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P R O J E C T      P A P E R

AQUACULTURE DEVELOPMENT

EGYPT

PROJECT 263-0064

August 9, 1978

AGENCY FOR INTERNATIONAL DEVELOPMENT  
PROJECT PAPER FACESHEET

TRANSACTION CODE  
 A1 ADD  
 C1 CHANGE  
 D1 DELETE

PP  
 1. DOCUMENT CODE  
 3

1. COUNTRY ENTITY  
 Egypt

2. PROJECT NUMBER (7 DIGIT)  
 163-0064

3. BUREAU/OFFICE  
 NE

4. PROJECT TITLE (Maximum 40 CHARACTERS)  
 Agriculture Development

5. ESTIMATED % OF PROJECT COMPLETION  
 83

6. ESTIMATED DATE OF OBLIGATION  
 A. INITIAL FY 718  
 B. QUARTER 4  
 C. FINAL FY 812

10. ESTIMATED COSTS (1000 OR EQUIVALENT \$)

A. FUNDING SOURCE	FIRST FY			LIFE OF PROJECT		
	B. FY	C. L/C	D. TOTAL	E. FY	F. L/C	G. TOTAL
AID APPROPRIATED TOTAL	2,500	700	3,500	19,200	14,500	27,500
GRANT	2,500	100	4,500	19,200	14,300	27,500
LOAN						
OTHER						
U.S.						
HOST COUNTRY		3	3		3,200	3,200
OTHER (CONCISE)						
TOTALS	2,500	703	3,503	19,200	18,200	27,500

11. PROPOSED BUDGET APPROPRIATED FUNDS (1000)

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
11 CA	143	1000		3,500		17,500			
21									
31									
41									
TOTALS				3,500		17,500			

12. MID-TERM EVALUATION SCHEDULED

A. APPROPRIATION	N. 4TH FY 81		O. 5TH FY 82		LIFE OF PROJECT	
	C. GRANT	F. LOAN	H. GRANT	I. LOAN	T. GRANT	U. LOAN
11 CA	6,200				27,500	
21						
31						
41						
TOTALS	6,200				27,500	

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

2 11 NO  
 11 YES

14. ORIGINATING OFFICE CLEARANCE

SIGNATURE: *Am R. G. Carter*

TITLE: Acting Director

DATE SIGNED: 10/11/73

15. DATE DOCUMENT RECEIVED IN AID/7 OR FOR AID/9 DOCUMENTS. DATE OF DISTRIBUTION: 10/11/73

Other Clearances:

T. Carter (LEG) *[Signature]*

D. F. Brown (CONT) *[Signature]*

S. Applegate (TA) *[Signature]*

C. Weden (PRG) *[Signature]*

R. Bakley (CDE) *[Signature]*

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### Introduction

The project design presented in this paper is the result of over 18 months of design and evaluation work on the part of USAID and the GOE. The design effort was implemented in three phases. First, a review of Egyptian fisheries was carried out in late 1976, to identify the subsectors of the Egyptian fisheries industry where AID assistance would be most productive.<sup>1/</sup> This review recommended a concentration on the fish farming subsector. Based on this finding a PID for fish farming development was submitted to AID/W and approved in August 1977.

The recommendations of the review were reinforced and expanded in the second phase, with the completion of the aquaculture feasibility report in December 1977.<sup>2/</sup> This study evaluated the soil and water characteristics of nine potential sites and recommended the Abassa area as the most suitable. The team also identified the areas in the fish farming system most in need of strengthening and prepared a preliminary project design. The team coordinated its work with the World Bank, who reviewed the feasibility report. On an informal basis, it was decided that AID would concentrate on the institutional support needed for national planning, research and extension activities as well as a production component, while the World Bank would stress production activities alone.

In the third phase, a six-person team, including two fisheries specialists, a hatchery specialist, a marketing specialist, an engineer and a project analyst, completed the final project design and prepared the project paper. Detailed reports prepared by this team include separate analyses of the engineering aspects and the hatchery requirements for the project. The results of these studies have been incorporated in the project paper.

1/ A Report of the Fisheries Review Team to Egypt for USAID, December 19, 1976, AID, Xerox.

2/ Egyptian Aquaculture Feasibility Report, December 5, 1977, AID.

