the GOJ has expressed strong support for this project and the development of a fish farming industry. The Fish Production Systems Development Project will support an integrated system of production and will create lasting institutions that will continue to function after project support ends.

### 3. Other Donor Assistance

A further indication of the favor with which freshwater fish farming is viewed is shown by the \$440,000 IDB loan (signed in May 1979) to the Urban Development Corporation (UDC), for the purpose of establishing commercial fish farms on marginal lands controlled by UDC. Technical assistance in designing and constructing the fish farms as well as brood stock for establishing fingerling production will be provided by the Inland Fisheries Unit. No major freshwater projects are in progress or anticipated by other donor agencies. However,

during Prime Minister Manley's recent visit to the Soviet Union, agreement was reached that the Soviets would provide technical assistance and fishing vessels to assist Jamaica's marine fishing industry. The magnitude and timing of this assistance has not yet been announced.

## II. PROJECT INPUTS

### A. Technical Assistance (\$962,000)

AID - Loan --; Grant \$954,000; Total \$954,000.

GOJ - \$8,000

USAID will provide technical support through a Grant funded institutional contract for technical advisors. A senior technical advisor will be with the project for four years and work at the national policy level. Two extension advisors will each be with the project for three years working at the regional level.

The senior technical advisor will have his office at the Twickenham Park facility and be a counterpart to the director of the IFU. He will serve as team leader for the technical services contract, and as liaison between GOJ, USAID, and Peace Corps. He will design and assist in the implementation of research activities, organize and participate in training of IFU personnel, teach formal courses in aquaculture at JSA and UWI, and advise on the selection of overseas training participants. The senior technical advisor is scheduled for four years to insure the timely planning, coordination and implementation of the project's activities.

The two extension advisors will serve as counterparts to the Regional Fisheries Extension Officers in the eastern and western regions. The advisors will assist and teach pond surveying and design, preparation of detailed management plans for fish production in individual farm pond, and preparation of literature (extension bulletins) for use in aquaculture extension. They will be responsible for training parish fishery extension specialists.

During the first year of the project, there will be one extension advisor who will work in the eastern region because it will take a year before the western regional staff and facilities are in place sufficiently to warrant the use of a full time foreign technician.

At the end of year three, the extension advisor will no longer be needed in the eastern region. By this time IFU personnel will have been trained to perform the work in this region.

The second extension advisor will be assigned to the western region in year two through the end of the project to provide the expertise to develop the extension program in that region. The U.S. advisors will help maintain program

momentum and provide technical backstopping to the various activities, particularly while counterpart staff are away receiving further training. Grant funds of \$900,000 are provided for technical assistance. Detailed job descriptions for the advisors are provided in Annex H.

To provide new IFU staff members with the technical and operational skills needed in fingerling production and extension work, they will undergo special in-service training at Twickenham Park assisted by specialists brought in on a short-term basis from the U.S. under the Grant. A total of nine months short-term assistance in the first two years of the project at a cost of \$48,000 is budgeted.

The staff of the IFU will increase from 44 to 160 by 1982 and will consist of 36 professional fisheries officers and 124 laborers, clerical staff, pond operators, and drivers. The professionals will be recruited whenever possible from among graduates of the UWI Faculty of Science located in Kingston or the JSA located at Twickenham Park near the IFU facilities. Neither school offers formal training in aquaculture although the JSA has started an elective course in fish farming taught by IFU staff.

The GOJ puts a high priority on the rapid expansion of fish culture. To facilitate this expansion they have requested the Peace Corps to assist the IFU by providing Volunteers to work as counterparts to the Jamaican staff during the three to four years it will take to build its competency. Over the life of the project, 25 PCVs will be assigned as counterparts to IFU staff mainly in the area of extension and hatchery management. The GOJ will contribute \$8,000 to Peace Corps to help support these Volunteers. Other Volunteer training and support costs will be provided under the Peace Corps budget.

The Peace Corps has agreed to recruit Volunteers who have college level courses in limnology or fisheries biology. The Volunteers will undergo nine weeks' training in fish culture at the University of Oklahoma or an equivalent program before arriving in Jamaica. Their training will continue in Jamaica with three months of in-service training at Twickenham Park and Mitchell Town in pond management and extension techniques.

Volunteers assigned to hatchery management counterparts will assist in the operation and management of large-scale fingerling production and/or applied research facilities at Twickenham Park, Mitchell Town and Ferris Cross. Their duties will be to assist their counterparts in the daily operations such as fingerling sexing, water quality testing, and calculation of adjustments to feeding schedules for fingerlings. These Volunteers and their counterparts will also be responsible for maintaining records of requests for fingerling for stocking from the extension staff and for maintaining adequate fingerling production to meet these requests.

Volunteers assigned as counterparts to extension agents will assist in farm site surveys for pond construction, farm visits during the fish production cycle to advise and assist farmers in such things as water quality, feeding rates, harvesting, and marketing. A very strong emphasis will be placed on PCVs helping to train their counterparts, not just doing the work.

One month of short-term advisory support (\$6,000) has been budgeted under technical services for a U.S. consultant who will assist in a mid-term project evaluation.

Timing of technical assistance is shown in the following charts:

Long-term Technical Assistance	79	80	81	82	83
Senior Technical Advisors					
Extension Advisors (Eastern)					
Extension Advisors (Western)					
Short-term Technical Assistance	79	80	81	82	83
Formal In-Country Training (9pm)		—	—		
Evaluation (1pm)			-		

Peace Corps Volunteers	79	80	81	82	83
PCVs (8)	---	---	---		
PCVs (8)		---	---	---	
PCVs (9)			---	---	---

B. Training \$268,000)

AID - Loan \$170,000; Grant \$52,000; Total \$222,000.

GOJ - \$46,000.

The project will provide in-service training for 27 new hatchery and extension staff members of IFU in the areas of pond management, fish production methodology and extension techniques. The training will be provided by short-term technical assistance and the long-term technical advisors assigned to IFU. In addition, further training in the U.S. will be necessary for career fishery officers to give them the technical and theoretical skills and knowledge to manage a complex aquaculture program. This project will provide 12 months of training in aquaculture for a research/training officer; 14 months training with specialty in aquaculture extension for two regional extension specialists and 24 months training in aquaculture for a regional production/extension officer. In addition, 12 fishery extension agents will be sent on a rotational basis to a 15-week special Aquaculture Training Program for foreign biologists offered each March to July at Auburn University in Alabama, or an equivalent program. The training program at Auburn, offered at the request of, and funded by, AID, is designed to give theoretical and practical instruction in fish culture including visits to various U.S. fish farming activities. The program explains the U.S. Cooperative Extension and Agricultural Experiment Station system using the U.S. integrated catfish farming industry as an example. The AID contribution to this training will be \$170,000.

The GOJ agrees to pay international travel and salaries of the trainees, which amounts to \$46,000.

The IFU staff and long-term technical advisors will be used to teach courses in pond management and production techniques to farmers, in addition to their other duties.

These courses will be offered on a quarterly basis and will be given at the Twickenham Park facility which has a 14 person dormitory and training building. Every farmer will be encouraged to attend one of these one-week short courses.

To supply the continuing needs of trained farm management and extension personnel, a three course curriculum consisting of Introduction to Fish Culture, Pond Management, and Aquaculture Extension Methods will be developed at JSA. The project will provide 15 months of training in aquaculture, fisheries extension and economics to two JSA staff members to supply the expertise needed to implement the new curriculum. While the JSA staff members are on study leave, the long-term advisors and IFU staff will provide the teaching needs at JSA.

The need also exists for trained people above the level given at JSA; consequently, additional support (\$12,000) is provided under the Grant to give nine months of postdoctoral training to one faculty member of UWI. This person will study freshwater fish culture in the U.S. and then incorporate this material into the curriculum both at the undergraduate and graduate level at UWI. The person would also be qualified to supervise graduate research in freshwater fish culture as well and will be encouraged to link into the research program at Twickenham Park.

The JSA and UWI faculty members will be required to agree to return to their respective institutions for a period of time not less than twice the length of their overseas training.

The JSA and the UWI both enroll students from other Caribbean countries besides Jamaica; to the extent that other countries in the region need trained people in fish culture, they may send them to these schools. The current JSA enrollment is about 450 of which 35 come from other Caribbean and African countries. The Zoology Department at the UWI has 40 final year students working toward the B.S. degree, of which 12 (four non-Jamaicans) are in the fisheries-marine biology specialty. Grant funds will be used to support the development of aquaculture curricula at these schools because of the potential regional benefits which will stem from these activities.

Timing of the training activities is shown in the following chart:

	79	80	81	82	83
<u>Long-Term Training</u>					
Research/Training Officer (12 mm)					
Regional Production/Extension Officer (24 mm)					
Regional Extension Specialist (15 mm)					
Regional Extension Specialist (15 mm)					
JSA Faculty Member 1					
JSA Faculty Member II					
UWI Faculty Member					
<u>Short-Term Training</u>					
4 Extension Agents					
4 Extension Agents					
2 Extension Agents					
2 Extension Agents					
<u>In-Country Training</u>					
Formal - IFU					
On-the-Job - IFU					
Farmer Training					

C. Construction of Facilities - (\$830,000)

AID - Loan \$380,000; Grant \$--; Total \$380,000

GOJ - \$450,000

The Fish Production Development Project will provide Loan funds to cover foreign exchange costs required to upgrade or renovate research facilities at Twickenham Park and hatchery facilities at Mitchell Town in the eastern region and Ferris Cross in the western region. The estimated budget for these activities is \$380,000. The upgraded hatchery facilities will provide the IFU with the basic infrastructure to produce 13 million fingerlings annually. This capacity will be more than sufficient to cover the need for fingerlings during the life of the project. It will also allow continued expansion of fish production after the end of the project without the need for the GOJ to expand the IFU facilities.

Upgrading the research facility at Twickenham Park by additional ponds will provide the IFU with the capacity to investigate new species and conduct practical research on feeding and stocking rates, mixed sex culture, and polyculture.

As an incentive to encourage fish production by small farmers (10 acres or less) the GOJ will share half the cost of their pond construction. This assistance will be in the form of providing a bulldozer and operator through the IFU to construct ponds. Each regional facility will have a pond construction team equipped with a bulldozer and equipment to transport it. This team will survey pond sites and design and construct ponds.

The total immediate cost to the GOJ of small farmer pond construction will be \$420,000. Half of this cost will be in the form of an outright GOJ Grant of services to the small farmers and the other half will be repaid by the farmers out of their operational profits, as discussed in the Financial Analysis below. Another \$30,000 will be expended by the GOJ on project facilities.

D. Commodities (\$1,705,000)

AID - Loan \$1,665,000; Grant \$40,000

GOJ - \$--

Loan funds in the amount of \$272,000 will be provided for the purchase of utility vehicles. These vehicles will be distributed among the three facilities in the following manner. The Twickenham Park research and training facility will receive two station wagons and a van to provide transportation for the IFU personnel and training participants; this facility will also be provided a pickup truck to transport feed, fertilizer, chemicals, and equipment necessary to carry out a research program.

The project will provide \$262,000 in Loan funds for the purchase of three bulldozers and two trucks for transportation. These will be used for the small farmer pond construction and a depreciation reserve set up for their replacement.

The two hatchery facilities will each receive a small farm tractor to do light pond maintenance and hauling, and a two-ton truck for transporting fingerlings to farmers' ponds. The western regional facility will receive a station wagon and a pickup for transporting the feed, fertilizer, and chemicals needed for the daily operation of a hatchery. The western facility will also receive a trailer for the farm tractor.

The regional and parish extension officers will be provided with pickups to haul pond surveying equipment and sampling nets when they visit farmers' ponds. These officers may also assist small farmers in very remote areas by hauling feed or fertilizer for them. A total of 18 pickups, nine for each region, will be needed.

The project provides for ten two-man extension contact teams, made up of an extension agent and a PCV counterpart, to visit small farmers for the purpose of explaining fish farming and to encourage them to participate. These teams will also make follow-up visits to farmers who are raising fish to answer questions and advise them on proper methodology. Secondary roads and trails leading to farms are generally rough and little served by public transportation. In order to keep costs to a minimum and still have the mobility needed, the extension contact team members will be provided with trailbikes. The estimated cost for 20 trailbikes of approximately 125 cc size is \$20,000.

Each extension agent will be given the opportunity to enter into an individual legal agreement with the MOA for obtaining transportation under the procedures currently used by the MOA for individual acquisition. The details of these procedures are shown in Annex J.

An important part of the project is the provision of \$900,000 in loan funds to the GOJ to ensure that supplies of feed, fertilizer, and seine material, are available in-country during the life of the project. In the first project year, Loan funds will equal 100 percent of the expected foreign exchange needs to import these items. In years two, three and four, the Loan will provide 69 percent, 36 percent, and 17 percent of the estimated needs, respectively.

Loan funds will be made available to the Bank of Jamaica which will in turn make the money available to in-country feed manufacturers to buy the necessary components for a fish feed ration, such as vitamin premix and soybean meal, from U.S. sources. The feed manufacturers will then make a feed ration specifically for fish which will be sold to farmers in Jamaica through existing retail outlets.

The local currency generated from the sale of U.S. dollars to feed manufacturers will be used to support the project in a manner jointly agreed upon by USAID and the GOJ.

At regular intervals the IFU will review the project's needs for feed, fertilizer, and seine material and provide the Bank of Jamaica with a projection of the supplies needed for the next six months.

The future success of the IFU will depend on the continuing supply of well trained professional fisheries officers. The UWI and JSA could supply these people if an aquaculture curriculum were established at these schools. To stimulate the rapid development of such curricula the project provides Grant funds to these two institutions for training facilities and the purchase of equipment and supplies necessary to teach courses in aquaculture. These two institutions also serve a Regional training function and it is expected that students from other Caribbean countries will take advantage of the aquaculture courses offered.

The IFU will need to purchase a number of commodities such as seines, tanks for hauling fingerlings, agitators, dip nets, laboratory equipment, surveying equipment, and chemicals for the operation of the research and training facility and the two hatcheries. The project provides \$211,000 for the purchase of this equipment. Detailed equipment lists are provided in Annex C.

Timing of commodity purchases under the project is shown in the following chart.

	Y E A R				
	1979	1980	1981	1982	1983
Autos		<u>2</u>	<u>1</u>		
Pickups		<u>9</u>	<u>6</u>	<u>5</u>	
Vans		<u>1</u>	<u>1</u>		
Trucks		<u>3</u>	<u>1</u>		
Bulldozers		<u>3</u>			
Tractors (farm)			<u>1</u>	<u>1</u>	
Trailer (for farm tractor)			<u>1</u>		
Trailbikes		<u>12</u>	<u>8</u>		
Fish Handling Equipment					
Feed & Fertilizer					

E. Operations, Maintenance and Salaries - (\$3,136,000)

AID - Loan --; Grant --;

GOJ - \$3,136,000

During the life of the project, the staff of the IFU will increase from 44 to 160 people. The GOJ will contribute \$1,480,000 to cover the salaries for these people, and will contribute \$1,656,000 for operation and maintenance of facilities, equipment and vehicles. The Government's contributions to construction, commodities, technical assistance and training have been shown in earlier sections of this paper.

Timing for personnel hiring and the GOJ's contribution to operation and maintenance are shown in the following chart.

Personnel	79	80	81	82	83
1. Professional Fisheries Officers	2	3	1		
2. Extension Personnel	4	9	7		
3. Labor, Clerical, Drivers	3	42	31	14	
<u>GOJ Contributions</u>					
Operations & Maintenance					
Facilities					

### III. PROJECT SPECIFIC ANALYSIS

#### A. Technical Feasibility

The decision to proceed with an expanded fish production project in Jamaica must be based, at least partially, on the answers to a number of questions about the feasibility of introducing the relatively new concept of aquaculture or fish farming. This section answers questions about: a) the availability of proper technology and inputs to support a viable aquaculture program; b) the existence of the proper species of fish with which to develop an aquaculture program; c) the ability of the IFU to produce and distribute fingerlings for stocking; and d) the ability of farmers to learn and of extension personnel to teach the methodology involved in fish farming. Other important questions dealing with marketing, credit and the institutionalization of aquaculture curricula are also addressed.

##### 1. Fish Production Techniques

Fish production at the farm level begins when a farmer expresses an interest in adding fish culture to his regular farming activities. Information on fish culture will have come from a number of sources; such as: newspapers, regular agriculture extension agents, or IFU extension contact teams whose major role is the dissemination of information about fish production. Interested farmers will be visited by a fisheries extension specialist who will discuss in detail the fish production program, and answer questions about fish production. If the farmer is still interested in fish farming, the extension officer will return to survey the available land and conduct soil tests to determine if pond construction is feasible. In determining pond construction feasibility, the extension officer must take into consideration the soil type, water availability and source, and whether the pond is to be hand dug, excavated by machine, or if a simple dike across an existing waterway is adequate. If soil samples from the proposed pond site indicate a sandy type soil, the farmer will be discouraged from pursuing any further pond development activities. Assuming the soil samples indicate a good clay soil, the extension officer will develop a pond design and detailed cost/return estimate with the farmer.

The cost/return estimate will be calculated on one of several production techniques available to the farmer. A farmer can elect an intensive production package which involves feed and fertilizer, or a less intensive package involving only fertilizer. If a farmer has some other type of livestock, such as chickens or cattle, he may choose to use the manure to fertilize the fish ponds. If there is no source of organic fertilizer, then it will be necessary to use inorganic fertilizers. The type of production package the farmer chooses will determine the length of time it will take to pay off the cost of pond construction, and if he is borrowing money, the number and size of installments needed to pay off this loan. Intensive

feeding and inorganic fertilizer has been shown to be the most profitable. After discussing this information with the extension specialist, the farmer must make a decision as to whether to go into fish production or not.

Many times this decision will be influenced by the availability of credit to pay for construction and production costs such as feed, fertilizer, and seines for harvesting. The farmer has several credit options depending on the size of his holding, credit rating, and collateral. The extension specialist will discuss these options with him. Small farmers with no more than five acres of arable land can qualify for Crop Lien Loans from the MOA if:

- a) the pond design is approved by the extension specialist;
- b) he is not in arrears on any other credit line, and
- c) he can get one guarantor to co-sign the loan agreement.

Farmers with holdings of from five to twenty-five acres can qualify for credit through the Agricultural Credit Board - Peoples Cooperative Bank or through the Self-Supporting Farmers Development Program. Credit through these institutions requires some form of collateral such as a clear title to land, which the Crop Lien Program does not require. Larger farmers of twenty-five acres or more, can obtain credit through regular credit or banking institutions such as the Jamaica Development Bank. If the farmer qualifies for the Crop Lien Program, the extension specialist will assist in making a loan application if requested.

As an incentive to encouraging small farmers to take up fish farming, the MOA has instituted a policy of cost sharing for pond construction. The MOA, through the IFU, will pay approximately 50% of the cost of pond construction by providing a bulldozer and operator. Larger farmers are expected to arrange for pond construction by local contractors, but will continue to receive all extension/training assistance offered by the IFU on the same terms as the smaller farmers.

Once the pond is constructed, filled with water, and the farmer has decided which production practices to use, he must stock it with fish. The IFU will provide the first stocking of tilapia fingerlings free of charge. The farmer contacts the fisheries extension specialist and arranges for the delivery of fingerlings by the IFU.

During the production cycle, four to six months depending on whether the farmer uses feed and fertilizer or just

fertilizer, the extension agent will visit once every two weeks to help maintain good water quality and sample the fish to determine if they are growing at the normal rate. If weight gains are not as fast as they should be, the extension specialist will recommend more fertilizer, more feed or some other appropriate action.

Farmers will also be encouraged to attend a one week course at Twickenham Park which teaches the practical techniques of farm pond management. Transportation and room and board will be provided for by the IFU. The course will be offered once every three months so all new farmers will have a chance to attend during the first production cycle of their ponds.

During the pre-pond construction discussions with the extension agent, the farmer will have determined how he plans to harvest the fish. Farmers who have a readily available source of water may construct ponds which can be drained at harvest time, others may have elected to scine their ponds, use fish traps or harvest with hook and line. Much will depend on whether the farmer plans to sell fish in large quantities or use them for home consumption and sell small quantities to neighbors and higglers. The farmer and the extension specialist will decide when to harvest the fish. When a time is set, the farmer and the extension specialist will advise the neighbors, local higglers, or large wholesalers when to come to the farm to buy fish. If a farmer is harvesting only small quantities, the extension specialist will show him how to use fish traps and cast nets. Farmers harvesting large quantities of fish will be instructed in the use of pond seines and may use IFU equipment for the first crop if the farmer requests it.

All farmers will also be instructed in construction and use of live boxes. Basically, a live box is a holding pen made of wood and hardware cloth or chicken wire in which a farmer can corral his fish for one or two days after capturing them. With this piece of equipment, the farmer can keep fish on hand if he doesn't sell them all the day of harvest or if the buyer is delayed and doesn't arrive on harvest day. The IFU extension specialist will keep local and regional fish buyers advised of the farmers in the area who have fish to harvest.

When the farmer harvests his fish, some of the income will have to go to debt servicing on capital equipment and pond construction, and some will have to go back into buying feed, fertilizer and fingerlings. Before a new production cycle, the

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\* small middlemen (usually women) who buy agricultural produce exclusively for re-sale.

farmer and extension agent will discuss again the type of production package the farmer chooses and, using the experience gained from the first crop, what changes will be made in the next.

## 2. Technology

The technology being recommended by Inland Fisheries is based on systems developed in other tropical countries and tested at the expanded Twickenham Park facility. The initial use of Tilapia mossambica as the principal culture species is based on its local availability. This species, along with carp, is one of the most widely dispersed and frequently cultured fresh water fish in the tropical world. Techniques for its propagation and culture are well understood. Yields obtained in Jamaica are in line with results reported under similar conditions in other countries such as Brazil and the Pilippines.

Tilapia feed low on the tropic chain and can sustain high densities in ponds. As of now there are no better systems of fish culture available than are being advocated and tested in Jamaica.

As with any production technology, there is a constant flow of new ideas that need to be tested. The Twickenham Park facilities, though rather modest even as expanded under this project, will provide the capability to test and evaluate promising new methods of fish culture. The recent acquisition of grass carp and the planned acquisition of common carp for testing in polyculture systems with tilapia are examples of adaptive research capability within the Inland Fisheries Unit. The technology of fish culture is evolving rapidly and this research capability is essential if obsolescence is to be avoided and new techniques are to be made available to farmers.

It is expected that the IFU, UWI and JSA will arrange to have access to the latest basic research in aquaculture which could be adapted to Jamaican conditions during the life of the project. The grant will provide funds for the acquisition of scientific journals and papers dealing with fresh water fish production.

Fish farming can be practiced at various levels of intensity with yields expected to increase as management and inputs increase. The kinds and amounts of fish, feeds, and fertilizer used in a fish pond are the major variables determining fish production within the biological limits of the system. Productivity is also proportional to surface area so the size of the pond will set the limits of fish production at a given level of intensity.

### 3. Fingerling Supply

Currently, only male fish are used for stocking farmers' ponds. Males are used because it has been shown that they have a faster weight gain than females.

At the hatching facility in Mitchell Town, sexually mature males and females at the ratio of 1:3 are raised together in brood ponds. When the baby fish are  $1\frac{1}{2}$  to  $2\frac{1}{2}$  inches long, the ponds are seined and the small fish are manually sexed. The females are used to stock additional brood ponds or are sold as "soup fish." The males are placed in holding ponds to await their delivery to farmers needing fingerlings for stocking.

With the increased number of fish ponds there will be a large demand for fingerlings for stocking. The Mitchell Town facility already has 27 acres in production and 50 new acres are under construction. This facility is expected to be the main government center for production of tilapia fingerlings for distribution to small farmers in the eastern region of the country.

The recommended stocking rate is 6,000 fingerlings per cycle per acre, and farmers will stock at least twice per year. Fingerling production currently is 100,000 males per acre of water per year, and the IFU has 50 acres of production ponds. This output will support approximately 450 acres of fish ponds in intensive grow-out operation. Such an output will meet any immediate need for fingerlings and if capacity is underutilized, extra ponds will be used for production demonstrations in support of the extension effort. A similar facility is planned for the western region and will have comparable fingerling production capacity.

By 1983 there are scheduled to be 1,100 acres of fish ponds in production requiring 13 million fingerlings for stocking. Farmers, sugar estates, and large government sponsored fish farming schemes, such as the UDC, which have 20 acres of ponds or more, will be encouraged to produce their own fingerlings. It is estimated that for each 8.3 acres of fish ponds, one acre of brood ponds will be needed. The IFU estimates that by the end of the project there will be approximately 80 acres of brood ponds being managed by large fish farming operations. This will reduce the demand for fingerlings produced by IFU to five million per year. This will allow IFU to continue expansion of the fish production program without having to build any new hatchery facilities for some time to come.

#### 4. Fertilizer and Feed

With heavy reliance on fertilizer, as much as 220 short tons of triple super phosphate (TSP) per year could be used in the 1,100 acres of fish ponds developed during this project. This is less than one percent of the average annual amount of fertilizer imported 1970-78 and could be easily handled within the existing infrastructure system. Currently, fertilizer for fish pond use is sold at subsidized prices. To land 220 short tons of TSP in Kingston would cost, at current prices, approximately \$55,000. Fish yields of 2,000-3,000 lbs. per acre are obtainable with careful management and heavy fertilization (at the rate of 400 lbs TSP/acre/year) at a fertilizer cost of approximately \$.02/lb. of fish produced.

Supplemental feeding of fish to provide greater yields than would be generated by fertilizers alone is also possible. The amount of increased yields will be proportional to the amount of feed used, other conditions being favorable, and should add about one pound of fish for every pound of 28% protein feed. Using an 18 percent protein feed mix at \$.10 per pound, we currently produce one pound of fish, at \$.48/lb., for every 1.5 pounds of feed. Past experience confirms, under identical technology, that if a feed mix of 28 percent protein at \$.15/lb. is used, the conversion ratio is one pound of fish for one pound of feed. The marginal returns from either feed are equivalent. A return of \$.43 for one pound of fish can be generated by either investing \$.15 for 1.5 pounds of 18 percent protein feed mix or investing \$.15 for one pound of 28 percent protein feed mix. Therefore, both in macro terms of foreign exchange savings for the country and in micro terms of input decisions of the farmer, the economic results are equivalent.

Average annual fish pond yields using combined feeds and fertilizers of about 6,000 lbs./acre are reasonable based on past experience and results reported from other parts of the world. Under close to optimum conditions at Mitchell Town, yields have reached 14,000 pounds per acre per year.

Informal contacts with the major animal feed milling companies in Jamaica indicate that they are working at less than full capacity and could easily produce an increased volume to supply the needs of fish producers as a result of this project, provided basic ingredients are available. The millers indicate that there are no current local surpluses of feed ingredients and that all the ingredients or a ready-milled feed would need to be imported. Were fish feeding to be widely practiced in 1,100 acres of ponds, as much as five million pounds of feed

(at the rate of 4,500 lbs./acre/year) would need to be imported each year at a current cost of approximately \$750,000. This would represent a substantial increase in the volume of animal feeds being imported and would consume foreign exchange, the ramifications of which are discussed in the financial analysis section. In 1976 a total of 7.7 million pounds of animal feeds were imported at a cost of \$1.2 million. Fish feed requires more protein than other animal feeds and would not be an economical substitute to be diverted into other uses. This project provides assurance that the necessary inputs for fish production activities will be available on a timely basis. These assurances will come from two project activities. First the IFU will provide the GOJ with a semi-annual list of required commodities (feed, fertilizer, seine material) necessary for effective fish production. Second, loan funds will be made available through the project for the importation of these commodities.

It is unlikely that the fish food ration will be used for other livestock since, being of a higher protein content, it will sell for three to five cents a pound more than regular chicken feed.

#### 5. Management Capability

There will need to be careful coordination by Inland Fisheries to insure that proper items are identified and available on a timely basis. The amounts of fertilizers and feeds needed to support fish pond use will depend on the intensity of management applied by the various farmers.

Provision has also been made in the project to train the new technical people who will be needed in the Inland Fisheries program. Several of the needed people have already been identified among the soon-to-graduate class at the Jamaica School of Agriculture. The Inland Fisheries Twickenham Park facility is located very near to the Jamaica School of Agriculture. Students in fisheries courses at the school may, therefore, easily use the facilities at the fisheries station for their practical training.

#### 6. Credit Availability

Based on current experience, approximately 85 percent of farmers taking up fish production will need credit for pond construction, feed and fertilizer, or both. There exists in Jamaica a number of credit institutions providing credit to farmers of all sizes. A recent AID/Ohio State University study entitled, "Recent Economic Growth and Rural Financial Markets in Jamaica: Analysis of Performance, Problems and Recommendations," discusses these

institutions in detail. Of particular interest to this project are those credit schemes such as the Crop Lien Program, Agricultural Credit Board - Peoples Cooperative Bank (ACB-PCB) and the Self Supporting Farmers Development Program (SSFDP).

The Crop Lien Program, administered by the MOA, provides credit to farmers with no more than five acres of land. To qualify, the farmers must not be in arrears in any other credit program and must have one co-signature to the loan. The maximum loan is for J\$6,000 at 6 percent interest and no collateral is required.

Another source of credit available to farmers in the five to twenty-five acre size is through the SSFDP administered by the Jamaica Development Bank. This program was launched in 1969 to improve the productivity of small scale farming in Jamaica. To qualify for credit through the SSFDP, the farmer must have clear title to his land and the farm must be able to generate a net annual income of at least J\$2,400. The interest on SSFDP loans is 7 percent, and the minimum which can be borrowed is J\$1,400.

At present there are 115 PCBs scattered throughout the Island with 130,000 members. These banks are owned by the local people through small individual share holdings. Membership is not restricted by size of farm, although in general the members are mainly small and medium sized farmers who subscribe to shares of J\$2 each to build up the share capital of the bank. This paid-up share capital of the PCBs is then utilized to provide small, generally consumption-oriented loans for the members at an interest rate of about 10 percent. The PCBs also augment their loanable funds by borrowing from the Agricultural Credit Board.

Larger farmers (over twenty-five acres) will be expected to use the regular commercial sources of credit at an interest rate of 11 percent. The extension specialist will advise each participating farmer of the available sources of credit and will develop a cost-return model for each farm which can be included with the application for a loan. In the case of farmers applying for Crop Lien loans, the extension specialist will assist the farmer in filling out the application. Crop Lien loan applications must also be approved by the fisheries extension specialist.

A high percentage of arrears has plagued the Crop Lien Program in the past because of lack of training on the part of extension personnel to accurately determine cost/returns and because farmers have not had an incentive to pay back their loans. The Fish Production Development Project will train

fisheries extension officers to make accurate estimates of returns and costs before a farmer proceeds with pond construction. Farmers will not be sold additional fingerlings for stocking if they do not service their debt.

## 7. Marketing

The Fish Production Project does not include a formal marketing component. The USAID and GOJ are at present designing a comprehensive marketing project aimed at improving efficiency in distribution and selling of locally produced commodities. The Marketing Project will provide technical assistance and training in the speciality area of fish marketing. The Marketing Project will also provide for regional sub-terminal markets which have cold storage and packaging facilities. In as much as the streamlining of the distribution facilities and the increase in fish production will take place concomitantly, there is no need for a marketing component within the Fish Production Systems Development Project.

The decision not to include a formal marketing component is supported by experience with small scale fish production. Small farmers at some distance from large metropolitan centers have been successful at selling their fish to higglers and directly to neighbors. Farmers nearer to the urban centers sell either to higglers or to large wholesalers such as the Agricultural Marketing Corporation (AMC). At present the combination of higglers and larger wholesalers/retailers process and distribute approximately 8,000 tons of fresh fish annually, which is over two and a half times the projected output of this project. The large wholesalers and cold storage companies, such as Jamaica Frozen Foods, are currently operating at below capacity and have expressed willingness to buy tilapia. The IFU will continue to work with these marketing outlets to keep them apprised of fresh fish availability. IFU will also gear its extension activities toward the processors' requirements for certain sized fish.

## B. Administrative Feasibility

### 1. Ministry of Agriculture

The Ministry of Agriculture as the implementing agent will be responsible, through its Production and Extension Division, for the overall administrative and policy direction of the project. This responsibility will include coordination with the Ministry of the Public Service for assignment of personnel and coordination with the Ministry of Finance for providing counterpart financing for the various project activities and facilitating the importation of commodities

procured under the Loan.

Liaison between the Ministry of Agriculture and the Ministries of Finance and the Public Service needs to be strengthened. However, the Loan Agreement will contain covenants which will insure adequate and timely budget allocations by the Ministry of Finance and approval of the project staffing pattern by the Ministry of Public Service.

a) Production Extension Department

The Production and Extension Department of the Ministry of Agriculture was established in 1976 to facilitate and stimulate in-country agricultural production to offset the import restrictions imposed by the Government as a means of reducing foreign exchange expenditures.

This Department is directly responsible for administering the GOJ's land reform program (Project Land Lease), the Crop Lien Program, various international donor programs such as the World Bank First Rural Development Project, and The Netherlands Water Tank Construction Project, as well as the National Extension Service and the Inland Fisheries Unit.

The Department is composed of a multi-disciplinary team of staff of high calibre, each being responsible to maintain contact with the regional staff operating in his area to provide technical backstopping and monitoring. It has the administrative flexibility to act promptly, and it has been given a semi-autonomous administrative status enabling it to execute policy defined by the Ministry as effectively as possible.

The use of the Crop Lien Program, a program of low interest loans to small farmers for the purchase of agricultural inputs, has been approved by the Production and Extension Division for use by farmers interested in becoming involved in fish culture. These loans will be administered by the existing Regional and Parish Office staff of the Department and have been structured so that the payback period is five years instead of the normal one year.

Farmers electing to use the Crop Lien Program will receive credit in kind, such as fertilizer, feed, and harvesting equipment (seines).

Presently, the Crop Lien Program provides approximately J\$10 million per year as credit to small farmers. The default rate for this credit is high, but the Ministry of Agriculture is in the process of instituting better screening criteria to ensure that farmers are better "risks."

Figure 1. ORGANIZATION OF INLAND FISHERIES UNIT

\* USAID Advisor  
 \*\* Peace Corps Volunteer

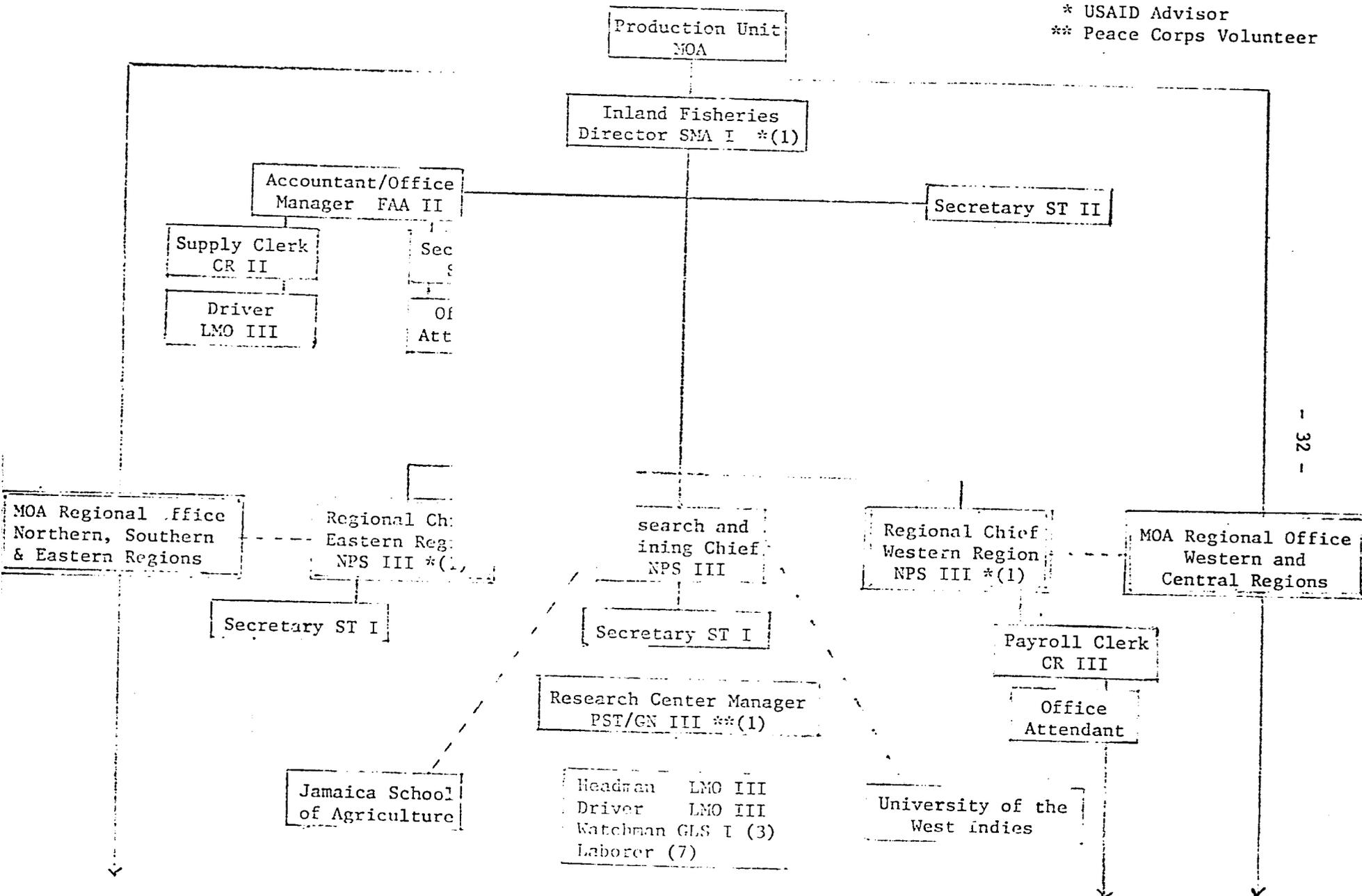
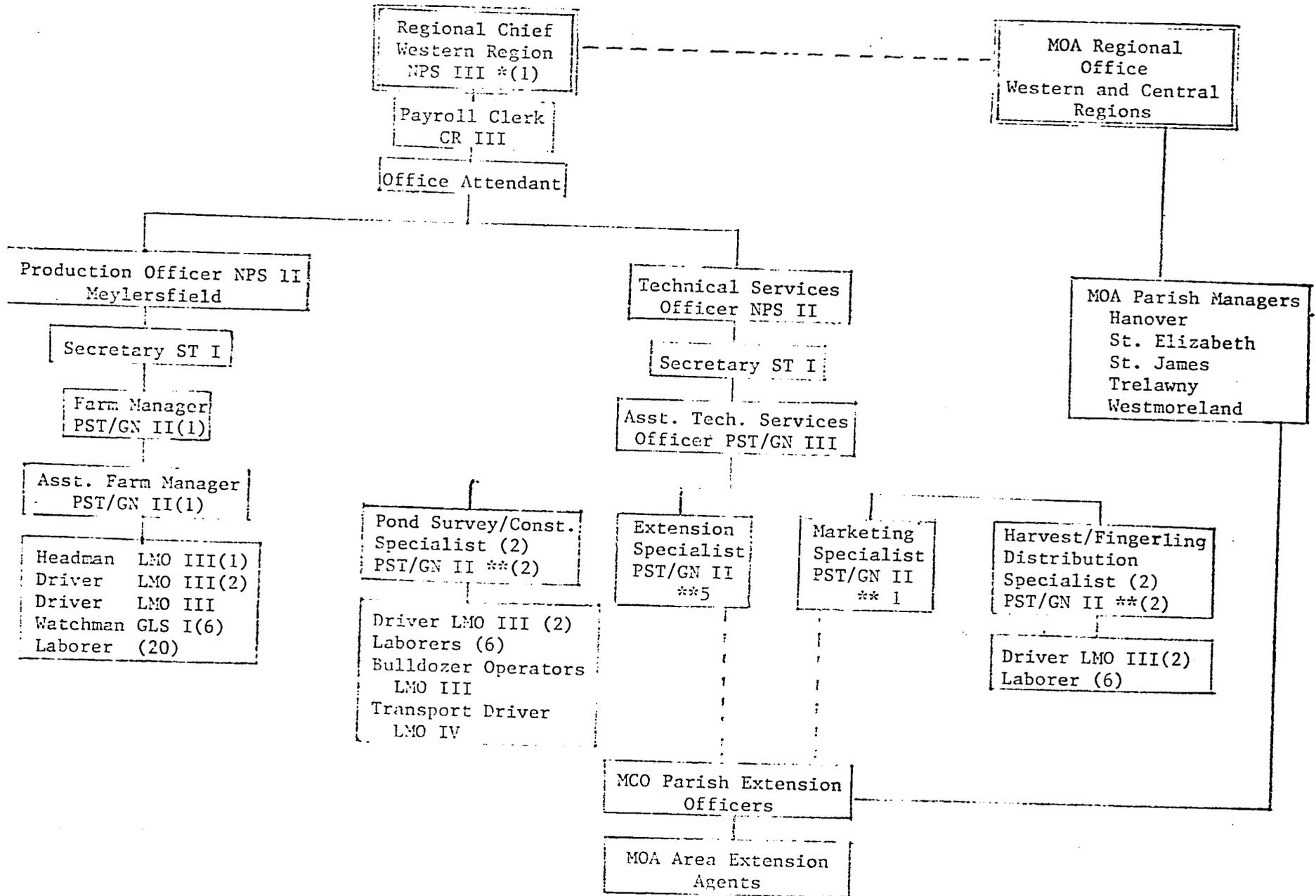




Figure 1. Sheet 3



b) Inland Fisheries Unit

The IFU will manage the day-to-day operations of the project from its headquarters at Twickenham Park, for the Eastern Region, and Ferris Cross for the Western Region. The organizational structure of IFU is shown in Figure 1.

The fundamental capacity to carry out the project exists as a result of an earlier USAID grant project, and is reflected in the active program currently being conducted by IFU.

The facilities presently being used by the IFU consist of laboratory and office space and 5.6 acres of research and fingerling ponds at Mitchell Town. Both of these facilities are in the Eastern Region. In addition, the Fisheries Unit has a trained staff of forty-four people and eight vehicles for transportation of staff and fingerlings.

To support the proposed expanded project, the GOJ is: currently expanding fingerling production facilities at Mitchell Town by an additional fifty acres; building managers' residences at both Mitchell Town and Twickenham Park; and constructing a fourteen person dormitory/training facility at Twickenham Park. These activities are funded by the GOJ and have not been included in the estimates of the GOJ's contribution to the proposed project.

The GOJ is also negotiating for the purchase of an additional production/research facility site at Ferris Cross in the Western Region. The 1979-80 GOJ budget includes funds for the purchase of this site and discussions with the owners are in progress.

If these negotiations are unsuccessful, the GOJ has an alternative site, owned by the Government, which can be developed as the hatchery facility for the Western Region.

The IFU will directly control all project activities such as training, supervision of pond construction and fingerling production, and transportation. The present Inland Fisheries staff handles these activities efficiently for the Eastern Region. The additional inputs of the proposed project (technical assistance, training, equipment) will allow the IFU to expand its activities to the Western Region without diluting the effectiveness and efficiency with which the Unit now operates.

Liaison between the technical and administrative staff of the Production and Extension Division is excellent, and there are no problems anticipated at this level which would impede project implementation.

## 2. Jamaica School of Agriculture

The JSA is the principal source of agricultural technicians (extension agents, agriculture teachers, etc.) in Jamaica. This school also trains technicians from other countries in the Caribbean Region.

Development of an aquaculture curriculum at the institution is vital to the long term success of fresh water fisheries production on the Island and could have the added benefit of offering this expertise to the Caribbean Region as a whole.

At present JSA offers a basic course in aquaculture taught by personnel of the IFU. The principal of JSA is very interested in further development of an aquaculture curriculum and the project plans to train two faculty members in this subject in the U.S.

The proximity of the IFU's Twickenham Park facility to the JSA and their mutual interest in developing an aquaculture curriculum indicate a high probability of success of this component of the project.

## 3. The University of the West Indies

The UWI is a highly respected education and research institution with widespread regional impact.

The Jamaican campus offers a good program in marine biology and is prepared to offer research and teaching in the area of freshwater aquaculture.

The University presently operates research stations at several locations on the Island and has developed plans with the IFU to utilize its freshwater research facilities at Twickenham Park to conduct research in aquaculture.

The UWI will offer degree level training, both undergraduate and graduate, and research in aquaculture, thus providing a source of professional level technicians for the continual expansion of fish culture in Jamaica and the region.

The project will train one of the UWI faculty members in freshwater aquaculture at a U.S. institution. This will supply the nucleus of an aquaculture program at the Regional University level.

### C. Economic Analysis

This analysis will examine the feasibility and justification of the project from the viewpoint of: (a) its profitability to both large and small farmers; (b) the impact of the project on farmers' incomes and on Jamaica's foreign exchange savings; (c) the adequacy of demand for fish and the likelihood that this demand will be maintained (or grow) over time; (d) the importance of the project from a nutritional standpoint.

#### 1. Profitability

Is the project profitable to farmers, assuming reasonable efficiency, availability of inputs at current market prices and sale of output at current prices? The analysis will be in terms of constant costs and prices throughout the projection period on the assumption that increases in costs (certain to occur) will be matched by increases in farm gate prices which are determined by market conditions. The magnitude of the benefit/cost ratios will suggest the extent to which costs may rise in relation to product prices before the project ceases to return to a rate equal to the opportunity cost of capital.

On the basis of cost data collected from the fish ponds currently in operation and current local fish prices, eight models were projected showing the benefit/cost ratio that would prevail under various conditions: with and without use of imported feed; assuming "optimum" and "average" technology and conditions; and for "large" and "small" farmers.

A crucial assumption in the analysis is that the farmer can sell the amount he produces at the current price for fish ranging between J\$.73 and J\$1.50 per pound depending on the size of the fish and the farmer's location.<sup>1/</sup>

The assumption that there is a strong demand for the fish pond product and that fish prices are not likely to decline in relation to production costs is based on the following considerations:

- (a) There is a substantial volume of fish imports to satisfy consumption requirements. Total fish imports of the types that can be substituted by

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<sup>1/</sup> Farmers in the country's interior can sell fish at a much higher price than those near the coastal towns, as the latter must compete with marine products.

domestic production ranging between US\$14 and US\$19 million a year during the 1974-79 period. We estimated this demand at US\$21 million in 1979 (see Table 2).

- (b) The import demand for fish has been severely repressed in recent years owing to the shortage of foreign exchange. The types of fish competitive with potential fishpond production declined from US\$18.8 million in 1975 to only \$6 million in 1977 (see Table 2). This decline is not attributable to an increase in domestic production.
- (c) Fish is firmly rooted in the Jamaican diet. It is a basic ingredient in a variety of food preparations and constitutes, along with beans, milk and poultry, a major source of protein for Jamaicans.
- (d) The type of fish produced under the project, tilapia has gained acceptance and was found to be an acceptable substitute for a number of imported fresh frozen and salted fish; including codfish, mackerel, salmon, trout, halibut, haddock, and alewives. Imports of fish considered substitutable by domestic fishpond production are presented in Table 1.
- (e) Finally, domestic fishpond production will displace only a fraction of the amount imported. Our projections indicate that, at best, local fishpond production in 1985 will amount to only about 4,100 tons compared with a projected residual import requirement of 13,350 tons in that year. Thus, there will continue to be an ample market for the project's output.<sup>1/</sup>

## 2. Benefit/Cost Ratios

We have calculated the net rate of return (or benefit/cost ratio) for two classes of farming operations: "large" farms (twenty acres or more) including cooperatives and government farms, and "small and intermediate" farms (less than twenty acres).<sup>2/</sup> The calculations are presented in models 1 through 8

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<sup>1/</sup> In the absence of the proposed project, import requirements in 1985 would be about 17,450 tons (see Table 2). Deducting the projected production from this project (4,100 tons in Table 4) leaves a net import requirement of 13,350 tons.

<sup>2/</sup> For purposes of this analysis, small farmers are those with less than ten acres, while intermediate farmers have between ten and twenty. This classification is on the basis of total size of farm, not fishpond size.

Table 2

## FISH IMPORTS, 1973-1985

Year	Cod (a,b)		Mackerel (a,c)		Other (d,e)		Total	
	Metric Tons	US\$000	Metric Tons	US\$000	Metric Tons	US\$000	Metric Tons	US\$000
<u>Historical Data</u>								
1973	4306	5513.6	3052	1427.1	10200	8125.7	17558	15066.4
1974	2821	5406.8	3145	2032.1	8300	10207.5	14266	17646.4
1975	2641	4745.6	4036	3480.9	8851	10622.9	15528	18849.3
1976	3016	5134.9	4665	3783.2	6009	5455.2	13690	14373.3
1977	827	1904.0	1406	1739.1	2286	2371.0	4519	6014.1
1978	3107		4806		7938		15851	
<u>Projected Requirements</u>								
1979	3144	7973.2	4864	4611.1	8049	8338.8	16057	20923.1
1980	3188	8084.8	4932	4675.5	8161	8454.8	16281	21215.1
1981	3233	8198.9	5001	4740.9	8276	8573.9	16510	21513.7
1982	3278	8313.0	5071	4807.3	8392	8694.1	16741	21814.4
1983	3324	8429.7	5142	4874.6	8509	8815.3	16975	22119.6
1984	3370	8546.3	5214	4942.9	8628	8938.6	17212	22427.8
1985	3417	8665.5	5287	5012.1	8749	9064.0	17453	22741.6

- (a) 1973-76: Statistical Yearbook of Jamaica, 1977; for 1978: source is unpublished data from MOA; projections 1979-85 used 1976 figures as base, then increased at an annual rate of 1.4%.
- (b) 1973-76 = Current J\$ converted at J\$1 = US\$1.10; 1977 Current J\$1 = US\$.80, 1979-85 volume multiplied by constant 1979 price of codfish US\$1.15 (US\$2535/ton).
- (c) 1973-76 & 1977: Same as (b); 1979-85 Constant 1979 unit price of US\$.43 (US\$948/ton).
- (d) Projections for 1979-85 were made by taking average of 1974-76 as base and increasing it at 1.4% annual rate.
- (e) 1973-76 & 1977 calculated as in (b). 1979-85 calculated using 1979 unit price of US\$.47 (US\$1036/ton).