## II. PROJECT DESCRIPTION

### II-A. Recommendation

USAID/Egypt recommends that AID/W approve a life-of-project cost of \$27.5 million, with initial obligation of \$3.5 million for technical services and participant training. The remainder will be incrementally obligated upon completion of final engineering designs. The project will assist the Government of Egypt, through the Sub-Ministry for Aquatic Resources of the Ministry of Agriculture, to establish a research and extension capability in aquaculture and increase the areas in production ponds, thereby increasing the supply of high-protein foods available to the Egyptian consumer.

### II-B. Introduction

The continued growth of Egypt's population together with the expected increase in per capita income will generate a rapidly increasing demand for protein foods. For a number of reasons, fish provide an appropriate means to meet the goal of increased consumption of high quality protein. First, fish is traditionally an important high protein food source in the Egyptian diet. Consumption is at present restricted by supply shortages. Second, fish production utilizes primarily low opportunity-cost resources including wasteland and off-season labor. It thus provides a net increase in total production and increases the productivity of presently underutilized resources without competing with livestock activities for food grains. Third, aquaculture\* utilizes highly divisible technologies well-suited to small-scale production.

The rapid growth in demand cannot be met by reliance on natural fisheries and existing fish farms. Population growth alone will require an additional 3,700 tons of fish per year to maintain per capita consumption at 3.7 kg., a low level by international standards. This demand for fish has been increasingly met by imports, which have been growing at 39% per year in value and totalled \$5,729,000 in 1977, placing an additional strain on the balance of payments.

The GOE is highly enthusiastic about aquaculture development and interest in the private sector, foreign as well as domestic, is growing rapidly. However, these operations have little relevance to the small farmer, who has the potential to benefit substantially from fish farming. There is, therefore, a need for a significant demonstration of aquaculture on a smaller scale to provide a base for aquaculture operation by small farmers.

See Annex 22 for definition of technical terms as used in this paper.

Brief Description

The project will address these needs by establishing

- 1) a National Fish Farming Center at Abbasa, Sharkia, to conduct training and applied research and provide extension services to the aquaculture industry;
- 2) a 1,200 feddan production area adjacent to the Center consisting of 80 15-feddan homesteads for recent agricultural graduates, supplying a minimum of 300 tons of marketable fish per year and serving as a model for fish farm expansion.
- 3) an additional 3,800 feddans of fish farms in the Sharkia - Ismailia area, including a minimum of 1,500 feddans of village fish ponds, supplying at least 3,000 tons/year;
- 4) two additional carp hatcheries, one at Abbasa and one at the current hatchery site at Serov, with a combined capacity of 18 - 30 million fry annually (a 140 - 300% increase over currently planned levels);
- 5) two additional mullet fry collection centers on the coast at Al Gameel and Al Gerby to augment the dwindling supply from the current collection activities at Al Mex, with a combined capacity to collect 40 - 60 million fry annually (a 100 - 200% increase over current levels, including illegal activity);
- 6) a mullet hatchery at Al Gameel, producing 6 million fry annually (a 20% increase).

In addition, the project will support Egyptian aquaculture capacity by long-term training (degree and non-degree) for 45 individuals and 140 person-months of short-and medium-term training out of country. It will also support national planning activities through the National Committee for Aquaculture Development and provide low-level technical and financial support to marketing and production activities in the project area and elsewhere, including the construction of a market at Zagazig.

## Project Purpose and Strategy

### Purpose

The proposed project will accomplish its goal of increasing the consumption of high quality protein by providing the capacity for sustained development of the fish farming industry on an economic basis through improved institutions for planning and coordination, applied research, training, and extension. This capacity will support fish farming on roughly 50,000 feddans. The project will directly increase annual fish production by at least 4,000 tons by 1986 through the establishment of a large model fish farming area, a revolving credit fund and the adaptation of small farmer technologies to Egypt. These activities will increase the fish farming area by 5,000 feddans, roughly a 50% increase over the current level.

### Strategy

The project purpose will be accomplished utilizing a two part strategy consisting of an institutional component and a production component. Both components are mutually reinforcing and equally essential to project success.