Model 1: Average Model - Large Farmer  
Production Based on Feed & Fertilizer

Year	Conversion Rate of Feed	Pounds of Fish Produced per Acre	Total Feed Costs (J\$)	Total Fertilizer Costs (J\$)	Total Fingerling Costs (J\$)	Water J\$	Labor J\$	Maintenance of Facility & Equipment	Replacement of Equipment	Total Costs	Total Production x Price			Net	Discount Flow @11%
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1.5	6,000	1710	189	900	75	564	25	0	3463	6,000 lbs. x \$0.85 = \$5,100			1637	1475
2									0	3463				1637	1328
3									0	3463				1637	1197
4									0	3463				1637	1078
5									544	4006				1093	649
6									0	3463				1637	875
7									0	3463				1637	788
8									0	3463				1637	710
9									0	3463				1637	640
10									2362	5825				-725	-255
11									0	3463				1637	519
12									0	3463				1637	468
13									0	3463				1637	422
14									0	3463				1637	380
15									544	4007				1093	228
ANNUAL PRODUCTION COSTS										ANNUAL BENEFITS				10,502	

1.0 Acreage  
3 Crops per year

Initial Outlay J\$3,500  
Total Discounted Benefits 10,502

Benefit/Cost Ratio 3.0

- 1/The number provided in this column is the feed to growth factor: 1.5 pounds of feed for each pound of fish produced.
- 2/Rate of production is also based on the amount of fish produced per acre for the first crop. Account is taken of farmer capability as well as the capacity of the Inland Fisheries' facilities at Mitchell Town. The figure in this column is based on a full year's production with three crops.
- 3/Feed costs are the actual costs (or the conversion rate for the first crop of fish) at a constant price of J\$0.19/lb. Subsequent feed costs are determined by the total production (pounds) multiplied by the conversion factor multiplied by J\$0.19, or column 11 x column 1 x J\$0.19.
- 4/Fertilizer cost is based on the type and amount actually used. Some farmers will have free manure from other operations (livestock) on their farms. Commercial fertilizer is priced at J\$0.15/lb.
- 5/The stocking rate cost equals column 5 (rate/ac) divided by the acreage of the pond multiplied by J\$0.05/fingerling. Farmers may use different stocking rates to obtain different sized fish; e.g., lower stocking rates produce larger fish which sell for higher prices as opposed to larger stocking rates and a higher production rate of smaller fish selling at a lower price. The net returns for the two methods are approximately the same.
- 6/Costs for water vary from farmer to farmer. Some farmers get free water by gravity flow from springs.
- 7/Charges for labor provided for managing the pond and harvesting the fish. The cost shown is the actual cost for the first year.
- 8/Maintenance covers costs for maintenance of equipment, pond dikes and water quality (chemicals). The cost shown is the actual cost for the first year.
- 9/Replacement of equipment based on a life determined by use. The high cost in the tenth year is attributable to the need to replace the pump, which is the main component of fixed costs.
- 11/The pounds produced per annum based on the results of a first crop.
- 12/Selling price based on the size of fish and the geographic location of the market.
- 14/Total revenue less total cost (column 13 less 10).
- 15/Figures in column 14 discounted at an annual rate of 11 percent (the assumed opportunity cost of capital).

in Annex I. We shall explain here only the calculation for model 1 (an "average large" farmer using both feed and fertilizer inputs) as the others follow the same methodology.

The figure of 1.5 column 1 shows the assumed conversion rate of feed to fish: it takes 1.5 pounds of feed to produce one pound of fish. Column 2 shows the number of pounds of fish produced per acre devoted to fish production. Columns 3 through 9 present total cost outlays for the various inputs required--feed, fertilizer, fingerlings, water, management and labor, maintenance of pond and equipment and replacement of equipment. The latter is charged in the year in which it is incurred. Amortization of the initial investment is excluded from operating costs in this cash flow analysis.

Cost figures for Year 1 are based on actual experience. When figures for the first full year were not available, we used data for the first crop extended to an annual basis. Imputed costs (for example, labor and management services provided by the farmer or his family) were included in the cost estimates at their proper market values. All costs are summed in column 10.

The calculation showing gross revenue is summarized in column 11 (pounds of fish), column 12 (average price per pound) and column 13 (total gross revenue received). Column 14 represents the net cash inflow from operations, and is the difference between column 13 (total revenue) and column 10 (total costs). This net cash inflow was then discounted for each year at the rate of 11 percent a year in column 15 to obtain the present value of this cash inflow. The interest rate of 11 percent represents the opportunity cost of capital and is based on the current commercial bank prime lending rate.

Note that this whole calculation (including the 11 percent opportunity cost of capital) is based on the assumption of constant cost and prices throughout the projection period. Upward adjustments will be required to the extent inflation occurs. A more detailed explanation of the derivation of the various figures in model 1 is presented in the footnotes to the table.

The summation of the discounted cash flow (column 25) comes to J\$10,502. Since the initial capital outlay was J\$3,500, the benefit/cost ratio is a very favorable 3.0 to 1. The Internal Rate of Return is 45 percent, four times the opportunity cost of capital. In the case of this "average large" farmer, the sum of feed and fertilizer costs could rise by 50 percent, with fish prices remaining unchanged, without depressing the rate of return on his initial investment below the opportunity costs of capital.

We have developed eight models to determine the profitability and benefit/cost ratios for large and small-intermediate farmers (defined below) operating under (a) optimum conditions, and (b) average conditions, (c) with feed and fertilizer, and (d) with fertilizer only. Large farmers are defined as farmers owning land of twenty acres or more; small-intermediate farmers include all farmers with less than twenty acres. "Optimum conditions" refer to a high degree of technical sophistication on the part of the owner-operator who is assumed to possess the equipment and inputs required to apply the proper technology. Most farmers are expected to operate under "average" conditions, which imply a level of production attainable with modest technical qualifications. With good extension services and the benefit of experience, the "average" output of many farmers could rise to approach the "optimum" level over a period of time.

Our models include operating with and without feed because feed, aside from being the costliest input, must be imported and the necessary foreign exchange may not be available for that purpose.

The benefit/cost ratios obtained from the eight models examined are recapitulated below. Note that the model we explained above is model 1-B which was selected for special attention because it is likely to represent the conditions under which a major portion of the fish will be produced in coming years.

Benefit/Cost Ratios

	Optimum Conditions	Average Conditions
	A	B
<u>LARGE FARMERS</u>		
1. With Feed & Fertilizer	6.11	3.00
2. With Fertilizer Only	2.42	1.97
<u>SMALL FARMERS</u>		
3. With Feed and Fertilizer	4.33	3.51
4. With Fertilizer Only	2.35	1.81

Analysis of these benefit/cost ratios suggests the following conclusions:

- (1) The benefit/cost ratios in all cases examined are substantial, ranging between <sup>1/</sup>1.8 to 6.1, indicating a very high internal rate of return.<sup>-</sup>
- (2) A substantial increase in production and profitability results from the use of feed (in addition to fertilizer). Note that the addition of feed enables the large farmer, operating under optimum conditions, to raise his benefit/cost ratio by 2.5 times (from 2.4 to 6.1), while the small farmer finds his B/C ratio increased by 84 percent (from 2.4 to 4.3). Under average conditions, the increase is still substantial though less dramatic (52 percent for the large farmer).
- (3) There is no significant difference in benefit/cost ratios between large and small farmers, except in the case of the large farmer operating under optimum conditions and utilizing both feed and fertilizer (model 1-A). In all cases, small farmers are expected to operate with about the same degree of efficiency as large farmers, indicating no significant economies of scale. The unusually high B/C ratio obtained by the large farmer operating with both feed and fertilizer under optimum conditions (model 1-A) is attributable to his ability to make more effective use of his pump, to stockpile inputs and to effectively integrate his fishpond production with his other farm enterprise. On the other

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<sup>1/</sup>A benefit/cost ratio of 1.0 indicates an 11 percent average annual rate of return on the initial investment.

hand, this farmer is assuming a much greater risk than the small farmer, which the latter probably could not afford to take,

Given the very favorable benefit/cost ratios in all of these models, it is clear, as was shown in the case of the large farmer operating under average conditions, that feed and fertilizer costs could rise substantially in relation to product prices without depressing the net rate of return of the operation below the opportunity cost of capital.

## 2. Earnings from Fish Pond Operation

Projected earnings from fishpond operation over the seven year period 1979-85 are presented in Table 3. The projections are based on the assumption of intensive fertilization and use of feed, with most of the fish production accounted for by farms operated by large farmers and by the GOJ (possibly on a cooperative basis)<sup>1/</sup>. Note that the number of small farmers benefited by 1983 exceeds the number of large farmers (including GOJ operated farms) by a ratio of 4:1 (1024 versus 256). However, most of the acreage devoted to fishpond production will be in the large farms (private and GOJ operated). Small farmers tend to reside in the mountainous areas and cannot devote to the fishpond operation the amount of land required for large scale operation, nor would they assume the risk associated with specialization. While every effort will be made to maximize the number of small farm participants, reliance on large farms for most of the output is unavoidable.

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<sup>1/</sup> Thus, the "large farmer" category includes GOJ-owned farms.

Table 3

PROJECTED NET INCOME FROM FISHPOND OPERATION, 1979-85

YEAR	LARGE FARMERS AND GOJ OPERATED FARMS (20 Acres or More)			SMALL & INTERMEDIATE FARMERS (Less than 20 Acres)			GRAND TOTAL
	No. of Fish Farmers	Ave. Net Income Per Project/ Farmer	Total Net Income	No. of Fish Farmers	Ave. Net Income Per Project/ Farmer*	Total Net Income	
1979	20	9,900	198,000	80	460	36,800	234,000
1980	60	9,900	594,000	240	460	110,400	704,400
1981	120	9,900	1,188,000	480	460	220,800	1,408,800
1982	184	9,900	1,821,600	736	460	338,560	2,160,160
1983	256	9,900	2,534,400	1,024	460	471,040	3,005,440
1984	282	9,900	2,791,800	1,126	460	517,960	3,309,760
1985	310	9,900	3,069,000	1,239	460	569,940	3,638,940
	TOTAL - 1979-85		12,196,800			2,265,500	14,462,300

The above projections are based on production supported by intensive fertilization and feeding, with the following assumptions:

- (1) 80% of the ponds and 20% of the acreage will be operated by small farmers and about 20% of the ponds and 80% of the acreage will be operated by large farmers and the GOJ;
- (2) the average pond size for small farmers will be 0.23 acres with an annual net income/acre of J\$2,000;
- (3) the average pond size for large farmers will be 3.3 acres with an average annual net income/acre of J\$3,000. The greater net income per acre for large farmers operating under optimum conditions is not due to economies of scale as explained above.

The calculation in Table 3 shows that over the seven year period, 1979-85, total net income generated by the project is expected to amount to an estimated J\$14.5 million, with J\$12.2 million going to large farm units and J\$2.3 million to small farmers. The assumptions underlying the calculation appear in the footnote to the table.

### 3. Impact on the Foreign Exchange Budget

The project will impact on Jamaica's foreign exchange resources in two ways: directly (and negatively) through the importation of input requirements (feed, fertilizer and equipment); and indirectly (and positively) by reducing foreign exchange allocations for fish imports. We have already indicated that fishpond production (mainly tilapia) will constitute a good substitute for a broad variety of fish historically (and currently imported).

Foreign exchange savings from fishpond production are projected in Tables 4 and 5 under two alternative assumptions. The calculation in Table 4 assumes that the government is not willing or able to make available foreign exchange resources for the importation of feed (which is by far the costliest input in terms of foreign exchange outlay). Only minimal foreign exchange is made available for the importation of fertilizer, seines, cages and chemicals, gasoline and other miscellaneous products. This will permit the foreign exchange allocation for inputs to be held down to only J\$.06 per pound, equivalent to US\$.034 at the current rate of exchange of US\$1 equals J\$1.78.

Under this assumption, however, fish production will be far below the optimum level since, as indicated by the production figures in Tables 4 and 5, supplementary feed is essential to approach maximum efficiency. Without supplementary feed, total production over 1979-85 will amount to US\$9.0 million while the outlay for imported inputs is held down to the very low figure of \$461,000. The potential foreign exchange saving is US\$8.5 million (Table 4).

The alternative calculation in Table 6 shows what would happen if the government made available the required foreign exchange to meet feed import requirements (and if the farmers could be persuaded to use supplementary feeding to achieve optimum production). Under this assumption, the value of fishpond production during 1979-85 rises to US\$21.2 million, 2.3 times the level without supplementary feeding. The projected output for imported inputs (US\$6.7 million) is 14.5 times what it was under alternative 1. However, potential foreign exchange savings over this

Table 4

PROJECTED FOREIGN EXCHANGE SAVINGS  
FROM FISHPOND PRODUCTION WITH NO FEED IMPORTS

Year	Projected Fishpond Production			Less Projected Value of Imported Inputs for Project <sup>4/</sup> (US \$000)	Potential Foreign Exchange Savings (3)-(4)
	Gross <sup>1/</sup>	Net <sup>2/</sup> Metric Tons	US \$000 <sup>3/</sup>		
	(1)	(2)	(3)	(4)	(5)
1979	66	59	86.5	4.4	82.1
1980	265	239	350.4	17.9	332.5
1981	562	533	781.4	39.9	741.5
1982	946	851	1247.6	63.8	1183.8
1983	1299	1169	1713.8	87.7	1626.1
1984	1429	1286	1885.3	96.4	1788.9
1985	1572	1415	2074.4	106.1	1968.3
TOTAL 1979-85			8139.4	416.2	7723.2

<sup>1/</sup> Conservatively projected on the assumption of no feed imports. Only imported inputs are fertilizer, seines, cages, chemicals and gasoline.

<sup>2/</sup> 90% of gross weight to allow for discard of viscera, gills, etc.

<sup>3/</sup> Assuming an average landed cost price of imported fish (that compete with the domestic variety) of US\$.665 per pound (=US\$1466/metric ton). This figure was arrived at by taking the weighted average of the following current (April 1979) landed cost prices:

Cod	US\$1.15/lb.
Mackerel	.43
Other	.47

These weighted with the relative import values of these three categories over 1975-77.

<sup>4/</sup> Based on a net cost of imported inputs per pound of fish of J\$.06 broken down as follows:

Fertilizer	.02
Seines, cages and chemicals	.02
Gasoline and miscellaneous	.02

TOTAL .06 or US\$.0344 (=US\$75 per metric ton)

Table 5

PROJECTED FOREIGN EXCHANGE SAVINGS  
FROM FISHPOND PRODUCTION WITH SUPPLEMENTARY FEED IMPORTS

YEAR	Projected Fishpond Production			Less Projected Value of Imported Inputs for Project <sup>4/</sup> (US \$000)	Potential Foreign Exchange Savings (3)-(4)
	Gross <sup>1/</sup>	Net <sup>2/</sup> Metric Tons	US \$000 <sup>3/</sup>		
	(1)	(2)	(3)	(4)	(5)
1979	136	122	178.9	56.5	122.4
1980	565	509	746.2	235.7	510.5
1981	1650	1485	2177.0	687.8	1489.2
1982	2268	2041	2992.1	945.0	2047.1
1983	3052	2747	4027.1	1271.9	2755.2
1984	3357	3022	4430.2	1317.6	3112.6
1985	3693	3324	4873.0	1539.0	3334.0
TOTAL 1979-85			19424.5	6053.5	13371.0

<sup>1/</sup> Projected on the assumption of supplementary feed imports to maximize output.

<sup>2/</sup> 90% of gross weight to allow for discard of viscera, gills, etc.

<sup>3/</sup> Same as footnote 3 of Table 3.

<sup>4/</sup> Based on a net cost of imported inputs per pound of fish of J\$.36, broken down as follows:

Feed	J\$.30	(18% protein)
Fertilizer	.02	
Seines, cages & chemicals	.02	
Gasoline & miscellaneous	.02	

J\$.36 or US\$.21 (=US\$463 per metric ton)

six-year period rise to US\$14.5 million, compared with US\$8.5 million over the previous alternative. Note that the ratio of foreign exchange generated to foreign exchange invested in inputs is still a very favorable 3.17 to 1.<sup>1/</sup>

The substantial increase in foreign exchange savings resulting from the use of feed is not surprising since the price of fish (estimated to be a weighted average of US\$.665 a pound) is a multiple of the price of feed (US\$.17 cents worth of feed is required to produce a pound of fish). The calculation indicates that from a foreign exchange savings standpoint, outlays for feed imports represent an excellent investment.

#### 4. Trend in Demand

We have already established that there is a substantial demand for fish at this time that is not met by domestic production. This is borne out both by the substantial volume of imports and by the fact that any fish that reaches distribution centers is sold immediately. In this section, we shall address the following questions: (a) Is the demand for fish likely to fall as incomes rise as a result of consumer shifts to other meat products such as poultry, pork and beef? (b) Should we expect fish prices to fall as production expands, thereby reducing the profitability of fish production and discouraging its expansion?

##### a) Demand for Fish as Income Changes

The trend in incomes (both GDP and per capita income) since 1972 has been steadily downward. Hopefully, this trend will soon be halted and reversed. However, given likely changes in per capita incomes and the estimated magnitude of the income elasticity coefficient of demand for fish, no significant reduction in the per capita demand for fish is anticipated over the next five years.

No work on the income elasticity coefficient of demand for fish has been done in Jamaica, nor is the ceteribus paribus assumption valid for the Jamaican data presented in this section. The Food and Agricultural Organization (FAO) of the United Nations estimates the coefficient for Latin America (excluding Argentina and Uruguay) at 0.5. This means that a 1 percent increase in personal disposable income will result only in a 0.5 percent increase in the demand for fish, and vice versa.

On the basis of this income elasticity assumption, one

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<sup>1/</sup> US\$21,166 over US\$6,685 (Table 4)

would expect the demand for fish to decline if per capita income declined (though at only half the rate of the change in per capita disposable income). Note should be taken of the fact that the continuing and substantial decline in real per capita income that has occurred since 1972 (about 25 percent cumulatively) has compelled the lower income groups to shift their food consumption pattern away from higher priced milk, meat, beef and fish toward lower-priced cereals and starch products. It is likely that they would resist any further reduction in their animal protein consumption. Thus, if per capita incomes should contract further, we are likely to find that the income elasticity of demand for fish will be less than .5. On the other hand, given the austerity that has been forced on the population in recent years, any increase in income might result in a roughly proportional increase in the demand for fish, poultry, dairy products and beef.

b) Impact of Increased Fish Supply on Prices

The increase in fish supplies from fishponds is not likely to have a significant adverse effect on the profitability of the project. In the first place, it cannot be assumed that the supply of fish available in Jamaica will be increased by the full amount of the fishpond production since it is likely to be attended by some cutback in imports. Second, even if the expansion of supply should result in some decline in fish prices, the negative effect on profitability of the price decline should be at least partly offset by the expansion of the market. According to Mellor, the price elasticity of demand for agricultural and livestock products is likely to be significantly higher than the income elasticity, about -1.5<sup>1</sup>/percent for animal protein in the case of low income countries. In the case of Jamaica (a middle income country), the price elasticity coefficient may be somewhat lower, perhaps in the range of -1 to -1.3 percent. This means that a decline of 1 percent in the price of fish could be expected to increase the quantity demanded by 1 to 1.3 percent, thus offsetting, in whole or in large part, the negative impact of the price decline on the profitability of fish production.

5. Impact on Nutrition

There is a nutrition problem in Jamaica, though it is not nearly as serious as in many other LDCs (E.G., Haiti, Bangladesh, India and the Sahel); nor is the problem apparent from per capita food availability statistics. On a national basis, both per capita protein and energy availabilities are adequate in relation to the recommended daily allowance (RDA), but this indicator does not

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<sup>1</sup>/ John W. Mellor, "The Economics of Agricultural Development," Cornell University Press, 1966, page 72.

take into account food distribution and hence the actual food consumption by various groups. Local and regional nutritional surveys focusing on the lower income groups have uncovered deficiencies, particularly in the area of the overall energy (calorie) intake of young children. According to a 1974 survey, the per capita energy consumption of the poorest 70 percent of the population was found to fall short of the RDA by 26 percent; while the per capita protein intake of the same group falls short of the RDA by 14 percent.<sup>1/</sup>

An islandwide survey of the nutritional status of per-school children and of pregnant and lactating women was carried out in 1978 by the Nutrition Unit of the Ministry of Health and Environmental Control involving a sample of 3,000 children (under five years of age) and 700 women. One of the study's key conclusions was that "over one-third of the children in the sample had a weight for age below 90 percent of the reference standard weight for age and could be classified as having some degree of malnutrition, according to the Gomez classification of nutritional status. Of the group, 31.1 percent had a weight for age between 75 and 89 percent of the reference standard, and could be said to be mildly malnourished (first degree malnutrition); a further 7 percent were moderately malnourished (second degree malnutrition); and 0.9 percent had a weight for age below 60 percent of the reference standard and could be classified as severely malnourished (third degree malnutrition)."<sup>2/</sup>

Some experts challenge the assumption that children in the Gomez I category (with a weight for age between 75 and 89 percent of the reference standard) should be classified as "malnourished" since about 16 percent of a "healthy" population usually falls in this category, and feel that inclusion of the Gomez I category exaggerates the proportion classified as malnourished in the population.

An alternative method to the Gomez classification of nutritional status is to use the 80 percent of the standard in the Harvard reference values for weight for age as the lower limit of normality; i.e., to assume that children that fall short of 80 percent of the reference standard weight for age should be classified as malnourished. By this more conservative classification, 14.3 percent of the children in the sample are malnourished (see Table 6).<sup>3/</sup> We conclude that the degree of malnourishment in children of less than five years of age is at least 14 percent, and could go as high as 39 percent if Gomez I children are included in the "malnourished" category.

<sup>1/</sup> National Planning Agency, "Five-Year Development Plan, 1978-82" pg.xv.

<sup>2/</sup> This study, as yet unpublished and restricted, is by the Nutrition Unit, Ministry of Health & Environmental Control. It is entitled, "Draft Report of a Survey in Jamaica, March 28-June 23, 1978 on the Nutritional Status of Vulnerable Groups in Jamaica, 1978." The quotation is from p.5

Table 6

UNDERNOURISHMENT AS MEASURED BY WEIGHT  
IN RELATION TO THE WEIGHT FOR AGE REFERENCE STANDARD  
(In children of less than five years of age)

<u>Percent of Standard Weight for Age Reference</u>	<u>Percent of Children in Sample</u>
Under 60% (severe malnourishment)	0.9%
60-69% (serious)	2.8%
70-79% (below normal)	<u>10.6%</u>
TOTAL under 80%*	14.3%

\*Using 80% of the Harvard standard reference values of weight for age as the lower limit of normality.

SOURCE: Condensed from Nutrition Unit, Ministry of Health & Environmental Control, "The Nutritional Status of Vulnerable Groups in Jamaica, 1978," Table 2.1.2 (unpublished).

The GOJ's Five Year Development Plan notes that "the long-term objective of the government's nutrition programme is the elimination of malnutrition in the vulnerable groups of the population, particularly serious protein-energy value and anaemia in young children and nutritional deficiencies in pregnant and nursing women."<sup>4/</sup> The proposed project should make some contribution toward this goal by providing a source of fish protein at a price lower than would be available without the project and by making fish available to the rural poor living in areas which without the project would not have access to comparable quantities of fish. To the extent that fish produced under this project substitutes for imports, the island-wide nutritional benefits will be diminished; however, the benefit derived from redistribution of fish from urban to poor rural areas is still significant.

In conclusion: The project has a strong economic justification on the basis of:

- (a) its impact on farm incomes and the very high benefit/cost ratio it provides to fishpond farmers;
- (b) its importance as a significant potential saver of foreign exchange, particularly if fishpond farmers can be persuaded to adopt the more efficient production techniques involving the intensive use of feed and fertilizer, and if adequate supplies of these inputs can be made available;
- (c) its favorable impact on the nutritional status of the lower income groups who will be able to devote some portion of their food budget to the purchase of animal proteins.

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<sup>3/</sup> Ibid, p.5

<sup>4/</sup> National Planning Agency, "Five Year Development Plan, 1978-82," Main Document, page 119.

#### D. Financial Analysis

This section examines the financing of project components by the GOJ and AID and the continuing financial responsibility of the GOJ after the end of the project. Major recurring cost components which require GOJ expenditures are analyzed to provide a rationale for continued GOJ support. This analysis identifies and examines those recurring costs to the GOJ that are necessary to continue expansion of the National Inland Fisheries Program on a sound financial basis. Net foreign exchange savings and a highly favorable cost/benefit ratio demonstrated in the economic analysis, provide justification for the GOJ annual allocation of foreign exchange for supplementary feed. This section presents guidelines for ensuring this annual allotment by the GOJ. The financial implications for the GOJ of a continuing credit system for fish farming are discussed.

##### 1. Financial Plan

The U.S. Loan and Grant financing and GOJ inputs by U.S. fiscal year are presented in the budget summary Table 7. The GOJ Inland Fisheries budget for years one and two after the project are presented in Table 8 together with the last year of the project. Table 8 shows the transfer of funding responsibility from the project to the GOJ.

The budget summary tables present a cash budget for GOJ. Table 9 (GOJ Inland Fisheries Operating Budget, U.S. Fiscal Year, 1979-83) provides the details of depreciation computation and a summary of other costs. This indicates that at the end of project, GOJ would have a total depreciation cost of \$625,000 (\$185,000 for equipment + \$440,000 for vehicles). Provision for depreciation is required to ensure that equipment and vehicles will be maintained at a level to continue the project. Contingency and inflation costs are added separately to arrive at current replacement costs.

Personnel and administrative support costs naturally increase as the IFU staff increases from 44 to 160 from 1979 to 1983. This personnel increase is composed primarily of extension officers and regional staff. As illustrated in Table 9, IFU salary costs will increase from \$279,000 in FY 1980 to \$392,000 in FY 1983. This dollar increase is disproportionately small compared to the increase in staff, because the increase is composed primarily of unskilled labor.

The Parish Fisheries Extension Specialists funded under the line item for salaries, can provide the necessary technical

Table 7

USAID/GOJ PROJECT COSTS BY U.S. FISCAL YEAR

(U.S. \$000)

U.S. CONTRIBUTION	FY1979	FY1980	FY1981	FY1982	FY1983	TOTAL
<u>Grant:</u>						
Technical Assistance						
Long Term	-	180	270	270	180	900
Short Term	-	18	24	6	6	54
Participant Training						
Long Term (39 pm)	20	12	20	-	-	52
Equipment (JSA & UWI)	-	40	-	-	-	40
<u>Sub-Total</u>	20	250	314	276	186	1,046
Contingency (5%)	1	13	16	14	9	53
Inflation (10% Compound)	-	25	66	91	86	268
TOTAL	21	288	396	381	281	1,367
<u>Loan:</u>						
Participant Training						
Long Term (66 pm)	32	15	39	-	-	86
Short Term (60 pm)	-	28	28	14	14	84
Commodities						
Vehicles	-	404	90	50	10	554
Equipment	-	172	19	13	7	211
Feed & Fertilizer	-	175	325	250	150	900
Facility Development	-	380	-	-	-	380
<u>Sub-Total</u>	32	1,174	501	327	181	2,215
Contingency (5%)	2	59	25	16	9	111
Inflation (10% Compound)	-	117	105	108	84	414
TOTAL	34	1,350	631	451	274	2,740
<u>GOJ CONTRIBUTION</u>						
Salaries	58	279	359	392	392	1,480
Technical Assistance (PCV)	1	2	2	2	1	8
Operational Maintenance Costs						
Facilities	30	172	267	311	311	1,091
Equipment	5	26	32	35	37	135
Vehicles	16	178	214	234	238	880
International Travel & Study	2	10	22	6	6	46
<u>Sub-Total</u>	112	667	896	980	935	3,640
Contingency (5%)	6	33	45	49	49	182
Inflation (10% Compound)	-	67	188	324	457	1,036
TOTAL	118	767	1,129	1,353	1,491	4,858

Table 8

GOJ RECURRING COSTS

	Last Year of Project	Project Year + 1	Project Year + 2
SALARIES	392	392	392
OPERATION & MAINTENANCE			
Facilities	311	311	311
Equipment	37	37	37
Vehicles	<u>238</u>	<u>238<sup>a/</sup></u>	<u>238<sup>a/</sup></u>
<u>Sub-Total:</u>	978	978	978
Contingency	49	49	49
Inflation (10% Compounded from base year 1979)	<u>454</u>	<u>597</u>	<u>753</u>
TOTAL	<u>1,481</u>	<u>1,624</u>	<u>1,782</u>

<sup>a/</sup> Does not include depreciation.

assistance to pond operators. The staffing at the end of the project will be adequate for an additional five years assuming a 10 percent annual rate of increase of small pond operators. This is achievable for two reasons. First, the extension specialists will become more efficient as they gain experience during project implementation; and, second, as pond operators become more experienced, they will require less time from the extension specialists. At the project end, each extension officer would provide technical support for 107 pond operators. This can be increased to 160 pond operators in the following five years, thus servicing the projected 10 percent annual increase.

The research, training and administrative support for a national fish production system can also be maintained and the 10 percent increase in small farmer ponds provided for without further major increases in the GOJ budget for five years after the project. This is possible because of the economies of scale inherent in research and training facilities and because of the gain in efficiency of the administration generated by experience from implementing the project. With the exception of inflation, the total IFU annual operating budget of US\$1,753,000 (Table 9) is expected to remain the same as the final project year (1983-84). Table 10 shows that, with inflation, this budget in money terms will grow from \$1.6 million to \$1.8 million in two years.

This represents the total continuing annual gross budgetary requirement for the GOJ. Cost offsetting revenue generated by the project (see Table 10) can, however, be used to cover part of these costs. During the project, GOJ budget costs could also be partially offset by local currency funds generated by the sale of the \$900,000 loan-funded feed and fertilizer. The potential budget adjustments are discussed in the following section to indicate the true economic costs of the project.

## 2. GOJ Offset Revenues

Table 10 indicates the net operating costs of the IFU to the GOJ. This table indicates that the project will generate cost offsetting revenue to the GOJ of (\$1.2 million and after the life of the project, \$297,000 plus inflation, annually.) These funds can be used to reduce the GOJ budget requirements during and after the life of the project.

Table 9  
INLAND FISHERIES OPERATING BUDGET, 1979-83  
(U.S. \$000)

	FY1979	FY1980	FY1981	FY1982	FY1983	TOTAL
1. Technical Assistance <sup>1/</sup>	1	2	2	2	1	
2. Salaries (fringe benefits, travel, overtime, etc. @ 15%)	58	279	359	392	392	1,480
3. Operational Cost of Facilities (electricity, feed, fertilizer, chemicals, miscellaneous supplies, tools)	30	172	267	311	311	1,091
4. Fish Handling Equipment <sup>2/</sup>	-	-	-	-	-	-
5. Inventory on hand	30	30	202	221	234	*
6. New Purchases	-	172	19	13	7	*
7. Cumulative Purchase Value (Line 5 + 6)	30	202	221	234	241	*
8. Depreciation (20% of Line 7)	6	40	44	47	48	185
9. Book Value (Line 7 Minus Line 8)	24	162	177	187	193	*
10. Repair & Maintenance (12% of Line 7)	4	24	27	28	29	112
11. Operational Cost <sup>3/</sup> (20% of Cost of Pumps)	2	7	11	13	14	47
12. Subtotal (Lines 8, 10, & 11)	12	71	82	88	91	344
13. Vehicles						
14. Inventory on Hand	41	41	445	535	585	*
15. New Purchases <sup>2/</sup>	-	404	90	50	10	*
16. Cumulative Purchase Value (Lines 14 + 15)	41	445	535	585	595	*
17. Depreciation (20% of Line 16)	8	89	107	117	119	440
18. Book Value (Line 16 minus Line 17)	33	356	428	468	476	*
19. Repair & Maintenance (20% of Line 16)	8	89	107	117	119	440
20. Operational Cost (20% of Line 16)	8	89	107	117	119	440
21. Subtotal (Lines 17, 19 & 20)	24	267	321	351	357	1,320
22. International Travel & Study (Training)	-	11	23	6	6	46
23. Subtotal (Lines 1, 2, 3, 12, 21, & 22)	125	802	1,054	1,150	1,158	4,289
24. Contingency (5% of Line 23)	6	40	53	58	58	215
25. Inflation (10% compounded)	-	80	221	381	537	1,219
26. TOTAL	131	922	1,328	1,589	1,753	5,723

<sup>1/</sup> Funding for Peace Corps Volunteer technical assistance.

<sup>2/</sup> To be purchased with USAID project Loan funds.

<sup>3/</sup> Operating cost is for operation of pumps only.

\* Non-add items

Table 10

GOJ NET OPERATING BUDGET<sup>1/</sup>  
(\$000)

	FY 79	80-81	81-82	82-83	83-84	Project Total	84-85	85-86
1. <u>Total GOJ Operating Costs (Table 3)</u>	131	922	1328	1589	1753	5723	1920	2112
2. <u>Revenue from Pond Construction</u>	-	46	51	56	61	214	68	74
3. <u>Fingerling/Food Fish Sales</u>	104	238	237	234	208	1021	229	252
4. <u>Net GOJ Operating Costs</u>	27	664	1090	1371	1569	4488	1623	1786

<sup>1/</sup> Both operating costs and revenue reflect a 10% inflation rate compounded from 1979. At the end of the project, in real terms, the operating costs are \$1,027,000. Revenues from pond construction are \$42,000, and revenue from fish sales is \$142,000. These amounts are expected to remain constant, in real terms, for the first five years after project completion.

## 2. Other GOJ Costs

### a) Feed and Fertilizer

Feed and fertilizer costs do not represent a direct cost to the GOJ, since they will be sold through retail outlets to fish farmers; yet, they do represent a continuing need for foreign exchange. Initially, US\$900,000 of this foreign exchange need for feed and fertilizer will be supplied under the AID Loan portion of funding. The local currency generated in this manner could be used to offset a portion of the project local costs.

It is estimated that these inputs will cost approximately \$1.5 million in 1985 and will generate a \$13.4 million foreign exchange savings (Table 5). Assuming a 10 percent increase per annum in fishpond construction after the end of the project, the projected need for foreign exchange will increase 2 percent to 12 percent (depending on the number of acres of ponds constructed (per annum in constant dollar terms. Foreign exchange in increasing (but not major) amounts will also be needed for other budget items such as repair parts, fuel and other related items.

The calculations assume a degree of correlation between increased inland fish production and a corresponding decrease in fish imports, although some of the increased fish production will go for nutritional improvement. Establishment of covenants in the Loan Agreement that require the GOJ to provide sufficient foreign exchange to cover projected production needs are recommended to ensure sufficient exchange to support the national fish production program. Although the incentives exist for the GOJ to make foreign exchange available for importation of fish production inputs, the serious nature of the foreign exchange problem requires that such covenants be included in the Loan Agreement.

### b) Credit Program for Inland Fisheries

As indicated in the Technical Analysis section, various programs have been authorized for use of small pond operators for both production credit needs and pond construction. These should ensure adequate lines of financing for the program. This project incorporates various elements to facilitate repayment of loans. Among the more important are:

- (1) Training in credit management will be given to extension personnel and farmers, and
- (2) IFU will refuse to sell fingerlings to pond operators who do not make loan payments.

These mechanisms are designed to ensure sound credit management and ensure credit availability for all pond operators. The highly favorable cost/benefits should provide sufficient funds for debt servicing. The long-run viability of inland fisheries requires access to credit by all pond operators, but we do not project a continuing expense to the GOJ for credit purposes. The projected fish farmer repayment capacity should ensure that pond operators become and remain credit worthy.

### 3. Summary

The financial analysis reflects the strong economic rationale supporting intensive (feed and fertilizer) inland fisheries production. The cost/benefits fully justify GOJ budget support. The shift in budget support from U.S. Grant and Loan funds to GOJ financial support is gradual during the life of the project and is based upon building inland fisheries production capability. Sources of revenues from fish production activities and sales of U.S. purchased commodities have been identified to offset the projected recurring expenses of an expanding inland fish production. The GOJ budget will have gradual increases and will lag behind the expanded production since some Loan funds will be used for foreign exchange production input items. Finally, mechanisms for providing both the foreign exchange costs and direct costs of the GOJ were examined to ensure adequate financial support for an expanding inland fisheries program.

### E. Social Soundness Analysis

This analysis considers the socio-cultural aspect of extending technology of inland fish production to the entire island. We examined the experience of the pilot project through interviews with participating farmers with regard to the acceptability of the technology and consumption of tilapia. The questions addressed by the social soundness analysis are:

- a) What does fish farming, under the specific conditions of the project mean to the Jamaican farmers' beneficiaries?
- b) What are the socio-cultural patterns which facilitate or constrain the proposals to expand fish production?
- c) The role of women in freshwater fish production.

#### 1. Fish Culture and the Jamaican Farmer Beneficiaries

The Jamaican farmer is very receptive to freshwater fish production technology. The IFU has a sizeable waiting list of farmers wanting fingerlings and technical assistance. A number of factors are related to its acceptability. The majority of farms are under five acres, and farmers prefer to diversify cropping patterns to ensure a steady year-round income; small livestock are kept for the same purpose. Fish culture utilizes marginal and under-utilized land, is a simpler technology than alternative livestock production, and is consistent with the farmers' tradition of diversification. Farm incomes are low, estimated at approximately \$1,300 per year, and the family is the main source of labor, with women taking responsibility for small livestock rearing. This project seeks to augment farm incomes, and provides economic activity for women in small farm households. Maintenance costs to the farmer are low, both in cash and time and offer no conflict to the farmer's other agricultural activities. Of great importance is the fact that fish farming is handled similarly to poultry, but is perceived as having less risk. Farmers whose educational level is low, indicate a high level of motivation to fish culture, particularly because they do not feel they have to undergo extensive training in new skills.

Fish is a traditional and integral part of the Jamaican diet, as a main dish in its fresh form, and used as a flavoring in its processed form. Fish is also an important source of protein for the Jamaican family.

Tilapia differs significantly in size and color from marine fish; however, this investigation found that Tilapia mossambica is prepared and eaten in the same way as marine fish and has a high level of acceptability in Jamaica.

Increased availability of fish will result in increased consumption, as it was found that tilapia was consumed by members of all producer households as well as by persons in the immediate community. The project will make fish available to nutritionally depressed areas, such as sugar workers' communities, isolated hill settlements, and urban low-income households where an estimated 20 percent malnutrition rate exists among children.

## 2. Socio-Cultural Patterns

There are aspects of the social situation of small farmers which can limit long-term involvement in the project. Small farm communities tend to be cohesive social units and innovations achieve long-term impact through community-wide receptivity, rather than as a result of individual farmer's response. Consequently, extension techniques to small farmers will aim to integrate fish farming with other community goals; e.g., nutrition, income generation or community enterprise organizations. Technical difficulties such as pond construction, feed availability, and marketing are more effectively dealt with when farmers work in a mutually supportive system.

There are no reasons to believe that these aspects cannot be successfully handled. The findings noted in 1 above suggest that innovation will be readily accepted within the community; in fact, the objectives of the project were found to be wholly compatible with those of the farming communities. This factor will reinforce the motivation and behavior of the individual small farmer.

## 3. Role of Women

Women play an increasingly important role in the agricultural sector in Jamaica. The 1977 Labor Force Survey indicates that the percentage of female participation in agriculture has increased steadily since 1975. In 1975, women made up 14.6 percent of the agricultural labor force and this figure rose to 17.6 percent in 1977.

Small farm households view fish farming as similar to other small livestock (chickens, goats, etc.) rearing activities which are traditionally the responsibility of the farm women. It is assumed that if there is an adult female member of the household of the 1,020 small farms participating in the project she will be actively involved in fish farming activities.

In addition, women comprise 82% of the small marketing middlemen called "higglers" who will be primarily responsible for marketing fish in the rural areas. Other job opportunities for rural women in the areas of processing and packaging fish and fish products will be generated by the project.

#### IV. IMPLEMENTATION ACTIVITIES

##### A. Implementation Schedule

As the Project Performance Network (Figure 2) shows, close attention to phasing and coordination of the inputs in the first six months of the project will be necessary for timely implementation. Of particular importance is the contracting of long term technical assistance, development of procurement plans, issuance of IFBs, and initiation of training activities. The CPI description is shown in Table 11.

Table 11

CPI DESCRIPTION

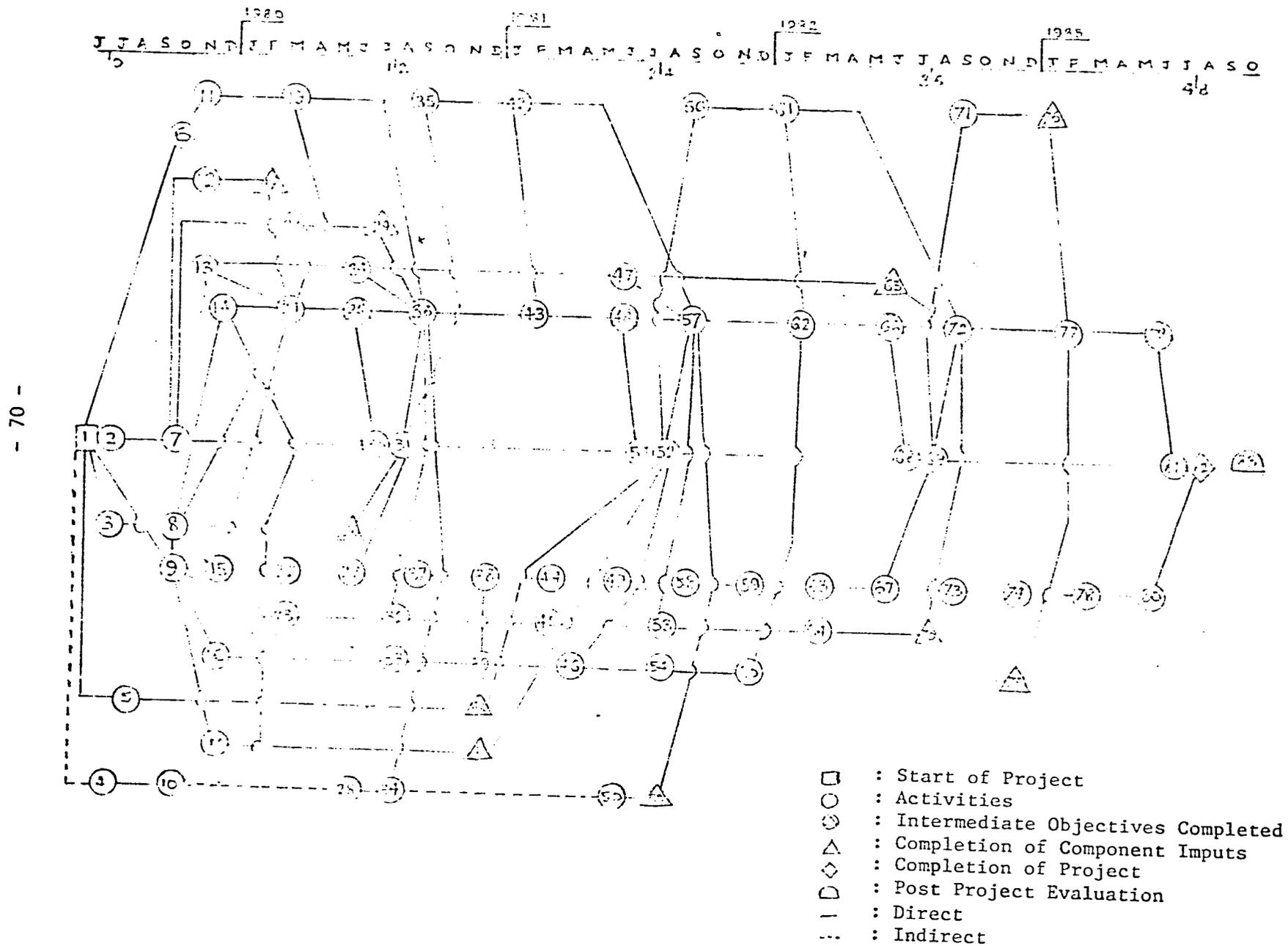
1. 6/79 Project Agreements signed
2. 7/79 Procurement waivers forwarded to Washington
3. Long Term T.A. contract signed
4. First group of PCVs assigned to project
5. 8/79 JSA long-term training participant departs
6. 10/79 Procurement which received above waivers initiated
7. All Conditions Precedent met
8. T.A. arrives (Team Leader/Senior Technical Advisor and Extension Advisor - Eastern Region)
9. IFU training initiated
10. PCVs trained
11. 11/79 IFBs for equipment and vehicles issued
12. Contracting for expansion of Twickenham Park and Western Region support facility initiated
13. Nine new IFU personnel hired - total of 56 people on board
14. 12/79 Project extension activities initiated
15. IFU fish production training for farmers initiated
16. 12/79 First and second IFU long-term training participants depart.

17. UWI long-term training participant departs
18. 2/80 Expansion of Twickenham Park facility complete
19. 3/80 Vehicles/equipment arrive
20. Construction of Twickenham Park facility and second support facility - Western Region initiated
21. Extension activities expanded in Eastern Region
22. IFU Regional and local fish production workshop
23. First group of IFU short-term training participants depart
24. 6/80 Sixty-five new IFU personnel hired - 121 people now on board
25. Three hundred and twenty small and 90 large producers and 36 acres in production
26. T.A. arrives (Extension Advisor - Western Region)
27. IFU fish production training for farmers
28. Second group of PCVs assigned to project
29. 7/80 Construction of Twickenham Park facility and second support facility complete
30. First year evaluation/audit
31. 8/80 Annual implementation plan for second project year prepared
32. First group of IFU short-term training participants return
33. Third IFU long-term training participant departs
34. PCVs trained
35. 9/80 IFBs issued for additional vehicles, equipment and commodities
36. Extension activities established - Western Region
37. IFU fish production training for farmers
38. 12/80 IFU fish production training for farmers
39. First IFU long-term training participant returns
40. JSA long-term training participant returns

41. UWI long-term training participant returns
42. 1/81 Additional vehicles/equipment arrive
43. 2/81 Expanded fisheries extension activities
44. 3/81 IFU Regional and local fish production workshop
45. Second group of IFU short-term training participants
46. 4/81 Second IFU long-term training participant returns
47. 6/81 Twenty-eight new IFU personnel hired - 149 people now on board
48. Six hundred small and 150 large producers and 580 acres in production
49. IFU fish production training
50. Third group of PCVs assigned to project - first group complete assignment
51. 7/81 Second year evaluation/audit
52. 8/81 Annual implementation plan for third project year
53. Second group of IFU short-term training participants returns
54. Fourth IFU long-term training participant departs
55. PCVs trained
56. 9/81 IFBs issued for additional vehicles, equipment and commodities
57. Expanded fisheries extension activities
58. IFU fish production training
59. 12/81 IFU fish production training
60. Third IFU long-term training participant returns
61. 1/82 Vehicles/equipment arrive
62. 2/82 Expanded fisheries extension activities
63. 3/82 IFU Regional and local fish production workshop
64. Third group of IFU short-term training participants departs

65. 6/82 IFU personnel hired (160 personnel aboard)
66. Nine hundred and twenty small and 230 large producers and 820 acres in production
67. IFU fish production production training
68. 7/82 Third year evaluation/audit
69. 8/82 Annual implementation plan for fourth project year
70. Third group of IFU short-term training participants return
71. 9/82 IFEs issued for miscellaneous equipment and supplies
72. Expanded fisheries extension activities
73. IFU fish production training
74. 12/82 IFU fish production training
75. Fourth IFU long-term training participant returns
76. 1/83 Equipment arrives
77. 2/83 Expanded fisheries extension activities
78. 3/83 IFU Regional and local fish production workshop
79. 6/83 One thousand, two hundred and eighty small and 320 large producers and 1,100 acres in production
80. IFU fish production training
81. 7/83 Fourth year audit
82. 8/83 PACD
83. 12/83 Final evaluation

FIGURE 2: PROJECT PERFORMANCE NETWORK



B. Project Monitoring

Monitoring will be performed by a Mission Project Committee whose members will have the following responsibilities:

- a) The primary monitoring task will reside with the Project Manager, USAID Agricultural/Rural Development Office, who will maintain liaison with IFU; coordinate necessary Mission Project backstopping; and prepare and present monthly progress reports to the USAID Mission.
- b) The Capital Development and Program Office will be responsible for overall project monitoring; for issuance of the Loan/Grant Agreement and Implementation Letters; and for assuring that provisions of these documents are met.
- c) The USAID Controller will review all disbursement requests for conformity with AID regulations and will ensure that adequate financial control methods are followed by IFU.

Quarterly progress reports, annual evaluations and audits, financial and other reports will be required of the IFU. Specific instructions as to the substance of these reports and other implementation actions will be issued by Implementation Letters.

C. Procurement Procedures

Except for small trail bikes (approximately 125 cc) which will have their source and origin in AID Geographic Code 899, goods and services procured under the Loan must have both their source and origin in AID Geographic Code 941 unless otherwise agreed in writing. Goods and services procured under the Grant will have their source and origin in AID Geographic Code 000. The procurement of project goods and services will be undertaken by the Ministry of Agriculture, IFU rather than by AID. AID will assist IFU in procurement through the issuance of an Implementation Letter detailing procurement procedures, through periodic Mission consultation, and through the provision of pre-project implementation technical assistance (SER/COM) in the development of a detailed procurement plan.

Waivers will be required as follows:

- a) Sole source waiver, requiring AID/Washington approval, for the procurement of three D-4 Caterpillar tractors since Caterpillar is the only distributor of such

equipment in Jamaica with adequate maintenance facilities.

- b) Sole source and origin waiver, Mission approved, for 20 trail bikes (approximately 125 cc) since no small trail bikes are manufactured in the United States and since Honda is the only Jamaican distributor with island-wide maintenance facilities.

The Regional Legal Advisor, Regional Contract Officer and SER/COM will be consulted prior to Loan implementation in the drafting of waivers.

#### D. Evaluation

The project shall be reviewed annually by the GOJ and USAID/Jamaica with a major comprehensive evaluation scheduled to occur at the end of the second project year. Evaluations are scheduled to coincide with project audits and preparation of revised implementation and budget plans at the end of each project year. Baseline data against which to measure the project's progress have been gathered under the research component of the earlier Inland Fisheries Development Project.

As several major project activities are initiated in the project's first year, the first evaluation shall focus primarily on the timely implementation of the project. The second and more comprehensive evaluation is expected to take two to three weeks and shall include representatives from USAID/Jamaica, AID/Washington, and GOJ, and contracted technical assistance contract institutions. At that time, Twickenham Park will have been expanded and renovated, the regional centers constructed, IFU and JSA training participants returned from the U.S., and 495 acres of ponds constructed. This evaluation will assess overall project performance as stated in the project objectives and suggest possible revisions in the project's implementation and goals. Four months after the PACE, the final review will take place to analyze the impact of the project on the target group and measure the project's success/failure in meeting its goals and objectives.

V. CONDITIONS, COVENANTS, AND NEGOTIATING STATUS

On May 14, 1979, the Ministry of Agriculture submitted a Project Profile for formal GOJ review and approval. Approval of the Project Profile and a request for Assistance is expected before the end of June, 1979. Proposed Covenants and Conditions Precedent to Disbursement are in Annex L. Project Authorization and Request for Allotment of Funds.

VI. ENVIRONMENTAL CONSIDERATIONS

The initial Environmental Examination (IEE) has been reviewed by AID/Washington and received a negative determination on June 25, 1979.