The support institution component will provide the training, extension, applied research and other support necessary to develop the fish farming industry. Its focal point will be the National Fish Farming Center at Abbasa. Other institutions, particularly hatcheries, will receive support and be integrated into a single system. The National Center will concentrate its operation in Sharkia and Ismailia governorates initially, and will eventually serve the entire country.

The production component will be implemented in two stages. The first stage will create a nucleus of progressive fish farmers around the National Center, to reinforce and stimulate its applied research and extension activities. This 1,200 feddan homestead area will also serve a demonstration function to provide the base for the second stage, in which a much larger area will be developed for operation by small farmers, village cooperatives, and medium-scale private farmers, as well as additional homesteaders. The production component will be implemented wholly through the private sector, with the exception of purchase of such inputs as fertilizer and fish fry, which are only available from the public sector. To the greatest extent possible, marketing will be through the private sector.

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## C. Relationship of Project Purpose and Strategy

4.

### II-C-1 Beneficiary Analysis

The ultimate beneficiaries of the project will be the consumers of the fish produced. At current levels of consumption, the 4,000 tons produced annually (according to the conservative production estimate) will meet the needs of 1,080,000 consumers. It is anticipated that most of the production will be consumed in Sharkia and Ismailia governorates. The National Center will support production serving an additional 8,100,000 consumers nationwide.

Fish produced will serve three groups of consumers. Mullet, a relatively high-value fish, will account for 10% of total production (a minimum of 400 tons annually), and serve a middle class market. Carp and large tilapia are low priced fish appealing to a somewhat less affluent stratum. At full production 2,500 tons will be produced for this market. Fish will reach the poor through three routes. First, roughly 840 tons of small low-value tilapia will be harvested and sold to the poor through the Fish Marketing Company. Second, it is expected that an additional 160 tons annually will be sold through the Fish Marketing Co. at reduced prices. Third, some fish will reach the rural poor through in-kind labor payments.

A second important group of beneficiaries will be the homestead farmers, other private farmers, and those employed as laborers and watchmen in fish production. Approximately 500 full-time equivalent jobs will be created by the production activities. Peak labor demand for harvest (Sept. - Dec.) and pond preparation and stocking (Jan.) falls during agriculture's slack period. Fish culture thus serves to smooth out labor demand and reduce seasonal unemployment.

The project will also employ directly 128 researchers and laborers in the National Center and related institutions. Indirect employment will be created in the areas of ice production and transport, fish marketing, sale of inputs, etc. Project construction will employ over 1,000 people on a temporary basis.

It is not possible to quantify the benefits to be expected from the National Center's research and extension activities as distinct from the total planned expansion of the fish farming sector. Plans call for acreage in inland fish ponds to total over 50,000 feddans by 1983. This level will be reached through the construction of a 30,000-feddan World Bank project, a 1000-feddan FAO project<sup>1/</sup>, and substantial government activity in addition to the 10,000 feddans of existing ponds and the 5000 feddans proposed here. This level of activity cannot be supported without parallel development in the research and extension functions. This project provides the only source of such development.

<sup>1/</sup> Other donor activities are discussed in more detail in Annex 19.

The 45 individuals receiving long-term training and the 30 receiving short-term training will also benefit directly as well as contribute to the development of a national capability in aquaculture.

Project activities, including research and extension, will be especially important in directing fish farming development toward the needs of two important beneficiary groups: the rural poor and women.

Rural poor: Fish farming is ideally suited to a low-capital, labor-intensive operation by low-income villagers where they can gain access to small plots of swampy or saline land or where small reservoirs or ponds exist. Development of the industry has so far bypassed this group. A research and extension program to reach them is a much-needed component of the proposed project. Not less than 1,500 feddans of the proposed 5,000 feddan total will be developed as village farms.

Women: The project will include mixed fish/poultry operations in 30 villages. It is expected that most of these will be operated by women, either cooperatively or as individuals. Poultry (both chicken and ducks) and fish production are complementary. Poultry manure is an important input for fertilizing fish ponds and ground small fish make excellent poultry feed. Joint operations have been successful on a village scale in Asia, and such projects provide a promising means of expanding the productivity of Egyptian village woman's poultry operation. Fish processing through such traditional means as salting and sun-drying will also provide some additional employment and income for village women.