PROJECT DESIGN SUMMARY  
 Logical Framework

Annex A  
 Life of Project:  
 From FY 1979 to FY 1983  
 Total U.S. Funding: \$3,825,000  
 Date Prepared: June 15, 1979

Project Title & Number: FISH PRODUCTION SYSTEM DEVELOPMENT 532-0059

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p><u>Project Purpose:</u>            To develop the capacity of Government of Jamaica institutions to increase fish production throughout the country. To establish freshwater fish farming as a viable farming activity islandwide.</p>	<p><u>Conditions that will indicate purpose has been achieved:</u>  <u>End of Status.</u>            160 IFU personnel on board by 1983 with 36 professionals;            1280 farmers participating in fish production by end of project with 1020 small farmers averaging 3000 lbs. per acre;            260 other Government/private sector facilities averaging 6000 lbs/acre.            1100 surface acres of water in production.            Farm income from fish farming is sufficient to repay principal and interest on loans and farmers use credit in a rational manner.</p>	<p>MOA, IFU, and BOJ records and reports; Project reports; Site visits; JSA and UWI records; credit institution records.</p>	<p><u>Assumptions for achieving purpose:</u>            Adequate supplies of fertilizer, feed and materials (seines, wire, etc.) available from established suppliers.</p>

PROJECT DESIGN SUMMARY  
Logical Framework

Annex A  
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<p><u>Program or Sector Goal: The broader objective to which this project contributes:</u></p> <p>a) Increase food production.</p> <p>Subgoals:</p> <p>b) Reduce foreign exchange drain of food imports.</p> <p>c) Increase income and employment and improve nutrition in rural areas.</p> <p>d) Establish the foundation for a regional training program in fish production.</p>	<p><u>Measures of Goal Achievement:</u></p> <p>a) Production of inland fish increased from 300,000 lbs. in 1979 to 1,245,000 lbs. in 1980, to 3,639,000 lbs. in 1981, to 5,000,000 lbs. in 1982, to 6,000,000 in 1983. Volume of locally produced fish distributed increased from near 300,000 lbs. in 1979 to 6 million lbs. in 1983;</p> <p>b) Foreign exchange savings increased from \$122,000 to \$42,755 million in 1983.</p> <p>c) Average annual net income of small farmers (5 acres or less) increased by 22% with 0.25 acre fish pond; 750 additional rural and urban dwellers employed in producing and marketing fish.</p> <p>d) 513,500 days of new employment generated.</p> <p>e) 10% of the students enrolling in aquaculture courses at UWI and JSA.</p>	<p>MOA, IFU, Bank of Jamaica (BOJ) UWI and JSA records and reports; Project reports and surveys; farm plans, production, processing and distribution records.</p>	<p><u>Assumptions for Achieving Goal Targets:</u></p> <p>Distribution system operates 60 extension agents, fish farm managers, and professional fisheries staff from Jamaica and the greater Caribbean Region receive training in fish production. The GOJ will continue to provide budget support to finance project activities during and after the life of the project.</p>

PROJECT DESIGN SUMMARY  
Logical Framework

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Project Title & Number: FISH PRODUCTION SYSTEM DEVELOPMENT 532-0059

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Inputs: (See Budget Summary, Table 1, page 4) Other: Peace Corps Volunteers</p>	<p><u>Implementation Target (Type and Quantity):</u> 90 m LT technical assistance, 12 m ST technical assistance; 105 m LT training, 60 m ST training; Equipment (vehicles &amp; fish handling) and commodities (fertilizer and feed) procured and operational Research ponds expanded from 5 to 10 acres at Twickenham Park by 1981; 20 acres of fingerling production established at Ferris Cross by 1981; 116 additional IFU staff (24 professional) over 1979 level of 44 (12 professional) by 1983; Operational support provided by GOJ to include credit for farmers and support for establishing IFU training program in fish production by 1980; 25 Volunteers over life of project</p>	<p>MOA, IFU, and BOJ records and reports; Annual budget submission and congressional presentations.</p>	<p>Inputs supplied in a timely manner.</p>

PROJECT DESIGN SUMMARY  
Logical Framework

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From FY 1979 to FY 1983  
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Project Title & Number: FISH PRODUCTION SYSTEM DEVELOPMENT 532-0059

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p><u>Outputs:</u> Farmers trained; IFU personnel trained; Regional (Caribbean) personnel trained; Fish produced.</p>	<p><u>Magnitude of Outputs:</u> 920 farmers receive training in fish production (230 m); 260 farmers receive technical assistance; 4 IFU staff receive LT training (66 m); 12 IFU staff receive ST training (30 m); 1 UWI faculty receive LT training; 50 students receive training in fish culture at JSA and UWI--curricula established at both institutions by end of project; 13 million fingerlings produced/annum by 1982; 6 million lbs. of fish produced/annum by end of project.</p>	<p>MOA, IFU and BOJ records and reports; Project reports; Site visits.</p>	<p><u>Assumptions for achieving Outputs:</u> Adequate credit for fish pond construction (e.g., Crop Lien loans); People are available and can be identified for training; There is no attrition of trained personnel and farmers before 1984.</p>

5C(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 sur-category 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?

Yes. Country Checklist is up to date and Standard Item Checklist has been reviewed.

A. GENERAL CRITERIA FOR PROJECT.

1. App. Unnumbered; FAA Sec. 653(b); Sec. 671  
 (a) Describe how Committees on Appropriations of Senate and House have been or will be notified concerning the project; Project included in FY'80 Congressional Presentation.  
 (b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than \$1 million over that figure) Yes.
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? Yes.
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? N/A
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 *the Principles and Standards for Planning Water and Related Land Resources* dated October 25, 1973? N/A
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? A 611 (e) certification is included in the Project Paper.
6. FAA Sec. 205, (b). 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? The project is not susceptible to execution as part of regional or multilateral project. Other countries in the region might benefit through participation in fisheries training established under the Project, however, other country training would not be financed under the Project.

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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) The project will reduce fish imports up to 6 million pounds annually by 1983;
  - b) The project will foster private initiative and competition through approximately 1024 small farmers and 256 large farmers who will establish fish ponds under the project.
  - c) Additionally, cooperatives made up of small farmers will be encouraged to participate. The project does not include a credit component but instead will rely on GOJ established credit channels. In some cases farmers may make use of credit unions.
  - d) The project will not encourage monopolistic practices.
  - e) The Project will improve technical efficiency of participating farmers.
  - f) N/A.
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).
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.
  - 8) US private firms will participate in training, technical assistance and supply the bulk of commodities.
  - 9) The GOJ is contributing well over half the total cost and virtually all of the local currency cost of the project; the US does not own any Jamaican currency.
10. FAA Sec. 612(d). Does the U.S. own excess foreign currency and, if so, what arrangements have been made for its release?
  - 10) No.
11. ISA 14. Are any FAA funds for FY 78 being used in this project to construct, operate, maintain, or supply fuel for, any nuclear power plant under an agreement for cooperation between the United States and any other country?
  - 11) No.

**B. FUNDING CRITERIA FOR PROJECT**

1. Development Assistance Project Criteria

a. FAA Sec. 102(c); Sec. 111; Sec. 291a. 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 other-

Approximately 1024 small farmers will benefit as direct participants in the project through use of marginal land to construct fish ponds. Farmers will receive training, technical assistance and construction support in fish culture which is expected to raise small farmer incomes.

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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; Approximately 1024 small farmers will participate in the project through small farm fish culture thus increasing small farmer incomes.
- (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; N/i
- (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; N/i
- (4) [106] for technical assistance, energy, research, reconstruction, and selected development problems; if so, extent activity is: N/i
- (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.

B1b

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

N/A

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(t). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made and efforts for other financing, or is the recipient country "relatively least developed"?

N/A

e. FAA Sec. 207; Sec. 113. Extent to which assistance reflects appropriate emphasis on: (1) encouraging development of cooperative, economic, political, and social institutions; (2) self-help in meeting the country's food needs; (3) improving availability of trained workers-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 (C) integrating women into the recipient country's national economy.

U.S. assistance to Jamaica places emphasis on encouraging the economic, social, and political institutions required for a democratic society. A major objective of this project is to strengthen GOJ institutions. Extension services and training made available to farm owners and their spouses should enable them to upgrade their standard of living through increased production. Women share a large portion of and participate actively in the national economy, especially in agricultural production and marketing of crops.

f. FAA Sec. 201(i). Describe extent to which program recognizes the particular needs, desires, and capabilities 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.

This program will provide inputs and services for development of Inland Fisheries Unit (IFU) Ministry of Agriculture in order to provide IFU with trained personnel and essential services when AID assistance has terminated.

B1

g. FAA Sec. 201(h)(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?

This project will contribute directly to the development of economic resources, t productive capacities and self-sustaining growth. It is consistent with other development activities of AID, the GOJ, other donors. The project paper provides information and conclusions on the project's economic and technical soundness.

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 U.S. balance-of-payments position.

The project will have a negligible effect on the 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.

Financing from other free-world sources has been studied but does not appear feasible.

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 lending terms of the loan.

Jamaica has made IMF agreements designed to strengthen its position over the next few years. Consequently, the repayment prospects are reasonable.

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?

Yes, see Project Paper, Annex D

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.

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B2

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?

Private enterprise will directly receive an estimated \$,797,000. of the loan and grant for training, goods and services.

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?

N/A

3. Project Criteria Solely for Security Supporting Assistance

N/A

a. FAA Sec. 551. How will this assistance support promote economic or political stability?

b. FAA Sec. 555(c)(1). Will assistance under the Security Assistance Special Requirements Fund be used for military, guerrilla, or subversive activities?

4. Additional Criteria for Alliance for Progress

N/A

[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?

b. FAA Sec. 251(c)(1); 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?

Certification Pursuant to Section 611 (e) of the Foreign Assistance  
Act of 1961, as Amended

SUBJECT: Jamaica - Capital Assistance - Fish Production System  
Development Loan

I, Donor M. Lion, as Director of the United States AID Mission to Jamaica, having taken into account inter alia, the maintenance and utilization of projects in Jamaica, previously financed or assisted by the United States, do hereby certify that, in my judgement, Jamaica has both the financial capability and the human resources to maintain and utilize effectively the proposed Fish Production System Development Loan.

This judgement is based primarily on the facts developed in the project paper for the proposed loan of \$2.740 million and A.J.D.'s review of the financial assistance previously provided to Jamaica.

*Donor M. Lion*

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Donor M. Lion  
Director

*June 27, 1974*

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Date



## MINISTRY OF AGRICULTURE

HOPE GARDENS,

KINGSTON 6,

JAMAICA

PLEASE QUOTE

REFERENCE No. PU/PR/12/783rd July 19 79

Rural Development Office  
 USAID/Jamaica  
 c/o Embassy of the United States of America  
 2 Oxford Road  
 Kingston 5

Attention: Dr. Kenneth C. Ellis

Gentlemen:

Re: Fish Production Systems Development Project

With reference to the above project, the Ministry of Agriculture requests the assistance of the United States Agency for International Development in developing inland fish production in Jamaica.

The project has already been approved by the Preselection Committee of the Ministry of Finance and Planning.

DATE REC.D: 7/15/79	
ACTION OFFICE: ARDC	
INFO. TO:	
DOM. P.	ARDC
EA	HRP
PROG.ING.	EDNC
CAP	ED
MGT	C & R
CONT	PER/GSO
DUE BY: 7/11/79	
ACTION TAKEN:	

Sincerely,

  
 Derrick H. Stone  
 Permanent Secretary

~~CONFIDENTIAL~~

UNCLASSIFIED

Classification

OR 162100Z SEP 77  
FM SECSTATE WASHDC  
TO AMEMBASSY KINGSTON 1016-17-14  
BT  
UNCLAS STATE 223016/1

AIDAC

E.O. 11652: N/A

TAGS:

SUBJECT: REVIEW OF FY 1978 ABS AND PIDS

DAP. AT THE BEGINNING OF THE REVIEW WHICH WAS HELD ON JULY 6 SOME GENERAL ISSUES WERE RAISED WHICH SHOULD BE ADDRESSED IN A REVISED DAP.

A. EMPLOYMENT. GIVEN THE HIGH UNEMPLOYMENT RATE WHICH ALREADY EXISTS IN JAMAICA AND THE PROSPECTS OF AN EVEN HIGHER RATE DUE TO REDUCED EMIGRATION AND THE RESTRICTIVE MEASURES TAKEN BY THE GOJ TO DEAL WITH THE PRESENT BALANCE OF PAYMENTS CRISIS, THE DAP SHOULD CONSIDER HOW OUR PROGRAM CAN DEAL WITH THE EMPLOYMENT PROBLEM. IT SHOULD ANALYZE THE CAUSES OF UNEMPLOYMENT INCLUDING RELATIVE WAGES IN THE ORGANIZED AND UNORGANIZED SECTORS GOVERNMENT UNEMPLOYMENT RELIEF, INCENTIVES TO CAPITAL-INTENSIVE PRODUCTION, ETC. THE TYPE OF PROGRAMS WE CAN AND SHOULD UNDERTAKE (FOR EXAMPLE SHOULD WE FOCUS ONLY ON RURAL AREAS OR SHOULD WE DEVELOP URBAN PROGRAMS AS WELL), THE MAGNITUDE OF OUR ASSISTANCE, WHAT IS REQUIRED FROM THE GOJ AND OTHER DONORS, AND NEEDED POLICY CHANGES SHOULD ALL BE TAKEN INTO ACCOUNT.

B. EMERGENCY PRODUCTION PLAN. THE DAP SHOULD CONSIDER WHETHER OUR PROGRAM SHOULD RELATE TO THE GOJ'S PRODUCTION PLAN AND HOW AID CAN ASSIST IN OTHER EFFORTS TO DEAL WITH JAMAICA'S OVERALL ECONOMIC CRISIS. SHOULD WE CONCERN OURSELVES ONLY WITH CERTAIN PORTIONS OF THE

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# TELEGRAM

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Classification

GOJ'S PROGRAM? SHOULD WE ATTEMPT TO MODIFY THE GOJ'S PRIORITIES IN ANY WAY? WHAT ROLE SHOULD WE PLAY VIS-A-VIS THE OTHER DONORS? TO WHAT EXTENT AND IN WHAT WAY SHOULD WE COORDINATE OUR PROGRAMS WITH THEIRS?

-- C. WHAT LONG TERM PLANNING IS BEING CARRIED OUT BY THE GOJ? SINCE PLANNING EFFORTS ARE BEING UNDERTAKEN BOTH BY THE MINISTRIES AND THE NATIONAL PLANNING AGENCY WHAT RELATIONSHIP EXISTS BETWEEN THESE AGENCIES? HOW SHOULD THE PLANNING EFFORT BE SORTED OUT? HOW SHOULD WE RELATE TO IT? CAN WE SUPPORT IT THROUGH OVERALL CONSULTATIONS OR SPECIFIC TECHNICAL ASSISTANCE PROJECTS?

THE DAP IS CURRENTLY SCHEDULED FOR SUBMISSION BY SEPTEMBER 30, 1977. IF ADDITIONAL TIME IS REQUIRED TO COMPLETE IT, PLEASE ADVISE.

2. AGRICULTURE SECTOR ASSESSMENT. THE QUESTION OF WHETHER A NEW AGRICULTURE SECTOR ASSESSMENT SHOULD BE PREPARED WAS DISCUSSED AT THE REVIEW, BUT IT WAS AGREED TO HOLD OFF A DECISION ON THIS MATTER FOR THE TIME BEING.

3. SECURITY SUPPORTING ASSISTANCE. FOR FY 1978 DOLS 10 MILLION OF SECURITY SUPPORTING ASSISTANCE WAS PROPOSED BY THE LA BUREAU FOR JAMAICA IN ADDITION TO THE DEVELOPMENT ASSISTANCE LEVELS DISCUSSED BELOW. THIS WAS REJECTED BY CENTRAL A.I.D. IN PREPARING ITS CONSOLIDATED SUBMISSION TO THE STATE DEPARTMENT. THE OVERALL USA PROGRAM FOR FY 1978 IS NOW BEING REVIEWED BY THE STATE DEPARTMENT.

WITH REGARD TO THE FY 1978 SSA PROGRAM IT SHOULD BE NOTED THAT ALL NON-TITLE X GRANT ASSISTANCE WILL HAVE TO BE FUNDED FROM THE SSA ACCOUNT. THIS INCLUDES OPGS AND PROGRAM DEVELOPMENT AND SUPPORT AS WELL AS OUR OTHER GRANT ACTIVITIES. BECAUSE OF THE ADDITIONAL FY 1978 GRANT FUNDING PROPOSED IN THE ABS, OUR TOTAL SSA SUBMISSION TO PPC FOR JAMAICA IN FY 1978 WAS INCREASED TO DOLS 10.6 MILLION. FURTHER INCREASES MIGHT BE REQUIRED TO COVER GRANT NEEDS UNDER THE INTEGRATED RURAL DEVELOPMENT PROJECT.

4. HOUSING GUARANTEES. TO CONFORM WITH THE SEM/8 SUBMISSION, WE REFLECTED HG LEVELS OF DOLS 15 MILLION IN FY 1977, ZERO IN FY 1978 AND DOLS 15 MILLION IN FY 1979 IN THE LA SUBMISSION TO PPC.

5. SPECIFIC COMMENTS ON EACH FID FOLLOW:

-- A. SMALL FARMER MARKETING DEVELOPMENT. (DOLS 10.0 MILLION LOAN). AN INTERIM REPORT SHOULD BE PREPARED TO DISCUSS THE FOLLOWING ISSUES:

# TELEGRAM

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(1) PROJECT STRATEGY - THE PID STATES THAT THE PROJECT WILL INFLUENCE PRODUCTION BY DEVELOPING AN ADEQUATE FIRST STAGE MARKETING SYSTEM FOR THE SMALL FARMER, PRINCIPALLY BY CONSTRUCTION OF FARM TO MARKET ROADS. LITTLE OR NO DISCUSSION WAS GIVEN TO OTHER MARKETING PROBLEMS SUCH AS LACK OF PROCESSING FACILITIES, CREDIT AND CROP FORECASTING AND PRICE INFORMATION. IF THE PROJECT IS TO BE AIMED AT ADDRESSING NUMEROUS MARKETING CONSTRAINTS TO INCREASED PRODUCTION (AS OPPOSED TO CONSTRUCTING FEEDER ROADS WHICH MAY ALLEVIATE ONLY CERTAIN ASPECTS OF THE PROBLEM), THE MISSION SHOULD FOCUS ON IDENTIFYING THE MARKETING CONSTRAINTS OF OUR TARGET GROUP BEFORE CHOOSING PROJECT COMPONENTS. THE INTERIM REPORT SHOULD IDENTIFY THE MARKETING CONSTRAINTS (INCLUDING CREDIT AND TRANSPORT CONSTRAINTS) FROM THE VIEWPOINT OF AT LEAST THE FARMER AND THE MIDDLEMEN AND ALSO DISCUSS THE ROLE AND EFFECTIVENESS OF THE AGRICULTURAL MARKETING CORPORATION'S POLICIES/ACTIVITIES IN ADDRESSING THOSE CONSTRAINTS. THE I.R. SHOULD SET FORTH THE MISSION'S STRATEGY FOR IMPROVING SMALL FARMER MARKETING SYSTEMS BASED ON THE CONSTRAINTS AND OPPORTUNITIES IDENTIFIED IN A MORE COMPREHENSIVE ANALYSIS OF MARKETING PROBLEMS THAN WAS REFLECTED IN THE PID.

--  
(2) RURAL ROADS COMPONENT - THE RURAL ROAD COMPONENT TO THIS MARKETING PROJECT SHOULD BE JUSTIFIED ON THE BASIS OF THE MARKETING CONSTRAINTS ANALYSIS; I.E., THE BASIC QUESTION OF HOW FEEDER ROAD CONSTRUCTION WILL ALLEVIATE THE MARKETING CONSTRAINT SHOULD BE ANSWERED IN THE INTERIM REPORT. IF ROADS ARE TO BE A COMPONENT OF THE PROJECT THE MISSION SHOULD ALSO CONSIDER WAYS TO ENCOURAGE LOWER ROAD CONSTRUCTION COSTS AND MORE LABOR INTENSIVE (EMPLOYMENT GENERATING) TECHNIQUES. PL 488 TITLE I LOCAL CURRENCY GENERATIONS SHOULD BE CONSIDERED AS A POSSIBLE SOURCE OF FUNDING FOR THE ROAD CONSTRUCTION PROGRAM.

--  
(3) ENVIRONMENTAL ISSUES - FURTHER GUIDANCE ON ENVIRONMENTAL CONSIDERATIONS FOR ROAD CONSTRUCTION WILL BE PROVIDED IN SEPTEL..

(4) IDY ASSISTANCE - IT APPEARS THAT SPECIALIZED IDY EXPERTISE WILL BE REQUIRED TO ASSESS THE MARKETING, CREDIT AND TRANSPORTATION CONSTRAINT AND ASSIST IN PREPARING THE INTERIM REPORT. A.I.D./V IS PREPARED TO PROVIDE ASSISTANCE ON A CONTRACT BASIS OR THROUGH LA/DR AS SOON AS THE MISSION HAS DECIDED TIMING AND HOW PROJECT DEVELOPMENT SHOULD UNFOLD.

# TELEGRAM

UNCLASSIFIED

-- B. SMALL FARMER COMMUNITY ENTERPRISES. (DOLS 5.0 MILLION LOAN). AN INTERIM REPORT SHOULD BE PREPARED TO DISCUSS THE FOLLOWING ISSUES:

-- (1) PROJECT FOCUS - THE PURPOSE OF THIS PROJECT WAS NOT CLEARLY FOCUSED IN THE PID, BUT SEEMED TO CONCENTRATE ON PROVISION OF CREDIT AND OTHER INPUTS. THE INTERIM REPORT SHOULD IDENTIFY THE PROBLEMS THIS PROJECT HOPES TO ADDRESS, THE MAJOR OBJECTIVES OF THE PROJECT AND ITS RELATIONSHIP TO THE MARKETING PROJECT.

-- # (2) PROJECT DEVELOPMENT - IN DEPTH STUDIES SHOULD BE UNDERTAKEN TO DETERMINE (A) THE SUPPLY AND DEMAND FOR AG CREDIT AND WHETHER LACK OF CREDIT IS A CONSTRAINT TO INCREASED PRODUCTION; (B) SUPPLY AND DEMAND FOR OTHER INPUTS SUCH AS FERTILIZER AND SEEDS; (C) ABILITY OF THE PRIVATE SECTOR TO PROVIDE ESSENTIAL INPUTS IF ADDITIONAL CREDIT WERE TO BE MADE AVAILABLE (E.G., STRENGTH AND WEAKNESS OF PRIVATE SECTOR OPERATIONS, ACCESS TO TARGET GROUP, ETC.); (D) CAPABILITY OF SUCH INSTITUTIONS AS THE JAS AND THE IU BANKS TO EXTEND SERVICES TO SMALL FARMERS.

-- (3) IDY ASSISTANCE - SPECIALIZED IDY ASSISTANCE WILL PROBABLY BE NEEDED FOR THIS PROJECT AND, AS STATED IN PARA A (3) ABOVE, CAN BE PROVIDED WHEN REQUESTED.

-- (4) COMBINING WITH SMALL FARMER MARKETING DEVELOPMENT LOAN. AT THE TIME THAT THE MATERIALS FOR THE FY 1979 CONGRESSIONAL PRESENTATION ARE SUBMITTED IN NOVEMBER 1977 THE USAID SHOULD ADVISE IF IT WANTS TO COMBINE THIS LOAN WITH THE SMALL FARMER MARKETING DEVELOPMENT LOAN TO CREATE A MARKETING/INPUT LOAN OR POSSIBLY AN AG SECTOR LOAN.

-- C. FISH PRODUCTION SYSTEM DEVELOPMENT. (DOLS 3.0 MILLION LOAN AND DOLS 1.0 MILLION GRANT OF WHICH DOLS 380,000 WAS INCLUDED IN THE FY 1979 BUDGET). BASED ON PROGRESS OF THE ONGOING INLAND FISHERIES GRANT, AN INTERIM REPORT SHOULD BE SUBMITTED TO DISCUSS THE TECHNICAL AND ECONOMIC FEASIBILITY ISSUES RAISED IN THE PID. THE

REPORT SHOULD ALSO CONSIDER THE IMPACT THIS PROPOSED PROJECT WILL HAVE ON SMALL FARMERS, INCLUDING HOW MANY SMALL FARMERS WOULD BENEFIT AND WHETHER SMALL FARMERS CAN BE EXPECTED TO PRODUCE FISH ECONOMICALLY? THE NUTRITIONAL ASPECTS OF THE PROJECT SHOULD BE ADDRESSED AS WELL. TO WHAT EXTENT WILL MEMBERS OF THE TARGET GROUP BE CONSUMERS OF THE FISH WHICH ARE PRODUCED?

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D. MIDDLE MANAGEMENT DEVELOPMENT. (DOLS 1.0 MILLION LOAN). ALTHOUGH THE PID FOR THIS PROJECT REQUESTED A DOLS 300,000 GRANT, THE ABS REVIEW COMMITTEE BELIEVES IT WOULD BE APPROPRIATE TO DISCUSS THE POSSIBILITIES OF A MANPOWER DEVELOPMENT LOAN WITH THE GOJ. THE PROJECT ENVISIONED AT THIS TIME MIGHT INCLUDE ESTABLISHMENT OR UPGRADING OF AN EXISTING PUBLIC SECTOR TRAINING INSTITUTE WITH CAPABILITY TO ANALYZE JAMAICA'S MANPOWER PROBLEMS AND FUTURE NEEDS AS WELL AS CONDUCT IN COUNTRY TRAINING SEMINARS FOR GOJ MINISTRIES; AND A REVOLVING LOAN CREDIT FUND TO PROVIDE OVERSEAS TRAINEES WITH MONEY TO FINANCE THEIR EDUCATION.

IF THE GOJ AND THE USAID AGREE TO MOVE FORWARD WITH THIS PROPOSED LOAN, A NEW PID SHOULD BE SUBMITTED BY NOVEMBER 30, 1977.

-- E. SPECIAL EDUCATION DEVELOPMENT. THE PID WAS DISAPPROVED SINCE IT WAS NOT CLEAR THAT SPECIAL EDUCATION WAS REQUIRED TO ADDRESS THE PROBLEMS PRESENTED IN THE PID. ALSO THE BENEFITS OF FOCUSING ON SPECIAL EDUCATION RATHER THAN FURTHER IMPROVEMENTS IN THE EXISTING EDUCATION SYSTEM WERE NOT DEMONSTRATED. IF IT WISHES TO PROCEED IN THIS AREA THE USAID SHOULD CONSIDER HAVING A STUDY CONDUCTED OF THE HEALTH AND NUTRITIONAL FACTORS AFFECTING LEARNING

IN THE JAMAICAN SCHOOL SYSTEM. A PROJECT IN SPECIAL EDUCATION SHOULD NOT BE INITIATED UNTIL THE RESULTS OF SUCH A STUDY ARE KNOWN.

-- F. AGRICULTURE PLANNING. (DOLS 500,000 GRANT DURING FY 1979, LIFE OF PROJECT NOT DETERMINED). THE ABS REVIEW COMMITTEE BELIEVED IT WOULD BE WORTHWHILE TO CONSIDER AN AGRICULTURAL SECTOR PLANNING PROJECT TO ASSIST THE GOJ IN DEVELOPING ITS LONGER TERM AGRICULTURAL STRATEGY, AS WELL AS PLANS FOR IMPLEMENTING THAT STRATEGY AND INCREASING AGRICULTURAL PRODUCTION AND EMPLOYMENT OPPORTUNITIES. AS THIS PROJECT DEVELOPS THE MISSION MAY WANT TO CONSIDER FOLDING IN THE PROPOSED PROJECTS FOR WATER RESOURCES PLANNING, SCREW WORM FEASIBILITY STUDY AND AGRICULTURAL EDUCATION DEVELOPMENT. THE LATTER PROPOSED A REVIEW AND APPRAISAL OF THE

AGRICULTURAL EDUCATIONAL/TRAINING NEEDS OF JAMAICA AND WOULD BE AN IMPORTANT ANALYSIS TO COMPLETE BEFORE UNDERTAKING ANY PROJECT IN AGRICULTURAL EDUCATION. IF THE MISSION AND GOJ AGREE TO MOVE FORWARD WITH THIS PROJECT, A PID SHOULD BE SUBMITTED BY NOVEMBER 30, 1977.