### II-C-2 Sector Goals

The Egyptian Government has set a goal for per capita fish production of 15 kg by 1986, requiring an increase in total annual fish production from 150,000 tons to 620,000 tons. To assist in accomplishing this long-term goal, they have set a medium-term goal of increasing "the rate of aquaculture development through expansion of aquaculture area used and increasing productivity per unit area of culture systems".<sup>1/</sup>

The proposed project will contribute to this goal directly by financing 5,000 feddans of ponds over 5 years and indirectly by laying the foundation for economic expansion of the industry through provision of research, extension and training services.

The expansion of aquaculture will contribute to the important sectoral goals of improving land productivity, especially in old lands; improving the balance of payments; providing employment; improving planning and coordination; and increasing the availability of high protein foods.

### II-C-3 Overall AID Objectives in Egypt

The strengthening of the aquaculture subsector addresses the central AID objective of promoting the development of a productive economic base in Egypt, in order to assure the stability and economic viability of the Egyptian Government. An increase in aquaculture production will lead to a parallel reduction in the diversion of foreign exchange to the purchase of basic foodstuffs. The project also contributed to sound planning and coordination of government activities as well as the development of a base for private sector expansion. Finally, the project supports the overall goal of increasing opportunities for employment in rural areas and augmenting rural incomes.

<sup>1/</sup> National Plan for Development of Aquaculture in Egypt, Institute of Oceanography and Fisheries, Cairo, 1975.

## II-D Project Outputs

The proposed project has two basic components: creation of aquaculture support institutions and establishment of 5,000 feddans of private fish farms.

### a. Support institutions

The recently-established National Committee for Aquaculture Development consisting of representatives of the Sub-Ministry for Aquatic Resources, the Institute of Oceanography and Fisheries, the Ministry of Land Reclamation, the Fish Marketing Company, and the Ministry of Agriculture's Department of Economics was created to coordinate government activities affecting fish farming. The Committee, chaired by the Under-Secretary for Aquatic Resources, is given a broad mandate to plan the expansion of the fish farming sector with particular attention to the AID and World Bank projects. This greatly-needed activity will be strengthened to enable it to support needed research and production activities and to produce a realistic national plan for fish farming.

The project will create a National Fish Farming Center at Abbasa for research, extension, training and fry production. The Center, under the Minister of Agriculture, will become the primary applied research, extension, and training institution for fish farming in Egypt and will be a major resource for the Near Eastern region.

### b. Research

The Center will conduct applied and adaptive research programs on production (including hatcheries, ponds, and breeding), handling and utilization, fish pathology and small farmer technologies. Research will be supervised by a research committee, with representation from each of the Center's divisions, to set research priorities and ensure that only applied and adaptive research is undertaken.

### c. Extension

The second major subcomponent of the Center will be the extension division, with programs in farm management (including farm budgeting and cooperatives), pond construction

and engineering, and production technology. The extension program will provide training for farmers and extension agents and operate a field station. It will also coordinate efforts to recruit small farmers for the second phase of production activities through a separate aquaculture promotion and small farmer assistance program.

Egypt does not at present have an extension capacity designed to serve the fish farming sector. Nor is it reasonable to expect the existing extension agents - already overburdened with field crops, livestock and fruit production - to promote fish farming effectively, even if they were given training. Consequently, the most appropriate course of action to meet the growing needs of the fish farming sector as a whole, encourage small farmer and village cooperative participation in fish farming, and provide for coordination between research and extension is to build an extension component into the National Center. Training will be an important element of the extension program. Six extension interns will receive formal and on-the-job training in extension work. Trainees will include graduates of local agricultural high schools, as well as college graduates and returning participants. Once trained, the extension workers will provide extension services to World Bank, FAO, GCE and private production farms as well as to the AID project area. At full operation, the Center will employ six extension agents in addition to the interns. It is expected that field stations will ultimately be established in several locations, to provide both research and extension services.

#### d. Hatcheries

Third, the Center will operate a production hatchery producing 6 - 10 million two-gram carp fry annually. This level of production will meet the needs of the proposed project at full production and produce up to four million fry for sale to other farms. The production hatchery/nursery will also include a mullet fry nursery with an annual capacity to produce 3 - 4 million two-gram mullet fry, from 1/5-gram fry transported from Al Mex.

#### Other Activities:

The Center will also have an administrative division, including library, printing and audiovisual programs serving both research and extension. As fish farming activities in other regions expand to a scale requiring local research and extension capacity, other regional centers will be set up under the direction of the National Center.

The project will undertake a number of activities to increase government capacity to supply carp and mullet fry to farmers. First, management of the existing carp hatchery at Serou will be improved and an artificial hatchery will be built to supplement the existing natural hatchery. This will result in an increase in annual fry production capacity from 1.5 million to 10 - 17 million fry.

Second, mullet fry collection techniques at Al-Mex will be improved and two new centers at Al-Gameel and Al-Gerby near Port Said will be built. At present, fry collection at Al-Mex near Alexandria provides the only legal source of mullet fry. The fry catch from this location has been diminishing in recent years due to worsening water pollution. Losses during transport are also exceptionally high due to poor handling. Correction of this problem together with the new facilities near Port Said will increase mullet fry availability to 50 - 70 million, sufficient to stock 14 - 20,000 feddans or ponds, if fry mortality is reduced to 50% from its current level of 80%.

Dependence on collection of naturally hatched fry exposes the fish farming industry to an undesirable degree of risk. Techniques have recently been developed to produce mullet fry in artificial hatcheries. A pilot production hatchery using this technology in Egypt would greatly assist the fish farming industry and would also generate interest in other mullet producing countries including Tunisia, Italy, Greece, Turkey, Iran and others. Artificial hatcheries to supplement collection of natural fry will be necessary if the planned expansion of fish farming is to take place. To meet these needs, the project will establish a mullet hatchery with an annual capacity of 6 million fry. Although desirable from an institutional viewpoint, neither Al-Mex nor the current mullet research center at Fayoum provides an appropriate site due to poor water quality. The proposed hatchery will therefore be located at Al-Gameel, or, if this is not feasible, near the Al-Gerby collection center at Ras Al-Barr. The mullet hatchery is planned for the fourth year of project activity, when the demand will outrun the supply of natural mullet fry. Demand for mullet fry will depend on the growth of fish farming; if expansion does not take place as planned, it may be desirable to further delay construction of the hatchery or consider eliminating it from the project.

Finally, the marketing network near the project area will be strengthened by the construction of a new fish market at Zagazig. This market, to be owned by the governorate, will rent storage and selling space to local entrepreneurs to cover its operating expenses. The facility has been soundly designed by Zagazig governorate authorities but funds have been unavailable to date. As the first

fish market in Egypt providing for adequate sanitary conditions the Zagazig market will serve as a model for future market facilities.

#### a. Participant Training

Efforts to upgrade Egypt's fish farming industry have been hampered by a lack of trained personnel in all fields and at all levels. Personnel available at present have frequently received a preparation that is too academic for the needs of the industry at this stage. Because aquaculture is a new field, training is not available in most aquaculture specialties, despite the generally high quality of Egyptian agricultural colleges. To counter this problem the project will provide long-term training for 45 participants. Both degree and non-degree programs will be provided. 30 participants will also receive a total of 140 mm of short-term training. Training will be provided in a range of specialties including pond engineering and fish farm management as well as in aquaculture and fisheries biology.

Participant training will be provided to the Master's level for 35 individuals and to the doctoral level for 10. The unusually high level of doctoral training is made necessary by the severe shortage of personnel capable of handling applied research in the area of fisheries. It is necessary to provide a substantial amount of advanced degree training in order to create a cadre of well-trained individuals who will be able to sustain the effort begun by the technical assistance team once the team departs. In all cases, participant programs will be designed to emphasize applied and adaptive research rather than pure research, which is not needed in this field at present. Where possible, participants in advanced degree programs will return to Egypt to conduct their thesis research at the National Center on an applied topic, under the supervision of contract staff or a visiting professor. The participant training component and the associated cost are discussed in Annexes 7-b and 13.

#### b. Production

The project will establish 5,000 feddans of production ponds in Sharkia and Ismailia Governorates. This area will produce a minimum of 4,000 tons of tilapia (70%), carp (20%) and mullet (10%), using a low-cost technology during the initial period.

The total of 5,000 feddans (5,200 acres) will be reached in two stages: (I) a homestead farm stage and (II) a small farmer stage.