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G. WATER RESOURCES PLANNING, SCREW WORM FEASIBILITY STUDY, AGRICULTURAL EDUCATION DEVELOPMENT. THE PIDS FOR THESE PROJECTS WERE DISAPPROVED SINCE IT WAS CONSIDERED PREFERABLE TO COMBINE THESE ELEMENTS IN TO THE OVERALL AGRICULTURAL PLANNING PROJECT WHICH IS DISCUSSED ABOVE.  
VANCE

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# TELEGRAM

INDICATE  
 COLLECT  
 CHARGE TO USAID

	FROM Ambassy/Kingston	CLASSIFICATION Unclassified
E.O. 11652- TAGS:	N/A	
SUBJECT:	Fish Production Systems Development Project	
ACTION:	SECSTATE WASHDC <u>PRIORITY</u>	
	Unclassified Kingston _____	
DIST:		
AMB	AIDAC	
DCM	Ref: A) Fish Production Systems Development PID; B) State 223016/1 C) State 322561; D) State 094761	
AID -5		
RF	1. Because of short time available for completion of Fish Production	
CHRON	System Development Project Paper, this cable responds to questions raised in Refs. A and B in lieu of an interim report. The PP is scheduled for review in June 1979.	
	2. Technical and Economic Feasibility Issues Raised In The PID.	
	A. <u>The appropriate species or species combination for production</u> The present Inland Fisheries Project (532-0038) has shown that fish production utilizing <u>Tilapia mossambica</u> is economical and feasible. Research and large scale demonstrations have shown that <u>T. mossambica</u> responds well in systems utilizing only fertilizer, either organic or inorganic, and in systems utilizing a combination of fertilizer and supplementary feeding. In systems utilizing	

DRAFTED BY: RDO:KCellis:lv	DRAFTING DATE 4/26/79	TEL. EXT. 254	CONTENTS AND CLASSIFICATION APPROVED BY: Donor M. Lion, Mission Director
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RDO:HF Peterson  
 PROG:HJohnson  
 A/DIR:PSchwab  
 CDO:PWenger

only fertilizer production has been maintained at 4000 lb/A/yr over a two-year period. Systems utilizing fertilizer plus supplementary feeding have maintained yields of 10,000 lb/A/yr over the same period of time.

In late CY 78 two new species of fish, Tilapia nilotica and Cynopharyngodon idella were introduced into Jamaica. T. nilotica is being investigated as a possible replacement for T. mossambica because of its faster weight gain potential and because it reaches sexual maturity at an older age making it somewhat less management intensive for small farmers.

Research will continue with C. idella and Cyprinus carpio (to be introduced in June 1979) to determine how best to move into a polyculture which will better utilize existing and proposed pond systems. Fingerling production of C. idella has already begun.

- b. Suitability of local feed sources: Supplemental feed rations can be produced from locally obtainable components. However, the dependability of supply is still in question because present demand is not very great. The PF will examine this issue in detail. The Inland Fisheries Project has worked closely with local feed manufacturers in particular, Mastermix, to develop a feed ration specifically for fish utilizing locally available chicken offal from the island broiler industry, bonemeal and soybean meal or wheat and rice middlings. This mixture has proven to be an excellent <sup>supplementary</sup> ~~supplementary~~ feed. At present Mastermix makes this ration only for the Inland Fisheries Project because it is not a "standard" Mastermix (T) brand. Farmers can purchase the ration through the Inland Fisheries Project. It is expected

that as demand increases Mastermix will add this or a similar ration to their regularly available feeds.

- c. Definition of the range of feasible sizes of production units. Present experience with small and medium-sized farmers <sup>has</sup> ~~has~~ shown that pond sizes ranging from .04A to 2A are economically feasible. There are individuals with ponds or tanks as small as .004A (12 ft. x 14 ft.). Units this small are used only for family consumption. Ponds much larger than 2A are difficult to harvest by seining. Demonstration ponds of up to 10A have been constructed to show harvesting techniques by pond draining. It is expected that this technique will prove very feasible for large commercial farms and government owned/operated farms.
- d. Cost of alternative feed sources: The inorganic fertilizer supplementary feed ration presently being used in the least expensive alternative tested to date. The fish food ration presently being produced by Mastermix as a supplementary feed sells for J\$12/cwt. Standard chicken feed which has also been tested sells for J\$18/cwt. and is not as acceptable because it has a lower protein content. Inorganic fertilizer (imported) sells for J\$15/cwt, and the farmers use approximately 10 cwt per/A/yr for a total of J\$150/A/yr. Locally produced chicken manure sells for J\$1.75/cwt, however, to produce the equivalent weight gains farmers must use 360 cwt/A/yr at a cost of J\$630/A/yr.

There are other local sources of supplementary feed such as coffee pulp, citrus pulp, coconut meal and spent brewers grains which are ~~in adequate~~ <sup>in adequate</sup> supply. Research and testing of these materials is continuing.

- e. Import requirement to support intensive fish production:  
Importation of inorganic fertilizer will be necessary for small and medium-sized farmers who do not have a readily <sup>available</sup> source of organic fertilizer such as chicken manure or livestock manure. Supplementary feed for those farmers electing the high management package can be produced in country from by products of agricultural commodities (soybean, wheat, rice) imported to supply the island with some of its basic food requirements such as edible oil, flour and rice. Sein or material for sein construction (principally nylon because of its long life and resistance to rotting) will also have to be imported.
- Processing technology: Adequate processing facilities and technology are in place in Jamaica to handle large quantities of fresh fish. The Inland Fisheries Project has worked with Jamaica Frozen Foods Ltd. the Company which produces salted and canned fish for the Jamaican market. This facility alone can process 30,000 lbs of canned or salted fish per day. Jamaica Frozen Foods Ltd. processed canned tilapia in three different ways--in oil, in water, and in tomato sauce. They also used two different sizes of fish--three inch size and eight inch size. The canned produce was excellent according to them and the fish sold at J\$1.50/pound. The company is also interested in Tilapia for producing salted fish but for this type of processing they require a minimum one pound fish.

Presently all of the freshwater fish being produced as a result of the Project are being sold fresh or fresh frozen because of the great demand for this type of product.

g. Marketing, distribution, transportation system:

Marketing of freshwater fish is not now and is not projected to be a problem. Presently marketing of large quantities of fish is handled through the Agricultural Marketing Corporation (AMC) which has refrigerated trucks and large holding bins in which the fish can be stored. Upon notification of the harvest day AMC comes to the pond-site and collects the fresh fish. The fish are taken to their processing facility eviscerated, packaged, and frozen. The packaged produce is then delivered to their produce outlets where they are sold. Up to 10,000 lbs of fish per month are currently handled in this manner. As fish production increases Jamaica Frozen Foods Ltd. and Grace Ltd. will also take large quantities of fish for processing and marketing.

Farmers producing smaller quantities of fish are selling directly to their neighbours or to higglers.

For the next four to five years it is expected that freshwater fish in sizeable quantities will continue to be distributed by the larger companies mentioned above because they have good transportation and processing facilities.

- h. Prices of substitutes: Freshwater fish ~~XXXXXX~~ <sup>sell quite</sup> well with substitute or alternative sources of protein commonly consumed on the island. Tilapia one half pound and larger sell in the market for J\$1.40/lb. <sup>smaller</sup> fish size (three inches and under) sell for J\$1.10/lb. This is compared to: red peas at J\$2.25/lb; pork chops at J\$2.25/lb; chicken at \$1.32/lb; salted marine fish at \$3.80/lb and

fresh marine fish at J\$2.80/lb.

3. In addition to those questions raised in the PID Ref. B.

asked that the following questions be addressed:

- a) What impact the proposed project will have on the small farmer? For those small farmers participating in a freshwater fish production program there are three major benefits--increased income, better utilization of marginal or ruinate land and increased nutrition.

Small farmers with an average size pond (.25A) can easily produce 750 lb/yr with only fertilization. This production level represents a yearly income of \$375. It is projected however that the farmer would consume approximately one third of his production and market the remaining two thirds.

- b) How many small farmers would benefit?: The <sup>Project</sup> ~~fish production~~ aims at establishing at least 1650 small farmers in aquaculture by 1983. In addition there will be a number of large private land owners and several government owned/operated fish farms established by this same year.

- c) Will members of the target group be consumers of the fish produced: Present investigation with a test group of 42 small farmers indicate strongly that the answer is yes. The rural communities in the interior of the island have traditionally not been able to consume as much fish as they would like because of the lack of storage and handling facilities. Marketing studies with the test group of farmers shows that the farmer himself consumes a sizeable quantity of his produce and the remainder is sold directly to his neighbours or to higglers operating

in the small rural markets.

- d. Nutritional aspects of the project? Increased production and availability of protein is a valuable asset of this project. A recent nutrition survey of children and pregnant and lactating mothers suggested the possible unavailability of nourishment for the poorer people especially the rural poor. This possibility is supported by the continuing price increases for food stuffs, especially protein, the governments restrictions on importation of food commodities and the failure of the Agricultural Sector to counteract import restrictions through local production.

Production of freshwater fish will make available, especially to the rural sector where fish protein has traditionally not been available, a supplementary source of protein which is highly competitive price wise (para 1b) with existing sources such as red meats, poultry, and legumes.

4. Mission assumes field approval of the project will be authorized per para 1. Ex since we have extensive fisheries experience through the Inland Fisheries Project and since we have already developed and successfully utilized a project review and approval procedure for the Agricultural Planning Project. If Mission is so authorized it is our intention as per Ref. D to request someone from DS/AGR/Fisheries to participate in the review. Please advise.

Lawrence



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AS SEDIMENT TRAPS, "FILTERS" FOR SURFACE WATER POLLUTANTS, FLOOD WATER REGULATORS AND WILDLIFE HABITATS. CONSTRUCTION OF PONDS IN THESE AREAS MAY RESULT IN THE LOSS OF ONE OR MORE OF THESE FUNCTIONS. SECONDLY, IT MAY ALSO BE ADVISABLE TO AVOID SEEDING NATURAL WETLANDS UNDER THIS PROJECT WITH WHAT MIGHT BE "EXOTIC" SPECIES. WHILE THE IEE STATES THAT "TILAPIA MOSSAMBICA HAS BEEN ESTABLISHED IN JAMAICA'S WATERS FOR DECADES," TILAPIA MAY NOT BE AN ELEMENT OF THE ECOSYSTEM OF ANY GIVEN WETLAND. INTRODUCTION OF A NEW SPECIES MAY RESULT IN DISPLACEMENT OF EXISTING SPECIES WITH DETRIMENTAL IMPACTS. IF, FOR EXAMPLE, AN EXISTING SPECIES FEEDS ON SURFACE ORGANISMS SUCH AS MOSQUITO LARVAE, ITS DISPLACEMENT MIGHT HAVE SIGNIFICANT IMPACTS ON THE SURROUNDING HUMAN COMMUNITY. LAC/DR ENVIRONMENTAL ADVISOR REQUESTS MISSION RESPONSE ADVISORY AS TO HOW THESE ISSUES WILL BE DEALT WITH IN PROJECT DESIGN AND IMPLEMENTATION, BEFORE MISSION IEE IS SUBMITTED TO AA/LAC FOR THRESHOLD DECISION. PLEASE ADVISE ASAP.

4. THE REVIEW OF REF A RAISED A QUESTION WITH RESPECT TO THE PROJECTED REQUIREMENTS FOR AND SUPPLY OF FEED AND FERTILIZER FOR THIS PROJECT. THE VARIOUS STATEMENTS MADE IN THE PID AND REF A DO NOT PRESENT A COMPLETE PICTURE OF ESTIMATED NEEDS AND EXISTING SUPPLY. THE PID STATEMENT OF OUTPUTS ESTIMATES THAT 2,500 ACRES OF LAND WILL BE UTILIZED FOR FISH PONDS WHICH WILL YIELD APPROXIMATELY 3,850 POUNDS PER ACRE PER YEAR. THIS ESTIMATE IMPLIES INTENSIVE PRODUCTION YIELDING A TOTAL OF APPROXIMATELY 7.5 MILLION LBS. OF FISH EACH YEAR. THIS LEVEL OF PRODUCTION WOULD PROBABLY REQUIRE AT LEAST 22.5 MILLION LBS/YEAR OF GOOD QUALITY FEED. THE PROJECT PAPER SHOULD ADDRESS IN DETAIL THE INPUTS OF FEED AND FERTILIZERS REQUIRED, THE SOURCES AND QUANTITIES AVAILABLE DOMESTICALLY, THE ECONOMICS OF IMPORTING

SUCH INPUTS, AND THE PRACTICES TO BE FOLLOWED. OF SPECIAL CONCERN IS THE AVAILABILITY OF RELATIVELY INEXPENSIVE, DOMESTICALLY PRODUCED FEED AND LARGE QUANTITIES OF LIVESTOCK MANURE FROM FEED LOTS OF OTHER DOMESTIC ANIMAL HUSBANDRY. THE PP SHOULD DISCLOSE BOTH THE TECHNICAL AND THE BALANCE OF PAYMENTS IMPLICATIONS OF THE FEED/FERTILIZER SITUATION IN JAMAICA.

5. A FINAL QUESTION WAS RAISED WITH RESPECT TO THE TARGET GROUP. PID AND REF A BOTH EMPHASIZE BENEFITS TO ACCRUE TO THE SMALL FARMERS WHO WILL PARTICIPATE. REF A NOTES, HOWEVER, THAT "A NUMBER OF LARGE PRIVATE LAND OWNERS AND SEVERAL GOVERNMENT OWNED/OPERATED FISH FARMS WILL BENEFIT FROM THE PROJECT. THE PP SHOULD MAKE CLEAR THE ORIENTATION OF THE PROJECT WITH RESPECT TO BENEFICIARIES AND DETAIL THE EXTENT TO WHICH RESOURCES WILL BE DIVIDED BETWEEN SMALL FARMER-PRODUCTION AND LARGE PUBLIC AND PRIVATE COMMERCIAL OPERATIONS.

6. FY 79 CONGRESSIONAL PRESENTATION SHOWS THE OBLIGATION FIGURES FOR THIS MIXED PROJECT AT DOLS.3.6 MILLION IN LOAN  
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*Page*

AND DOLS.. 332,020 IN GRANT FUNDS. SHOULD THE MISSION PROPOSE ANY GREATER FIGURE FOR EITHER TYPE OF FUNDING IN THE PROJECT PAPER, A DRAFT CONGRESSIONAL NOTIFICATION JUSTIFYING THE INCREASE FOR THIS FY AND A REVISED ACTIVITY DATA SHEET FOR THE PROJECT SHOULD BE FORWARDED TO THE BUREAU ASAP.

7. A HIGH LEVEL OF INTEREST IN FISHERIES PROJECTS CURRENTLY EXISTS IN AID/W AND CONGRESS. BUREAU INTENDS TO DISTRIBUTE JAMAICA FISH PRODUCTION SYSTEMS PROJECT PAPER AS A MODEL PP, BOTH WITHIN AND OUTSIDE THE LAC REGION. BUREAU THEREFORE REQUESTS MISSION TO FORWARD A COPY OF THE PP FOR REPRODUCTION AND DISTRIBUTION ASAP AFTER MISSION APPROVAL. CHRISTOPHER  
BT  
#2483

Vehicle and Equipment ListVehicles 1/

<u>Quantity</u>	<u>Description</u>	<u>Cost \$</u>
3	Station Wagons, Compact 6 cyl. std transmission HD shocks and battery @ \$6500	19,500
10	Pick-up trucks; 6 cyl std transmission, ½ ton long wheel base @ \$6,000	60,000
8	Pick-up trucks; 6 cyl std transmission; 6 ply tires HD batter/ and alternater, crew cab w/long wheel base; ¾ ton @ \$8,000	64,000
2	Pick-up truck, 6 cyl std transmission; 6 ply tires Heavy duty battery and alternate long whellbase ¾ ton @ \$7,500	15,000
2	Van 9 passenger; V8 std transmission, @ \$10,000	20,000
2	Farm tractor @ \$15,000	30,000
1	Trailer for farm tractor @\$4,000	4,000
20	Trail bikes 125cc @\$1,000	20,000
3	Bulldozer; D4-type with ripper @ \$54,000	162,000
2	Truck, 4 ton diesel flat bed std transmission @ \$50,000	100,000
		<hr/>
		554,500
		<hr/>

Equipment

<u>Quantity</u>	<u>Description</u>	<u>Total</u>
5	Commercial Fish Seine, 2½" mesh, 10' x 300'	2,175
5	" " " 1 3/8" mesh, 10' x 300'	5,175
1	" " " 1 3/8" mesh, 10' x 400'	1,380
1	" " " 1 5/8" mesh, 10' x 300'	1,065
1	" " " 1 5/8" mesh, 10' x 400'	1,420
5	" " " 1½" mesh, 8' x 100'	825
1	" " " 1½" mesh, 8' x 150'	247
5	" " " 2" mesh, 8' x 100'	775
1	" " " ½" mesh, 8' x 400'	1,300
3	" " " 1" mesh, 8' x 400'	2,640
1	" " " 1" mesh, 8' x 200'	440
3	Raschel Nylon Seine, ¼" mesh, 6' x 50'	645
12	Commercial Fish Seine, 1½" mesh, 6' x 50'	696
200	Nylon Knotted Seine Netting (1b.), 2" mesh	1,000
20	Heavy Duty Fingerling Dip Net, ¼" mesh	180
5	Nylon Mud Line, 5/16" (50 lb.)	460
200	Nylon Knotted Seine Netting (1b.) 1" mesh	1,000
76	Agitator, 12 volt, Regular	3,800
6	" 160 volt, Heavy Duty	600
24	" 110 Volts, Regular	1,056
10	Cast Net, 3/8" mesh	380

Equipment cont'd

<u>Quantity</u>	<u>Description</u>	<u>Total</u>
16	Dip Net, Heavy Duty	288
16	" " Fingerling	208
12	Bait Net	60
6	Floats, Hard Foam (per 500)	378
20	Lead Sinkers (50 lb. box)	840
10	Net Needles (per 2 doz.)	80
10	Netcote (54 gal drum)	830
3	Electric Hot Pot (lead)	45
2	Lead Mold	16
100	Nylon Mending Twine (1 lb roll)	400
40	Tarred Nylon Seine Twine (1 lb. roll)	160
20	Braided Polypropylene Rope (per 600 ft)	420
8	Wire Basket	152
2	Life Vest (doz.)	124
7	Aluminum Dial Scaler	413
2	Seine, ¼" mesh 6' x 150'	940
2	" ¼" mesh 6' x 100'	1,252
2	Knotted Nylon Seine, ½" mesh 6' x 150'	792
2	" " " ½" mesh 6' x 100'	528
7	Nylon Lift Net, ¼" mesh, 12' x 12'	308
6	Vexar Plastic Netting (100ft roll), ½"	726
4	" " " (100ft roll), ¼"	420
12	" " " (62 ft roll), 1/8"	300
12	Nylon Holding Box, 1" mesh	432
200	Saran Filter Cloth (yd.)	1,000
8	Fiberglass Transport Tank (Jum 60)	3,880
4	" " " (Regular)	1,440
6	Polyethylene Bags, 10" x 20" (per 1000)	234
6	" " 18" x 32" (per 380)	234
20	" " 27" x 34" (per 100)	420
30	Marine Plyboard, 1" x 4' x 8' (sheet)	900
6	Nylon Cart Net, 1¼" mesh, 6'	354
4	" " " 1½" mesh, 7'	164
4	Monofilament Nylon Cast Net, 1¼" mesh, 7ft.	172
3	Weight Mold	21
6	Galvanized Tie Wire (roll)	408
6	Plastic Tub	438
20	Stack-n-Nest Container/Cover	400
6	Hurricane Boat Lantern	36
12	Flashlights	48
7	Potassium Permanganate (110 lb)	812
6	Formalin (5 gal)	180
2	Dylox, 80% (60 lb)	420
2	Karmex (50 lb drum)	290
2	Victoria Green (5 lb drum)	118
2	Methylene Blue (5 gal drum)	150
5	Acriflavine Neutral (500 gm bottle)	925
3	Aquathol K (50 lb bag)	99

Equipment Cont'd

<u>Quantity</u>	<u>Description</u>	<u>Total</u>
2	Terramycin (50 lb bag)	
6	Chorionic Gonado Tropin (10,000 vsp)	296
12	Hypno Fish Colmen (½ Pint)	108
10	Dissolved Oxygen Test Kit	60
24	Thermometers, Pocket	280
4	" Laboratory	120
3	Platform Scale	32
42	Plastic Pail	108
9	Feed Scoops	126
12	Tubs, #2	27
24	" #3	120
2	Loading Net	264
3	Water Quality Kit	118
2	Fish Feeder, Blower Driven, Tractor Drawn	537
2	10" Diesel Pump	6,000
2	Public Address System-Mobile	40,000
15	Hand Calculators	400
1	Movie Projector, 16mm	375
2	Camera, 35mm, with 28mm wide angle lens	500
1	Microscope, Binocular	600
1	" , Compound	300
30	Plastic Flagging, Vinyl (ctw of 12)	350
4	Flagging Dispenser	300
12	Water Cooler, 5 Gal.	28
20	" " 2 Gal.	396
3	Fuel Transfer Pump	340
6	Bank Blade	348
20	Pick Maddock	108
20	Handle for Maddock	260
6	Folding Pocket Magnifiers, 4X	260
3	Fist AID Kit - Laboratory Type	30
30	Auto-Travel First AID Kit	114
18	Compact First AID Kit	210
12	Weighing Scale	72
6	Weighing Scale	276
16	Cimnological Secchi Disc	198
2	Portable Oxygen Meter	240
2	Spare Membranes (pkg of 12)	398
2	Filling Solution	4
14	Soil Sampler	4
14	Extension Rod	742
12	Sample Bags-Soil (Ctw of 500)	70
1	Soil Analysis Outfit	288
4	Load Binders, Chain	94
4	Range Finders	224
4	Carrying Case	200
1	Salinity - Conductivity - Temperature Meter	44
3	Polar Planimeter	
		420

Equipment Cont'd

<u>Quantity</u>	<u>Description</u>	<u>Total</u>
12	Hand Level	420
3	Transit Level	1,185
3	Tripod	270
4	Jerry Jugs, 2½ Gal	36
14	Fiberglass Tape, 100ft.	266
10	Replacement Line, 100 ft.	130
1	Triple Beam Balance	50
2	Plankton Net	100
3	Fiberglass Leveling Rod, 13'	126
3	Carrying Case	21
3	Technical Pen Set	105
8	Waterproof Drawing Ink	16
4	Pencil Sharpner	36
12	Automatic Pencil Set	36
20	Lead, HB	20
4	Triangular Scaler	20
4	Protractor, 6"	16
3	Drawing Instrument Set	99
2	Drawing Board	74
1	Carousel Projector, 35mm	233
2	Bench Grinder	140
1	Oxy-Acetylene Torch Outfit	179
1	Gas Cylinder Truck	40
1	Arc Welder Outfit	139
4	Axe, Single-Bit	48
8	Sledge, 8-pound	128
3	Bow Saw, 30-in	18
3	Blade	9
24	Spading Fork	240
48	Shovels	336
2	Post-hole Digger	32
3	Wheel Borrow	210
3	Mechanics Tool Set - Standard	120
3	" " " - Metric	120
1	Master Mechanics Tool Set - Standard with Chest/Cabinet	368
3	Pipe Wrench, 10"	24
5	" " 18"	70
2	Brace and Bit Set	78
3	Hammer, Ball Pein, 1602	18
24	Hammer, Nail	216
6	Adjustable-joint Plier	42
14	Locking Plier Wrench, 7½"	56
24	Utility Plier	72
3	Lineman Plier, 8½"	24
2	Level, 24"	20
3	Hacksaw	21
6	Blades (pkg. of 2)	12
3	Carpenter's Apron	57

Equipment Cont'd

<u>Quantity</u>	<u>Description</u>	<u>Total</u>
3	Stapler, Heavy Duty Kit	54
20	Staples, 1/2" (pleg of 5,000)	100
20	" 9/16" (pleg of 5,000)	120
6	Measuring Tape, 10'	24
4	Hand Saw	48
1	Sabre Saw	50
2	Circular Saw, 7"	100
6	Blade, Combination 7"	84
1	Blade Set-Sabre, 50 Blades	21
2	Drill, Variable Speed, 3/8"	100
3	Drill Bit Set	129
2	Electric Bit Sharpener	60
6	Grease Gun Combination	90
40	Grease Cartridge (ctw of 10)	400
4	Tire Pump, 150 psi	56
8	Pressure Guage	48
1	Tune Up - Test Kit	55
8	Jack Stand, 5,000 lb	64
3	Hydraulic Jack, 5 ton	57
2	Battery Charger, 10 amp.	100
8	Booster Cable - Set, 16'	160
2	Printing Calculator	198
8	Nylon Ribbon - Replacement	16
36	Paper Tape (pkg of 3)	72
10	Steel Files, 25"	1,100
15	" " 18"	1,050
2	Power Plant, 7hp, 3000 watt	1,500
3	Fan, 30", two speed	495
3	Fan Shutter, 30"	105
2	Air Conditioner, 110 volt.	470
1	Window Fan, 20"	45
24	Truck Tires, H 8-15	1,200
12	Battery, Commercial	600
2	Gasoline Air Compressor, 10hp	2,760
1	Chain Saw, 18"	263
1	Replacement Chain	25
2	Refrigerator, 17 cu. ft.	740
2	Freezer, 15.9 cu. ft.	500
4	Compressed Air Sprayer, 4 gal.	236
1	Blender, 7-speed	17
20	Welded Wire, 2" x 4", 48", 100' roll	1,040
40	" " 1" x 2", 48" 100' roll	2,800
20	Hardware Wire, 1/2", 48", 100' roll	2,000
10	" " 1/4", 48", 100' roll	1,200
1	Gas Range 30"	280
1	Indoor/Outdoor Vacuum Cleaner	70
1	Attachments	10
2	Floor Polisher	100
3	Chain Hoist	150
5	Chain, 3/8", 2650 lbs, 14'	135

Equipment Cont'd

<u>Quantity</u>	<u>Description</u>	<u>Total</u>
	Reference Books	3,000
2	Water Pump, 4" Diesel, Portable	4,000
24	Duct Tape (roll)	96
2	Slide Projector Screen	50
8	Electrical Extension Cord, 50'	80
2	Vise	120
4	Replacement Lamp for Slide Projector	60
1	Microscope Illuminator	60
	Laboratory Glassware/Supplies	1,000
	Camera Batteries and Film	500
8	Rubber Hose, 5/8", 50'	120
2	Cold Chisel-punch set	34
10	Galvanized tank, 320 gal.	800
10	" " 222 gal	700
4	Blackboard, 6' x 4'	200
		<hr/>
	Misc. Equipment and Supplies During Second (\$8,000), Third (\$6,000), and Fourth Project Year (\$3,000)	144,916
		<hr/>
	Shipping and Insurance @ 30%	161,916
		49,000
		<hr/>
	TOTAL Equipment	210,916
		<hr/> <hr/>

1/ Vehicle prices are CIF Kingston.