During the first 3 years of the project, 1,200 feddans of swamp immediately adjacent to the National Center will be developed as 15-feddan homestead ponds. These will be distributed to recent agricultural graduates, with preference given to individuals from the area. The homesteaders will be selected by the Ministry of Agriculture using procedures similar to those employed in their other homestead programs. The farmers will assume control of their farms when they are nearly ready for stocking. Each farm will consist of two five-feddan ponds, plus five feddans for a homesite, storage, canals and roads, etc. A total of 80 such farms will be established in Stage I to create a model fish farming complex and provide a nucleus of progressive farmers upon which further fish farm expansion can build. These farms will serve an important demonstration function for the Stage II farms. This potential will be exploited through field days and through encouraging homestead farmers' contacts with their home villages.

Each homestead farmer will receive a loan to cover the cost of constructing the ponds, his expenses (including consumption) for the first two years, and the construction of a house. The farmer will receive most of these inputs, including the ponds themselves, fish fry and fertilizers, in kind rather than in cash. The loans will be provided through a revolving fund set up within the Agricultural Credit Bank. This Bank, currently attached to the Ministry of Agriculture, will offer 15-year loans at the market rate (8 - 9% at present) through its branch near Abbasa. These loans are discussed in more detail in the Economic Analysis.

As shown in Annex 12, the farmers will receive an annual income of over LE 1,200. This compares to a typical governmental salary of LE 1,000-600.

During the fourth and fifth years of the project, 3,800 additional feddans of ponds will be established. These Stage II production ponds will be a mixture of the following 4 types:

- a. Village cooperative farms: These farms will be operated on wasteland owned or rented by cooperatives at the village level. The typical size will be 25 feddans although small 10-feddan farms may also be established. These farms may have a higher proportion of tilapia and it is expected that most of their output will be consumed in the village. Financing will be provided from the project revolving loan fund through the Village Bank or the Village Council.
- b. Medium scale private farms: Local farmers and businessmen with access to suitable land will be encouraged to devote their land to aquaculture. Private aquaculture operations are expected to average 50 feddans in size and to produce for the commercial market. Several farms of this type are already in operation in the general project area.

c. Mixed operations: Small scale mixed poultry-fish culture operations have been highly successful in other developing countries, taking advantage of production complementarities. The center will adapt this technology to Egyptian conditions. This approach offers an opportunity to involve women in fish culture and increase the productivity of village flocks. The mixed operations will utilize existing small ponds where possible and are expected to average 5 feddans or less.

d. Additional homestead farms.

The final breakdown among these types will depend on land availability, the effectiveness of Center research and extension services, and other factors. It is expected that the 3,800 feddan areas will be achieved as follows:

<u>Type of farm</u>	<u>No. of farms</u>		<u>Area</u> Feddans	<u>%</u>
	Number	%		
homestead	60	33	900	24
village	70	39	1,750	46
medium-scale	20	11	1,000	26
mixed	<u>30</u>	17	<u>150</u>	04
	180		3,800	

It should be noted that the entire 5,000 feddan production area will be within the private sector. This is in contrast to the present fish farming industry, which is dominated by the public sector, and to the planned expansion of the fish farming sector, which will be approximately half private. The proposed project will also strengthen private sector fish farming by providing research and extension services, which have been unavailable to date.

#### II-E Inputs/Costs

~~The outputs~~ described above will require as inputs a combination of technical services, commodities, construction and other capital costs, funds for participant training, land, GOE salaries, and financial capital to establish the revolving credit fund. Total cost will be \$31.4 million, of which \$3.9 million, or 12%, will be contributed by the GOE. These costs are divided among the component outputs as follows (full details of these costs are provided in Section IV and Annex 7 ):