LONG TERM TECHNICAL ASSISTANCE JOB DESCRIPTIONS

Senior Technical Advisor (1)

1. Qualifications: Ph.D. or equivalent experience with knowledge of warm water fish culture and agricultural extension methods. Overseas experience desirable.
2. Serve as Team Leader of fisheries technical services contract and provide liaison between GOJ, USAID, and Peace Corps as related to the Fisheries Production Project. Prepare reports and assist in evaluation as specified in the contract.
3. Assist the Ministry of Agriculture implement the Fisheries Production Project including the design and interpretation of adaptive research; organization and giving of training to MOA personnel; assist in the selection and preparation of participants for overseas training; fingerling production; and provision of extension services.
4. Support the formal fish culture training program at the Jamaica School of Agriculture and assist the University of the West Indies develop their zoology curriculum with the capacity to instruct in freshwater fish culture.

Extension Advisors (2)

1. Qualifications: Should include an M.S. degree or equivalent experience in warm water fish culture and agricultural extension. Overseas experience desirable.
2. Serve as member of the Inland Fisheries staff in the Ministry of Agriculture as counterpart to the Regional Fisheries Extension Officer. Provide training and work with parish fishery extension specialists. Assist farmers in raising fish. Services offered will include survey and design of pond sites and preparation of detailed management plans for fish production in the ponds appropriate to the resources available. Advisor will also assist in the preparation of literature for use in fish culture extension.

## CASE HISTORIES/PRODUCTION MODELS

In this Annex, eight different models are presented representing alternative conditions under which large and small farmers are expected to operate. These include operation under "optimum" and "average" conditions, the two being differentiated by the level of technology utilized and the care with which farmers follow instructions, and utilization of both feed and fertilizer as against fertilizer alone.

Each model involves different assumptions with respect to costs and output. In all cases, actual costs and output obtained by various farmers, either on their first crop or in their first full year of operation, were used as the basis for the 15 year projection. Only one model--large farmers operating under conditions using both feed and fertilizer--was presented in the text, along with a detailed explanation of the methodology employed. A summary of the benefit/cost ratios yielded by all eight models was also presented in the text (page 47).

Description of Costs and Output

- 1/ The number provided in this column is the feed to growth factor: 1.5 pounds of feed for each pound of fish produced.
- 2/ Rate of production is also based on the amount of fish produced per acre for the first crop. Account is taken of farmer capability as well as the capacity of the inland fisheries facilities at Mitchell Town. The figure in this column is based on a full year's production with three crops.
- 3/ Feed costs are the actual costs (or the conversion rate for the first crop of fish) at a constant price of J\$0.19/lb. Subsequent feed costs are determined by the total production (pounds) X the conversion factor X J\$0.19 or column 11 X column 1 X J\$0.19.
- 4/ Fertilizer cost is based on the type and amount actually used. Some farmers will have free manure from other operations (livestock) on their farms. Commercial fertilizer is priced at J\$0.15/lb.
- 5/ The stocking rate cost equals column 5 (rate/ac) ÷ the acreage of the pond X J\$0.05/fingerling. Farmers may use different stocking rates to obtain different sized fish; e.g. lower stocking rates produce larger fish which sell for higher prices as opposed to larger stocking rates and a higher production rate of smaller fish selling at a lower price. The net returns for the two methods are approximately the same.
- 6/ Costs for water vary from farmer to farmer. Some farmers get free water by gravity flow from springs.

- 7/ Charges for labor provided for managing the pond and harvesting the fish. The cost shown is the actual cost for the first year.
- 8/ Maintenance covers costs for maintenance of equipment, pond dikes and water quality (chemicals). The cost shown is the actual cost for the first year.
- 9/ Replacement of equipment based on a life determined by use. The high cost in the 10th year is attributable to the need to replace the pump, which is the main component of fixed costs.
- 11/ The pounds produced per annum based on the results of a first crop.
- 12/ Selling price based on the size of fish and the geographic location of the market.
- 14/ Total revenue less total cost (column 13 - 10)
- 15/ Figures in column 14 discounted at an annual rate of 11% (the assumed opportunity cost of capital).

Year	Conversion Rate of Feed	Pounds of Fish Produced per Acre	Total Feed Costs (JS)	Total Fertilizer Costs (JS)	Total Fingering Costs (JS)	Water JS	Labor JS	Maintenance of Facility & Equipment	Replacement of Equipment	Total Costs	Total Production x Price	Net	Flow @ 11%
1	1.5	10,000	2,850	185	1,200	150	820	25	0	5234	10,000 lb. x 50.85 = 508,500	508,500	508,500
2									0	5234		3266	579.2
3									684	5918		3266	2651
4									0	5234		2582	1888
5									0	5234		3266	2151
6									0	5234		3266	1938
7									684	5918		2582	1380
8									0	5234		3266	1573
9									0	5234		3266	1411
10									684	5918		2582	1009
11									8818	7052		1448	510
12									0	5234		3266	1036
13									684	5918		2582	738
14									0	5234		3266	841
15									0	5234		3266	758
									684	5918		2582	540
ANNUAL PRODUCTION COSTS													
											ANNUAL BENEFITS	21,372	

Model 1-A: Optimun Model - Large Farmer  
Production based on Feed & Fertilizer

Initial Outlay JS3,500  
Total Discounted Benefits 21,372  
Benefit/Cost Ratio 6.11

Model 2-A: Optimum Model - Large Farmer  
Production based on Fertilizer Only

Acresage 1.0 Total Discounted  
Crops per Year 3 Benefits \$8,469  
Initial Outlay \$3,500 Benefit/Cost  
Ratio 2.42

Year	Conversion Rate of Feed	Pounds of Fish Produced per Acre	Total Feed Costs (\$)	Total Fertilizer Costs (\$)	Total Fingering Costs (\$)	Water (\$)	Labor (\$)	Maintenance of Facility & Equipment	Replacement of Equipment	Total Costs	Total Production x Price	Net	Flow # 112			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	0	3,000	0	189	600	100	282	25	0	1196	3,000 lbs. x \$0.85 = \$2,550	\$1354		\$1220		
2									0	1196		1354		1099		
3									0	1196		1354		990		
4									0	1196		1354		892		
5									544	1740		810		461		
6									0	1196		1354		724		
7									0	1196		1354		652		
8									0	1196		1354		588		
9									0	1196		1354		525		
10									2362	3558		-1008		-355		
11									0	1196		1354		430		
12									0	1196		1354		367		
13									0	1196		1354		305		
14									0	1196		1354		243		
15									0	1196		1354		181		
									544	1740		810		169		
ANNUAL PRODUCTION COSTS											ANNUAL BENEFITS					8,469

Model 3-A: Optimum Model - Small Farmer  
Production based on Feed & Fertilizer

Acreage 0.25 Total Discounted  
Crops per year 2 Benefits 53,790  
Initial Outlay JS875 Benefit/Cost  
Ratio 4.33

Year	Conversion Rate of Feed	Pounds of Fish Produced per Acre	Total Feed Costs (JS)	Total Fertilizer Costs (JS)	Total Fingering Costs (JS)	Water JS	Labor JS	Maintenance of Facility & Equipment	Replacement of Equipment	Total Costs	Total Production x Price	Net	Flow (11)	
1	1.5	8,000	570	13	200	30	190	6	0	1009	2,000 lbs. x \$0.85 = \$1,700	\$ 691	\$ 623	
2									0	1009		691	561	
3									275	1284		416	304	
4									0	1009		691	455	
5									0	1009		691	410	
6									275	1284		416	222	
7									0	1009		691	333	
8									0	1009		691	300	
9									1175	2784		-1084	-424	
10									0	1009		691	243	
11									0	1009		691	214	
12									275	1284		416	119	
13									0	1009		691	178	
14									0	1009		691	160	
15									275	1284		416	87	
ANNUAL PRODUCTION COSTS										ANNUAL BENEFITS				5,790

Model 4-A: Optimum Model - Small Farmer  
Production based on Fertilizer Alone

Acreage 0.25 Total Discounted  
Crops per year 2 Benefits \$2,054  
Initial Outlay J5875 Benefit/Cost  
ratio 2.35

Year	Conversion Rate of Feed	Pounds of Fish Produced per Acre	Total Feed Costs (J\$)	Total Fertilizer Costs (J\$)	Total Fingering Costs (J\$)	Water J\$	Labor J\$	Maintenance of Facility & Equipment	Replacement of Equipment	Total Costs	Total Production x Price	Net	Flow # 112		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	0	3,000	0	47	100	30	62	6	0	245	750 lbs. x 50.85	\$ 392	\$ 353		
2									0	245			392	318	
3									0	245			392	287	
4									0	245			392	256	
5									205	450			187	111	
6									0	245			392	216	
7									0	245			392	189	
8									0	245			392	170	
9									0	245			392	153	
10									1705	1950			-1313	-462	
11									0	245			392	124	
12									0	245			392	117	
13									0	245			392	101	
14									0	245			392	91	
15									205	450			187	36	
ANNUAL PRODUCTION COSTS										ANNUAL BENEFITS				2,054	

Model 1-B: Average Model - Large Farmer  
Production Based on Feed & Fertilizer

Acreage 1.0      Total Discounted  
Crops per year 3      Benefits 10,502  
Initial Outlay J\$3,500      Benefit/Cost  
Ratio 3.0

Year	Conversion Rate of Feed	Pounds of Fish Produced per Acre	Total Feed Costs (J\$)	Total Fertilizer Costs (J\$)	Total Fingerling Costs (J\$)	Water J\$	Labor J\$	Maintenance of Facility & Equipment	Replacement of Equipment	Total Costs	Total Production x Price	Net	Flow		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1.5	6,000	1,710	189	900	75	564	25	0	3463	6,000 lbs. x \$0.15 = 55,100	1637		1475	
2									0	3463				1637	1328
3									0	3463				1637	1197
4									0	3463				1637	1078
5									544	4007				1093	649
6									0	3463				1637	575
7									0	3463				1637	788
8									0	3463				1637	710
9									0	3463				1637	640
10									2362	5825				-725	-255
11									0	3463				1637	519
12									0	3463				1637	468
13									0	3463				1637	422
14									0	3463				1637	380
15									544	4007				1093	228
ANNUAL PRODUCTION COSTS										ANNUAL BENEFITS		10,502			

Year	Conversion Rate of Feed	Pounds of Fish Produced per Acre	Total Feed Costs (\$)	Total Fertilizer Costs (\$)	Total Fingering Costs (\$)	Water \$	Labor \$	Maintenance of Facility & Equipment	Replacement of Equipment	Total Costs	Model 2-B: Average Model - Large Farmer Production Based on Fertilizer Alone					
											Total Production x Price	Net	Flow @ 11%			
1	0	2,500	0	189	450	75	252	25	0	991	11	12	13	14	15	
2									0	991	2,500 lbs. x 50.85 = 52,125			1134	920	
3									0	991				1134	829	
4									0	991				1134	747	
5									544	1535				590	350	
6									0	991				1134	606	
7									0	991				1134	546	
8									0	991				1134	492	
9									0	991				1134	443	
10									2362	3353				-1228	-432	
11									0	991				1134	360	
12									0	991				1134	324	
13									0	991				1134	292	
14									0	991				1134	263	
15									544	1535				590	123	
ANNUAL PRODUCTION COSTS											ANNUAL BENEFITS					6,885

											Model 3-B: Average Model - Small Farmer Production Based on Feed & Fertilizer				
											Acreage	0.25	Total Discounted		
											Crops per year	2	Benefits	\$3,068	
											Initial Outlay	JS875	Benefit/Cost	Ratio	
											3.51				
Year	Conversion Rate of Feed	Pounds of Fish Produced per Acre	Total Feed Costs (JS)	Total Fertilizer Costs (JS)	Total Fingering Costs (JS)	Water JS	Labor JS	Maintenance of Facility & Equipment	Replacement of Equipment	Total Costs	Total Production x Price	Net	Flow @ 11%		
1	1.5	6,000	427	13	150	20	126	6	0	742	1,500 lbs. x 50.85 = \$1,275	\$ 533	\$ 480		
2									0	742		533	433		
3									0	742		533	390		
4									0	742		533	351		
5									205	947		328	195		
6									0	742		533	285		
7									0	742		533	257		
8									0	742		533	231		
9									0	742		533	208		
10									1705	2447		-1172	-413		
11									0	742		533	169		
12									0	742		533	152		
13									0	742		533	137		
14									0	742		533	124		
15									205	947		328	69		
ANNUAL PRODUCTION COSTS											ANNUAL BENEFITS			3,068	

Model 4-B: Average Model - Small Farmer  
Production based on Fertilizer Alone

Year	Conversion Rate of Feed	Pounds of Fish Produced per Acre	Total Feed Costs (US)	Total Fertilizer Costs (US)	Total Fingering Costs (US)	Water US	Labor US	Maintenance of Facility & Equipment	Replacement of Equipment	Total Costs	Total Production x Price		Net	Flow @ 11%
											11	12		
1	0	2,000	0	13	75	20	56	6	0	170	500 lbs. x 50.85 =	5425	\$ 255	\$ 230
2									0	170			255	207
3									0	170			255	187
4									0	170			255	168
5									205	375			50	30
6									0	170			255	136
7									0	170			255	123
8									0	170			255	111
9									0	170			255	100
10									1705	1875			-1450	-511
11									0	170			255	81
12									0	170			255	73
13									0	170			255	66
14									0	170			255	59
15									205	375			50	10
ANNUAL PRODUCTION COSTS											ANNUAL BENEFITS		1,581	

Acreage - 0.25    Total Discounted  
Crops per year 2    benefits \$1,581  
Initial Outlay JS875    Benefit/Cost  
Ratio 1.81

CONDITIONS OF PURCHASE

BETWEEN THE MOA AND EXTENSION PERSONNEL FOR TRAILBIKES

Under the Fish Production Development Project, each extension agent will be given the opportunity to enter into an individual legal agreement with the MOA for obtaining transportation under the procedures currently used by the MOA for individual acquisition.

- (a) The project will initially supply 20 trailbikes of approximately 125 cc engine size, with limited spare parts, for purchase by the fisheries extension agents at cost, interest free, but including the cost for mandatory insurance coverage.
- (b) Spare parts will be handled by the regional equipment maintenance and repair unit of the MOA.
- (c) Monthly payments will be withheld from the extension agent's salary by the MOA, to effect total repayment by each individual within a two-year period.
- (d) The monthly repayments will be deposited in a revolving fund to be used solely for the purchase of new trailbikes when necessary to facilitate project implementation.
- (e) Until repayment is completed, the MOA will retain title to each trailbike. Upon completion of repayment, the trailbike will become the property of the extension agent.
- (f) During the period of employment, the MOA will pay established travel allowances to the extension agent and the extension agent will be responsible financially for all maintenance and repairs.
- (g) In the event an extension agent voluntarily or involuntarily relinquishes employment related to the project, he will concurrently relinquish possession of the trailbike without refund of past purchase payments as compensation for depreciation, or will immediately pay the remaining balance owing in one lump sum.

DEPARTMENT OF STATE  
 AGENCY FOR INTERNATIONAL DEVELOPMENT LAC/DR-IEE-79-27  
 WASHINGTON, D. C. 20523  
ENVIRONMENTAL THRESHOLD DECISION

ASSISTANT  
ADMINISTRATOR

Location : USAID/Jamaica, 532-0059

Project Title : Fish Production System Development (Project)

Funding : FY 79-\$2,740,000 (Loan); \$380,000 (Grant), FY 80-\$300,000 (Grant)  
 FY 81-\$1,085,000 (Grant)

Life of Project: Five Years

Mission Recommendation:

Based on the Initial Environmental Examination, the Mission has concluded that the project will not have a significant effect on the human environment and therefore recommends a Negative Determination.

The Development Assistance Executive Committee of the Bureau for Latin America and the Caribbean has reviewed the Initial Environmental Examination for this project and concurs in the Mission's recommendation for a Negative Determination.

AA/LAC Decision:

Pursuant to the authority vested in the Assistant Administrator for Latin America and the Caribbean under Title 22, Part 216.4a, Environmental Procedures, and based upon the above recommendation, I hereby determine that the proposed project is not an action which will have a significant effect on the human environment, and therefore, is not an action for which an Environmental Impact Statement or an Environmental Assessment will be required.

\_\_\_\_\_  
 Assistant Administrator for  
 Latin America and the Caribbean

\_\_\_\_\_  
 Date

Clearances:

LAC/DR:Environmental Advisor:ROtto CRS

DAEC Chairman:MBrown MB

UNCLASSIFIED  
Department of State

INCOMING  
TELEGRAM

PAGE 01 KINGST 04289 19 OF 02 151921Z  
ACTION: AID-39

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KINGST 04289 01 OF 02 151921Z

INFO OCT-01 OES-09 ED-05 ARA-15 AGRE-00 IIR-10 CIAE-00  
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UNCLAS SECTION 1 OF 2 KINGSTON 4209

AIDAC

E.O. 12958: NA  
SUBJECT: IEE FOR JAMAICAN FISH PRODUCTION SYSTEM DEVELOPMENT PROJECT

1. FOLLOWING IS THE REVISED IEE FOR THE JAMAICAN FISH PRODUCTION SYSTEM DEVELOPMENT PROJECT. PLEASE ADVISE ASAP AS TO RECOMMENDED NEGATIVE DETERMINATION.

INITIAL ENVIRONMENTAL EXAMINATION

PROJECT LOCATION: JAMAICA  
PROJECT TITLE: FISH PRODUCTION SYSTEM DEVELOPMENT (PROJECT)  
FUNDING: (FISCAL YEAR AND AMOUNT IN THOUSANDS OF US DOLLAR GRANT)  
FY 79 2740 000  
FY 80 300  
FY 81 405  
2740 1005

LIFE OF PROJECT: JUNE 30, 1979 - JUNE 30, 1983

IEE PREPARED BY: FISHERIES CONSULTANT, DATE:

J. GOVER, AMBURN

UNIVERSITY

IEE REVISED AND CLEARED BY MISSION PROJECT DEVELOPMENT COMMITTEE

ENVIRONMENTAL ACTION RECOMMENDED:

NEGATIVE DETERMINATION

1. EXAMINATION OF NATURE, SCOPE, AND MAGNITUDE OF ENVIRONMENTAL IMPACTS

A. DESCRIPTION OF PROJECT

THE FISH PRODUCTION PROJECT WILL ASSIST IN THE DEVELOPMENT OF FISHPONDS AND INTENSIVE FISH CULTURE OPERATIONS AS PART OF THE RESOURCE DEVELOPMENT IN JAMAICAN AGRICULTURE. DURING THE 4-YEAR LIFE OF THE PROJECT FROM 1979 - 1983 APPROXIMATELY 1600 NEW PONDS REPRESENTING 1100 SURFACE ACRES OF WATER WILL BE CONSTRUCTED, AND BROUGHT INTO MANAGED PRODUCTION WITH ANNUAL YIELD OF APPROXIMATELY 6 MILLION POUNDS. PONDS WILL BE LOCATED IN RURAL AREAS WITH RELATIVELY LOW POPULATION DENSITY AND WHERE AN ESTIMATED ONE-THIRD OF PRODUCTIVE LAND HAS FALLEN INTO DISUSE AND UNEMPLOYMENT IS HIGH. PONDS MAY RANGE IN AREA FROM FIVE SQUARE YARDS TO SEVERAL ACRES AND FEW PONDS WILL EXCEED ONE ACRE IN SIZE OR MORE THAN FOUR FEET IN WATER DEPTH. ALTHOUGH INITIAL PROJECT ACTIVITIES WILL CONCENTRATE IN SOUTH CENTRAL JAMAICA, ESPECIALLY PONDS AND PRODUCTION ACTIVITIES SHOULD SPREAD ACROSS THE ISLAND AND TO THE COASTAL LOWLANDS AND THE FOOTHILL AGRICULTURAL AREAS.

B. IDENTIFICATION AND EVALUATION OF ENVIRONMENTAL IMPACTS

1. IDENTIFICATION OF IMPACTS

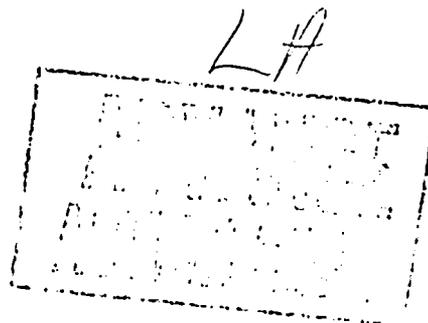
A. LAND USE

LANDS SELECTED FOR POND DEVELOPMENT GENERALLY WILL NOT BE IN PRODUCTIVE AGRICULTURAL USE. THIS INCLUDES WETLANDS, AND SWAMPY AREAS, DRAINAGE CHANNELS IN FLOODING PRONE AREAS, ALPINE LANDS REMOVED BECAUSE OF LOW PRODUCTIVITY AND DRAIN HOLES AND NATURAL PEEPINGS ALREADY FILLED WITH WATER. WETLANDS AND SWAMPY AREAS ARE NOT EXPECTED TO BE UTILIZED FOR FISH PONDS TO ANY GREAT EXTENT. WHERE THEY MIGHT BE UTILIZED THEY WOULD BE WHERE DRAINAGE CONDUITS EXIST AND ARE NOT AGRICULTURAL PROJECTS AND ARE ALREADY INTENDED TO FLOOD POSSIBLE ENVIRONMENTAL PROBLEMS. THE LOAN AGREEMENT WILL CONTAIN A CONDITION PRECEDENT TO DISBURSEMENT FOR POND

CONSTRUCTION IN WETLANDS OR SWAMPY AREAS. THE CP WOULD REQUIRE THAT BEFORE WETLANDS OR SWAMPY AREAS BE DEVELOPED FOR FISH PONDS UNDER THE PROJECT THAT SUCH SITES BE EVALUATED FOR POSSIBLE UNDERSTANDABLE ENVIRONMENTAL EFFECTS BOTH IN THE DISPLACEMENT OF EXISTING SPECIES AND IN LOSS OF OTHER BENEFICIAL BIOLOGICAL OR PHYSICAL FUNCTIONS. LAND VALUE IS GENERALLY ENHANCED WITH POND CONSTRUCTION BECAUSE OF MULTIPLE USES ASSOCIATED WITH POND CONSTRUCTION INCLUDING EROSION AND FLOOD CONTROL, STOCK WATERING, IRRIGATION SUPPLY, HOUSEHOLD USE, RECREATION, ETC. THE US SOIL CONSERVATION SERVICE PROGRAM OF FISH POND CONSTRUCTION IS AN EXAMPLE OF COMPARABLE POSITIVE LAND PROTECTION AND CONSERVATION WITH POND CONSTRUCTION.

B. WATER QUALITY

WATER USED IN PONDS MAY BE COLLECTED FROM SURFACE RUNOFF OR PUMPED FROM WELLS. RAINFALL IN THE HILLS IS GENERALLY ADEQUATE TO INSURE SUFFICIENT QUANTITIES OF WATER IN UPLAND AREAS. LOW COASTAL AREAS WHERE PONDS ARE BUILT WILL GENERALLY HAVE TO PUMP WATER FROM RIVERS OR WELLS BUT BECAUSE OF THE SMALL NUMBER OF PONDS TO BE BUILT IN THESE AREAS COMPETITION WITH OTHER AGRICULTURAL USES FOR WATER WILL BE MINIMAL. AQUACULTURE CAN USE WATER AND QUALITY FOR LAND CROPP APPLICATION. FISH CULTURE ACTIVITIES GENERALLY ADD MINERAL AND ORGANIC NUTRIENTS TO THE WATER AND WHEN PONDS ARE DRAINED MAY ADD ENRICHMENT TO RECEIVING WATERS. THE SIGNIFICANCE OF THIS ENRICHMENT IS USUALLY CONSIDERED OF LITTLE ENVIRONMENTAL CONCERN AND INDEED COULD BE EXPECTED TO ENHANCE THE NATURAL FISH PRODUCTIVITY IN NATURAL WATERS OR BE USED FOR IRRIGATION. MANY OF THE PONDS CANNOT BE DRAINED EASILY SO THE VOLUME OF OVERALL POTENTIAL DISCHARGE



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AGENCY FOR INTERNATIONAL DEVELOPMENT  
**PROJECT AUTHORIZATION AND REQUEST  
 FOR ALLOTMENT OF FUNDS PART I**

1. TRANSACTION CODE

A ADD  
 C CHANGE  
 D DELETE

PAF

2. DOCUMENT CODE  
 5

COUNTRY/ENTITY

JAMAICA

4. DOCUMENT REVISION NUMBER

PROJECT NUMBER (7 digits)

[ 532-0059 ]

6. BUREAU/OFFICE

A SYMBOL B CODE  
 LA [ 05 ]

7. PROJECT TITLE (Maximum 40 characters)

[ FISH PRODUCTION SYSTEMS DEVELOPMENT ]

PROJECT APPROVAL DECISION

ACTION TAKEN  
 A APPROVED  
 D DISAPPROVED  
 DE D/AUTHORIZED

9. EST. PERIOD OF IMPLEMENTATION

YRS. [ 0 ] [ 4 ] QTRS [ 1 ]

10. APPROVED BUDGET AID APPROPRIATED FUNDS (\$000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. 1ST FY <u>79</u>		H. 2ND FY <u>80</u>		K. 3RD FY <u>81</u>	
		C GRANT	D LOAN	F GRANT	G LOAN	I GRANT	J. LOAN	L GRANT	M. LOAN
FN	124B	077	077	380	2,740	300		687	
TOTALS				380	2,740	300		687	

A. APPROPRIATION	N. 4TH FY		Q. 5TH FY		LIFE OF PROJECT		11. PROJECT FUNDING AUTHORIZED		
	O. GRANT	P. LOAN	R. GRANT	S. LOAN	T. GRANT	U. LOAN	(ENTER APPROPRIATE CODE(S))	A. GRANT	B. LOAN
					1,367	2,740	1 - LIFE OF PROJECT 2 - INCREMENTAL LIFE OF PROJECT	2	1
TOTALS					1,367	2,740	C. PROJECT FUNDING AUTHORIZED THRU	8	1

INITIAL PROJECT FUNDING ALLOTMENT REQUESTED (\$000)

APPROPRIATION	B. ALLOTMENT REQUEST NO.	
	C. GRANT	D. LOAN
FN	380	2,740
TOTALS	380	2,740

13. FUNDS RESERVED FOR ALLOTMENT

TYPED NAME (Check SFR FM/FSD)  
 SIGNATURE  
 DATE

SOURCE/ORIGIN OF GOODS AND SERVICES

000  941  LOCAL  OTHER

FOR AMENDMENTS, NATURE OF CHANGE PROPOSED

FOR AC/PIAS ONLY	16. AUTHORIZING OFFICE SYMBOL	17. ACTION DATE	18. ACTION REFERENCE (Optional)	ACTION REFERENCE DATE
		MM DD YY		MM DD YY

UNCLASSIFIED  
Department of State

INFORMING  
TELEGRAM

PAGE 01 KINGST 04289 02 OF 02 151934Z  
ACTION AID-59

9719

INFO OCT-01 OES-09 EB-08 ARA-15 AGRE-00 INR-10 CIAE-00  
DODE-00 /102 W

-----C71550 152018Z /65  
P 151825Z JUN 79  
FM AMEMBASSY KINGSTON  
TO SECSTATE WASHDC PRIORITY 7648

UNCLAS SECTION 2 OF 2 KINGSTON 4289  
AIDAC

IS SLIGHT IN RELATION TO TOTAL STREAM FLOW. WATER SUPPLIES TO PONDS ARE UNPOLLUTED SO THAT THERE IS NEGLIGIBLE DANGER OF BIOCONCENTRATION OF TOXIC MATERIALS SUCH AS PESTICIDE RESIDUALS OR HEAVY METALS IN CULTURED FISH. (PONDS WILL NOT BE CONSTRUCTED WHERE WATER IS POLLUTED.) PERSISTENCE CHEMICALS ARE NOT USED IN FISH CULTURE SO POND DISCHARGE WATERS, THOUGH ENRICHED, ARE NOT HARMFUL TO AQUATIC LIFE.

C. ATMOSPHERIC

THE EXTENT OF POND DEVELOPMENT WILL BE SO SMALL THAT NO ATMOSPHERIC OR CLIMATIC IMPACTS ARE FORESEEN.

D. NATURAL RESOURCES

NEGLIGIBLE WILDLIFE HABITAT DESTRUCTION IS ANTICIPATED AS A RESULT OF POND DEVELOPMENT. THE POND ENVIRONMENT MAY ACTUALLY PROVE BENEFICIAL TO WATER FOWL AND OTHER AQUATIC ORGANISMS. THE OVERFLOW OR DISCHARGE OF PONDS INTO NATURAL WATERS MAY RESULT IN THE SEEDING OF THESE WATERS WITH COMMERCIAL FISH SPECIES USED FOR FISH CULTURE. HOWEVER, THE SPECIES USED FOR FRESHWATER FISH CULTURE, TILAPIA MORSABICA, HAS BEEN ESTABLISHED IN JAMAICA WATERS FOR DECADES AND PROVIDES THE BULK OF THE CATCH FOR THE ARTISANAL FISHERY ON INLAND WATERS. FURTHER ESCAPEMENT OF POND FISH WOULD LIKELY ONLY FURTHER ENHANCE THE COMMERCIAL FISHERY. THERE IS LITTLE OR NO OTHER CURRENT UTILIZATION OF FISH STOCKS IN THE RIVERS.

E. CULTURAL

JAMAICANS ALREADY CONSUME SUBSTANTIAL QUANTITIES OF FISH INCLUDING VARIETIES THE SAME OR SIMILAR TO THOSE INTENDED FOR POND CULTURE. NO SIGNIFICANT CHANGE OF FOOD HABITS IS EXPECTED AS A RESULT OF CULTURED FISH PRODUCTION. INDEED, POND PRODUCTION MAY HELP KEEP FISH CONSUMPTION HIGH AS IMPORTS ARE REDUCED BECAUSE OF FOREIGN EXCHANGE COSTS. THERE IS NOT ANTICIPATED DISRUPTION OF JAMAICA'S WELL REGULATED LAND OWNERSHIP AND WATER-USE RIGHTS AS A RESULT OF POND CONSTRUCTION.

F. SOCIOECONOMIC

THE DETAILED FEASIBILITY OF SOCIOECONOMIC IMPACT OF PROJECT ACTIVITY IS DISCUSSED IN THE SOCIAL SOUNDNESS ANALYSIS OF THE PROJECT PAPER. IMPROVED ECONOMIC PRODUCTIVITY IN AREAS WHERE FISH CULTURE IS ADOPTED SHOULD RESULT WITH NO ANTICIPATED DISRUPTION OF THE EXISTING SOCIO-POLITICAL STRUCTURE OR CHANGE IN POPULATION OR CULTURAL PATTERNS.

G. HEALTH

WATER-BORN DISEASES ARE ALWAYS A CONCERN WHEN POND DEVELOPMENT IS DISCUSSED. FORTUNATELY, POND PONDS ARE GENERALLY RELATIVELY HEALTHY ENVIRONMENTS WHERE FISH EAT MOSQUITO LARVAE AND WATER FILLED AND DEGRADES MOST POLLUTANTS. JAMAICA DOES NOT HAVE SCHISTOSOMIASIS OR MALARIA AND YELLOW FEVER HAS BEEN ELIMINATED FROM THE ISLAND. THE MOSQUITO-BORN DENGUE FEVER IS COMMON ON THE ISLAND BUT STOPPED PONDS ARE GENERALLY NOT SUITABLE MOSQUITO BREEDING HABITAT.

LAWRENCE

A.I.D. Loan 532-T-12

PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS

Name of Entity: Government of Jamaica  
Name of Project: Fish Production System Development Project  
Project Number: 532-0059

Pursuant to Part I, Chapter I, Section 103 of the Foreign Assistance Act of 1961, as amended, I hereby authorize a Loan and a Grant to the Government of Jamaica ("GOJ") of not to exceed Three Million One Hundred Twenty Thousand United States Dollars (\$3,120,000) (the "Authorized Amount") to help in financing certain foreign exchange and local currency costs of goods and services required for the project as described in the following paragraph.

The project will increase freshwater fish production in Jamaica and develop institutional capabilities for the production of fingerlings and the extension of fish farming techniques to farmers (hereinafter referred to as the "Project"). Of the Authorized Amount, Two Million Seven Hundred Forty Thousand Dollars (\$2,740,000) ("Loan") will be loaned to the GOJ to assist in financing certain foreign exchange and local currency costs of goods and services required for the Project. Three Hundred Eighty Thousand Dollars (\$380,000) of the Authorized Amount will be obligated when the Project Grant Agreement is signed, and Two Million Seven Hundred Forty Thousand Dollars (\$2,740,000) obligated when the Project Loan Agreement is signed.

I approve the total level of A.I.D. appropriated funding planned for this Project of not to exceed Four Million One Hundred Seven Thousand United States Dollars (\$4,107,000), of which Two Million Seven Hundred Forty Thousand Dollars (\$2,740,000) will be Loan funded and One Million Three Hundred Sixty Seven Thousand Dollars (\$1,367,000) Grant Funded, including the funding authorized above, during the period FY 1979 through FY 1981. I approve further increments during that period of Grant funding up to Nine Hundred Eighty Seven Thousand Dollars (\$987,000), subject to the availability of funds in accordance with A.I.D. allotment procedures.

I hereby authorize the initiation of negotiation and execution of a Project Grant Agreement and a Project Loan Agreement by the officer to whom such authority has been delegated in accordance with A.I.D. regulations and Delegations of Authority, subject to the following essential terms

and covenants and major conditons; together with such other terms and conditions as A.I.D. may deem appropriate:

A. Loan Interest Rate and Terms of Repayment

GOJ shall repay the Loan to A.I.D. in United States Dollars within Twenty (20) years from the date of first disbursement of the Loan, including a grace period of not to exceed ten (10) years. GOJ shall pay to A.I.D. in United States Dollars interest thereon from the date of first disbursement of the Loan at the rate of (a) two percent (2%) per annum during the first ten (10) years, and (b) three percent (3%) per annum thereafter, on the outstanding disbursed balance of the Loan and on any due and unpaid interest accrued thereon.

B. Source and Origin of Loan Goods and Services

Except for Ocean Shipping, goods and services financed by A.I.D. under the Loan shall have their source and origin in countries included in A.I.D. Geographic Code 941 or in Jamaica, except as A.I.D. may otherwise agree in writing. Ocean shipping financed under the Loan shall be procured in the United States or Jamaica, except as A.I.D. may otherwise agree in writing.

C. Source and Origin of Grant and Services

Except for Ocean Shipping, goods and services financed by A.I.D. under the Grant shall have their source and origin in the United States or in Jamaica, except as A.I.D. may otherwise agree in writing. Ocean shipping financed under the Grant shall be procured in the United States except as A.I.D. may otherwise agree in writing.

D. Conditions Precedent to Loan Disbursements

Unless A.I.D. shall otherwise agree in writing:

1. Prior to any disbursement, or the issuance of any commitment document under the Project to finance the development of hatchery facilities in the Western Region, the Borrower will furnish in form and substance satisfactory to A.I.D.:
  - (a) evidence that sufficient land or buildings for the facility has been acquired; and
  - (b) a detailed plan and budget for pond construction, facility renovation or construction, operation, and maintenance.

2. Prior to any disbursement, or the issuance of any commitment document under the Project to finance the expansion of research and training facilities at Twickenham Park, the Borrower will furnish in form and substance satisfactory to A.I.D.:
  - (a) evidence that sufficient additional land has been acquired, and
  - (b) a detailed plan and budget for the construction, operation, and maintenance of an additional five acres of research type ponds.
3. Prior to any disbursement, or the issuance of any commitment document under the Project to finance pond construction in wetlands or swampy areas, the Borrower will evaluate such sites for possible undesirable environmental effects in the displacement of existing species and in loss of other beneficial biological and/or physical functions.
4. Prior to any disbursement, or the issuance of any commitment document under the Project Agreement to finance trailbikes, the Borrower shall furnish to A.I.D., in form and substance satisfactory to A.I.D., evidence that a revolving fund has been established to be used solely for the purchase of new trailbikes when necessary to facilitate Project implementation.

E. Special Covenants for Project Loan Agreement

GOJ, except as A.I.D. shall otherwise agree, shall covenant that:

1. Jamaican currency accruing to the Borrower as a result of the importation of feed, fertilizer, and seine materials will be utilized for the Project in a manner agreed to by A.I.D.;
2. Trade licenses for the importation of feed, fertilizer and seine materials for the Project will be issued in a timely manner in keeping with Inland Fisheries Unit schedules for Project Implementation;
3. Within three months of the signing of the Agreement, the Ministry of Public Service will create the new positions for the Project to meet its implementation goals and the Ministry of Finance will provide the funding needed to cover the recurrent costs of such positions;

4. Funds accruing to the Government of Jamaica from the farmers' share of pond construction costs will be paid to the Inland Fisheries Unit to offset operating costs of pond construction equipment;
5. The Ministry of Finance will insure that adequate budget allocations for Project implementation, including funds for vehicle maintenance and operating costs will be provided in a timely manner consistent with implementation schedules developed by the Inland Fisheries Unit;
6. Borrower will furnish to A.I.D. by August 31, 1979, in form and substance satisfactory to A.I.D., a time-phased implementation schedule for the remainder of the first Project year through August 31, 1980;
7. During the twelve-month periods commencing on August 31, 1980, 1981, and 1982, respectively, the Borrower shall furnish to A.I.D. in form and substance satisfactory to A.I.D., time-phased implementation schedules for each such twelve-month period, each based on the results of the annual evaluation and annual audit of the Project during the previous twelve-month period;
8. Borrower will pay salaries and international travel of overseas participant trainees;
9. Borrower will implement procedures for ensuring that participant trainees will return to their post for a period of time not less than twice the length of time spent in training; and
10. Borrower will insure the availability of sufficient credit to small farmers so that they are financially able to construct and operate ponds under the Project.

F. Special Covenants for Project Grant Agreement

GOJ, except as A.I.D. shall otherwise agree, shall covenant that:

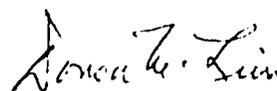
1. Grantee will furnish to A.I.D. by August 31, 1979, in form and substance satisfactory to A.I.D., a time-phased implementation schedule for the remainder of the first Project year through August 31, 1980;

2. During the twelve-month periods commencing on August 31, 1980, 1981, and 1982, respectively, the Grantee will furnish to A.I.D., in form and substance satisfactory to A.I.D., time-phased implementation schedules for each such twelve-month period, each based on the results of the annual evaluation and annual audit of the Project during the previous twelve-month period;
3. Grantee will pay salaries and international travel of overseas participant trainees; and
4. Prior to participant trainees' departure from Jamaica, Grantee will implement procedures for ensuring that participant trainees will return to their post for a period of time not less than twice the length of time spent in training.

G. Condition Precedent to Grant Disbursement

Unless A.I.D. shall otherwise agree in writing, prior to any disbursement, or the issuance of any commitment document under the Project to finance training for the University of the West Indies, the Grantee will furnish in form and substance satisfactory to A.I.D., an agreement with the University that the University will pay the salary and international travel for the participant trainee; a procedure for ensuring that the trainee will return to work for the University for a period of time not less than twice the time spent in training, and the plans of the University for incorporation of freshwater fish culture into the University's curriculum both at the undergraduate and graduate level.

Signature



Donor M. Lion  
Director, USAID/Jamaica

June 27, 1979

CLEARANCES:

LAC/GC:Robert Meighan (in draf  
AGR:Kenneth Ellis  
PROG:Henry Johnson  
CAP:Paul Wenger  
A/DIR:Philip Schwab  
CONT:Darrell Dolley

A.I.D. Loan 532-T-12

PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS

Name of Entity: Government of Jamaica  
Name of Project: Fish Production System Development Project  
Project Number: 532-0059

Pursuant to Part 1, Chapter 1, Section 103 of the Foreign Assistance Act of 1961, as amended, I hereby authorize a Loan and a Grant to the Government of Jamaica ("GOJ") of not to exceed Three Million One Hundred Twenty Thousand United States Dollars (\$3,120,000) (the "Authorized Amount") to help in financing certain foreign exchange and local currency costs of goods and services required for the project as described in the following paragraph.

The project will increase freshwater fish production in Jamaica and develop institutional capabilities for the production of fingerlings and the extension of fish farming techniques to farmers (hereinafter referred to as the "Project"). Of the Authorized Amount, Two Million Seven Hundred Forty Thousand Dollars (\$2,740,000) ("Loan") will be loaned to the GOJ to assist in financing certain foreign exchange and local currency costs of goods and services required for the Project. Three Hundred Eighty Thousand Dollars (\$380,000) of the Authorized Amount will be obligated when the Project Grant Agreement is signed, and Two Million Seven Hundred Forty Thousand Dollars (\$2,740,000) obligated when the Project Loan Agreement is signed.

I approve the total level of A.I.D. appropriated funding planned for this Project of not to exceed Four Million One Hundred Seven Thousand United States Dollars (\$4,107,000), of which Two Million Seven Hundred Forty Thousand Dollars (\$2,740,000) will be Loan funded and One Million Three Hundred Sixty Seven Thousand Dollars (\$1,367,000) Grant funded, including the funding authorized above, during the period FY 1979 through FY 1981. I approve further increments during that period of Grant funding up to Nine Hundred Eighty Seven Thousand Dollars (\$987,000), subject to the availability of funds in accordance with A.I.D. allotment procedures.

I hereby authorize the initiation of negotiation and execution of a Project Grant Agreement and a Project Loan Agreement by the officer to whom such authority has been delegated in accordance with A.I.D. regulations and Delegations of Authority, subject to the following essential terms:

and covenants and major conditons; together with such other terms and conditions as A.I.D. may deem appropriate:

A. Loan Interest Rate and Terms of Repayment

GOJ shall repay the Loan to A.I.D. in United States Dollars within Twenty (20) years from the date of first disbursement of the Loan, including a grace period of not to exceed ten (10) years. GOJ shall pay to A.I.D. in United States Dollars interest thereon from the date of first disbursement of the Loan at the rate of (a) two percent (2%) per annum during the first ten (10) years, and (b) three percent (3%) per annum thereafter, on the outstanding disbursed balance of the Loan and on any due and unpaid interest accrued thereon.

B. Source and Origin of Loan Goods and Services

Except for Ocean Shipping, goods and services financed by A.I.D. under the Loan shall have their source and origin in countries included in A.I.D. Geographic Code 941 or in Jamaica, except as A.I.D. may otherwise agree in writing. Ocean shipping financed under the Loan shall be procured in the United States or Jamaica, except as A.I.D. may otherwise agree in writing.

C. Source and Origin of Grant and Services

Except for Ocean Shipping, goods and services financed by A.I.D. under the Grant shall have their source and origin in the United States or in Jamaica, except as A.I.D. may otherwise agree in writing. Ocean shipping financed under the Grant shall be procured in the United States except as A.I.D. may otherwise agree in writing.

D. Conditions Precedent to Loan Disbursements

Unless A.I.D. shall otherwise agree in writing:

1. Prior to any disbursement, or the issuance of any commitment document under the Project to finance the development of hatchery facilities in the Western Region, the Borrower will furnish in form and substance satisfactory to A.I.D.:
  - (a) evidence that sufficient land or buildings for the facility has been acquired; and
  - (b) a detailed plan and budget for pond construction, facility renovation or construction, operation, and maintenance.

2. Prior to any disbursement, or the issuance of any commitment document under the Project to finance the expansion of research and training facilities at Twickenham Park, the Borrower will furnish in form and substance satisfactory to A.I.D.:
  - (a) evidence that sufficient additional land has been acquired, and
  - (b) a detailed plan and budget for the construction, operation, and maintenance of an additional five acres of research type ponds.
3. Prior to any disbursement, or the issuance of any commitment document under the Project to finance pond construction in wetlands or swampy areas, the Borrower will evaluate such sites for possible undesirable environmental effects in the displacement of existing species and in loss of other beneficial biological and/or physical functions.
4. Prior to any disbursement, or the issuance of any commitment document under the Project Agreement to finance trailbikes, the Borrower shall furnish to A.I.D., in form and substance satisfactory to A.I.D., evidence that a revolving fund has been established to be used solely for the purchase of new trailbikes when necessary to facilitate Project implementation.

E. Special Covenants for Project Loan Agreement

GOJ, except as A.I.D. shall otherwise agree, shall covenant that:

1. Jamaican currency accruing to the Borrower as a result of the importation of feed, fertilizer, and seine materials will be utilized for the Project in a manner agreed to by A.I.D.;
2. Trade licenses for the importation of feed, fertilizer and seine materials for the Project will be issued in a timely manner in keeping with Inland Fisheries Unit schedules for Project implementation;
3. Within three months of the signing of the Agreement, the Ministry of Public Service will create the new positions for the Project to meet its implementation goals and the Ministry of Finance will provide the funding needed to cover the recurrent costs of such positions;

4. Funds accruing to the Government of Jamaica from the farmers' share of pond construction costs will be paid to the Inland Fisheries Unit to offset operating costs of pond construction equipment;
5. The Ministry of Finance will insure that adequate budget allocations for Project implementation, including funds for vehicle maintenance and operating costs will be provided in a timely manner consistent with implementation schedules developed by the Inland Fisheries Unit;
6. Borrower will furnish to A.I.D. by August 31, 1979, in form and substance satisfactory to A.I.D., a time-phased implementation schedule for the remainder of the first Project year through August 31, 1980;
7. During the twelve-month periods commencing on August 31, 1980, 1981, and 1982, respectively, the Borrower shall furnish to A.I.D. in form and substance satisfactory to A.I.D., time-phased implementation schedules for each such twelve-month period, each based on the results of the annual evaluation and annual audit of the Project during the previous twelve-month period;
8. Borrower will pay salaries and international travel of overseas participant trainees;
9. Borrower will implement procedures for ensuring that participant trainees will return to their post for a period of time not less than twice the length of time spent in training; and
10. Borrower will insure the availability of sufficient credit to small farmers so that they are financially able to construct and operate ponds under the Project.

F. Special Covenants for Project Grant Agreement

GOJ, except as A.I.D. shall otherwise agree, shall covenant that:

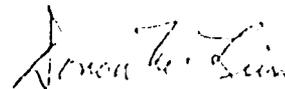
1. Grantee will furnish to A.I.D. by August 31, 1979, in form and substance satisfactory to A.I.D., a time-phased implementation schedule for the remainder of the first Project year through August 31, 1980;

2. During the twelve-month periods commencing on August 31, 1980, 1981, and 1982, respectively, the Grantee will furnish to A.I.D., in form and substance satisfactory to A.I.D., time-phased implementation schedules for each such twelve-month period, each based on the results of the annual evaluation and annual audit of the Project during the previous twelve-month period;
3. Grantee will pay salaries and international travel of overseas participant trainees; and
4. Prior to participant trainees' departure from Jamaica, Grantee will implement procedures for ensuring that participant trainees will return to their post for a period of time not less than twice the length of time spent in training.

G. Condition Precedent to Grant Disbursement

Unless A.I.D. shall otherwise agree in writing, prior to any disbursement, or the issuance of any commitment document under the Project to finance training for the University of the West Indies, the Grantee will furnish in form and substance satisfactory to A.I.D., an agreement with the University that the University will pay the salary and international travel for the participant trainee; a procedure for ensuring that the trainee will return to work for the University for a period of time not less than twice the time spent in training, and the plans of the University for incorporation of freshwater fish culture into the University's curriculum both at the undergraduate and graduate level.

Signature



Honor M. Lion  
Director, USAID/Jamaica

June 27, 1979

CLEARANCES:

LAC/GC: Robert McIghem (in draft)  
AGR: Kenneth Ellis  
PROG: Henry Johnson  
CAP: Paul Weggen  
A/DIR: Phillip Schwab  
CONT: Darrell Dolley

AGENCY FOR INTERNATIONAL DEVELOPMENT  
**PROJECT AUTHORIZATION AND REQUEST  
 FOR ALLOTMENT OF FUNDS PART I**

1. TRANSACTION CODE

A  
 C  
 D

A ADD  
 C CHANGE  
 D DELETE

PAF

2. DOCUMENT CODE  
 5

3. COUNTRY/ENTITY

JAMAICA

4. DOCUMENT REVISION NUMBER

5. PROJECT NUMBER (7 digits)

[ 532-0059 ]

6. BUREAU/OFFICE

A SYMBOL B CODE

LA

[ 05 ]

7. PROJECT TITLE (Maximum 40 characters)

[ FISH PRODUCTION SYSTEMS DEVELOPMENT ]

8. PROJECT

APPROVAL  
 DECISION

A  
 B  
 D  
 DE

ACTION TAKEN

A APPROVED  
 B DISAPPROVED  
 DE DEAUTHORIZED

9. EST. PERIOD OF IMPLEMENTATION

YRS [ 0 ] [ 4 ]

QTRS [ 1 ]

10. APPROVED BUDGET AID APPROPRIATED FUNDS (\$000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. FY 79		H. FY 80		K. FY 81	
		C GRANT	D LOAN	F GRANT	G LOAN	I GRANT	J LOAN	L GRANT	M LOAN
(1) FN	124B	077	077	380	2,740	380		687	
(2)									
(3)									
(4)									
TOTALS				380	2,740	380		687	

A. APPROPRIATION	N. FY		O. FY		LIFE OF PROJECT		13. PROJECT FUNDING AUTHORIZED (THRU)	14. PROJECT FUNDING AUTHORIZED (THRU)
	C GRANT	P LOAN	R GRANT	S LOAN	T GRANT	U LOAN		
(1) FN					1,370	2,740		
(2)								
(3)								
(4)								
TOTALS						1,370	2,740	

12. INITIAL PROJECT FUNDING ALLOTMENT REQUESTED (\$000)

A. APPROPRIATION	B. ALLOTMENT REQUESTED	
	C GRANT	D LOAN
(1) FN	380	2,740
(2)		
(3)		
(4)		
TOTALS		380 2,740

13. FUNDS RESERVED FOR ALLOTMENT

TYPE/D NAME (What SER/INTSD)

SIGNATURE

DATE

14. SOURCE/ORIGIN OF GOODS AND SERVICES

000

941

LOCAL

OTHER

15. FOR AMENDMENTS, NATURE OF CHANGE PROPOSED

FOR  
 PPC/PIAS  
 USE ONLY

16. AUTHORIZING OFFICE SYMBOL

17. ACTION DATE

MM DD YY

18. ACTION REFERENCE (Optional)

ACTION REFERENCE DATE

MM DD YY