- a. National Committee for Aquaculture Development. The National Committee will require the equivalent of 2 senior personnel and 4 junior and support personnel, for a LOP cost to the GOE of LE 42,000 (\$58,800).. Approximately one-fifth of the team leader's time (\$30,000) will be spent with the National Committee during the first year of his tour. Projects such as the Zagazig Market funded through the Committee are costed below. Total cost is thus \$88,000.
- b. National Center. 25 person-years of long-term and 60 mm of short term technical assistance will be provided at various times throughout the project (cost: \$4.747 million). Construction of the Center will cost \$2.843 million (including GOE contribution) and commodities will cost \$2.164 million. GOE contributed staff will cost \$.352 million. Total cost is thus \$10.352 million.
- c. Other Supporting Institutions. The carp hatchery at Serov will cost \$542,000 (construction: \$182,000; commodities: \$224,000;(land and operations: \$77,000; and GOE staff: \$59,000). The mullet collection facilities (excluding assistance to Al-Mex, which is funded under the National Center) will cost \$435,000 (construction: \$118,000; commodities: \$157,000; (land and operation: \$78,000;) and GOE personnel: \$82,000). The mullet hatchery at Al-Gameel will cost \$2.278 million (construction: \$735,000; commodities: \$490,000; (land and operation: \$392,000; GOE salaries: \$31,000; and expatriate staff: \$310,000\*). The Zagazig market will require \$100,000.
- d. Participant Training: Long-term training, providing an average of 2.4 years of training for 45 individuals will cost \$1,963 million. Short-term training, averaging 4.6 months for 30 participants, will cost \$550,000. Total training costs are thus \$2.513 million.

\* Other donor funding may be available for this component.

- e. Production Farms: A total of \$5.0 million will be required to finance the revolving fund for the establishment of the 1,200 feddans of stage I homestead farms and the 3,800 feddans of small farmer, or stage II, production farms. The details of fund operation are dealt with in Section III-A.

The GOE will contribute the land for the stage I production farms, the Center, and the hatchery. The total 1,400 feddans may be conservatively estimated at \$1,372,000 in value (LE 700/feddan, or roughly one-tenth the value of good agricultural land).

#### Need for an Interim Specialist in Aquaculture

To expedite project implementation, an interim fish farming specialist will be hired on a Personal Service Contract as soon as possible after signing of the project agreement. He will serve as an advisor to the National Committee, assist in the final design to the Center and surrounding production area, and oversee the initial construction. It is important that the momentum created during the project design phase not be broken by the inevitable delay in obtaining the principal contractor. Over the past 13 months, an excellent working relationship has been developed between GOE personnel and AID design team members. The GOE has created a special position for the current Under-Secretary for Aquatic Resources as a consultant to the incoming Under-Secretary in large part so that he will be able to continue his work on the AID project.

Furthermore, the productivity of the project team would be greatly increased if a part of the planned facilities could be ready for use by the prime contractor team upon its arrival. A contract for the design of the Center and homestead production ponds will, therefore, be let to a local contractor prior to arrival of the contract team and construction will begin as soon as possible after completion of the design (A&E) work. This will mean that the technical assistance team will not have direct input into the overall physical layout of the Center. However, the alternative—that Center design be delayed until the team arrives—would in turn delay the start of research, extension, and production activities by a year at the very least. The interim specialist will work with the A&E and construction contractors to ensure the technical quality of the design and initial construction work. The technical assistance team leader will approve the final designs for the research and extension facilities prior to the initiation of construction work on these structures. Construction of the housing, center ponds and production ponds will proceed with the approval of the interim specialist. The Mission believes that an individual with the mix of skills necessary for this position will be available to serve in this position beginning shortly after the grant agreement is signed. Such an individual will be hired pursuant to the procedures outlined in Chapter 1.-3.-2 of Handbook 11 and would be likely

to come from either U.S. educational institutions (such as certain land-grant or sea-grant universities), from governmental organizations such as U.S. or state Fish and Wildlife Services, or from commercial organizations, particularly in the South and Southwest. It would be essential that such an individual have experience overseas in aquaculture development, preferably with AID or an AID-supported activity. It is believed that the potential of aquaculture in Egypt is such that one or more of these institutions would allow a staff member to participate through a personal services contract arrangement or that individuals would be interested in such a contract on a direct personal basis.

#### II-F Administrative/Management Responsibilities

The Ministry of Agriculture, principally the Sub-Ministry for Aquatic Resources, will administer the project. To the degree possible, the project will be executed through a host country contract (ECC). This will minimize the need for direct AID involvement in administration once the contractor is identified. Within this general framework, each facet of the project will be administered as follows:

a. The National Committee for Development of Aquaculture. The National Committee Group, chaired by the project director from the Sub-Ministry of Aquatic Resources, will receive assistance in strengthening its operations from the chief of the contract team. It will administer the funds in support of activities outside the National Center, either independently or through the Center according to the circumstances. The project director, working with the Committee, will be the principal contact for the AID project officer, the ECC team leader, and the interim fisheries specialist who will be brought on to manage the project until the ECC team arrives.

b. The National Fish Farming Center. The Center will be administered by Aquatic Resources and will be managed by a Director. Total Egyptian staff will number 67. U.S. contract staff will serve as advisors to the Director of the Center. The Center will have a research division and an extension division in addition to the central administrative functions and the hatchery.

Although the Center will be under the control of the Ministry of Agriculture, it is anticipated that it will contract for Institute of Fisheries (IOF) personnel in order to take advantage of the latter's research experience. It is expected that the IOF will play a substantial role in the operation of the Center. The Center will serve the Sharkia/ Ismailia area initially, providing service to the rest of the country as it reaches full operation.

See Annex 9 for an organization chart of the Center.

Other Institutions. Those institutions such as the Serow hatchery and Al-Mex collection center that are administered by the IOF will remain under the IOF, although it is expected that they will closely coordinate their work with the National Center through the National Committee. New institutions, such as the Al-Gameel and Al-Girby collection centers, will be under the control of the Ministry of Agriculture through the National Center.

Production Farms. The homestead farms in the area adjacent to the Center will be operated by the individual farmers with guidance from Center and project staff. The National Committee will be responsible for developing procedures and screening applicants. Farmers will be encouraged to form a private cooperative since fish farming operations can be conducted more efficiently if the farmers cooperate on scheduling, obtaining inputs, etc.

As part of the production activity, a revolving credit fund will be established in the Agricultural Credit Bank, which has a Village Bank branch near Abbasa. This fund, established through a grant to the Ministry of Agriculture for use by the Bank, will finance long term loans at the Bank's normal interest rate (approximately 8 percent). The Bank will receive a management fee to be negotiated of not more than two percent and the remainder will be recirculated through the fund to help maintain its real value. The revolving fund will finance the Stage II production farms as well. The loans will be available to village councils, cooperatives and individuals in the project area through the Village Banks. Because the Stage II production farms will be relatively heterogeneous and dispersed, it is expected that they will be more independent of central control than the Stage I farms.

Construction of Farms and Center. Project implementation will be greatly facilitated if construction can begin prior to signing of the HCC and arrival of the technical assistance team. This will not only maintain the project's forward momentum but will also increase the productivity of the technical assistance team in the initial period.

Consequently, the A&E work will be performed under a separate contract to be let as soon as possible after signing of the grant agreement. This work will be coordinated with the additional environmental analysis so that all requirements for proceeding with the full-scale construction and technical assistance work will be met as quickly as possible. The interim specialist will oversee the A&E work to ensure its technical quality. The construction sub-contractor will be selected as soon as possible after completion of the A&E work. He will begin construction under a contract supervised by the interim fisheries specialist in cooperation with the

Aquatic Resources project director if the HCC team leader has not arrived. Supervision of his work will devolve to the HCC team leader, through the Undersecretary for Aquatic resources, when he assumes his other duties.

Participant Training. Since it is desirable that participants should return from training while project technical staff are still in country, it is recommended that the first group of participants be selected as soon as the Project Agreement is signed. This group will therefore be selected and processed by AID in cooperation with the National Committee. Later groups will be selected by the National Committee in consultation with the team leader and the AID project manager. Administration will be the responsibility of the contractor.

Responsibilities of the Principal Contractor. The project will be executed primarily through a host country contractor, who will be responsible for all aspects of project development, including participant training and supervision of construction. It is expected that the team will consist of a team leader and five other long-term fisheries specialists, as well as approximately 60 person-months of short-term specialists. These positions and their responsibilities are described in more detail in Annex 14.

The central responsibility of the contractor is to assist the GOE in establishing the National Fish Farming Center and the 5,000 feddans of production ponds in Sharkia/Ismailia area. For this reason it is expected that the contract teams will live in Abbasa and housing will be constructed for their use. The team will also provide assistance to other GOE fisheries facilities, specifically Sercw and Al-Mex, and will be responsible for the new facilities at Al-Gameel and Al-Gerby. To the greatest extent possible consistent with their primary responsibilities, the contract team will provide technical assistance to other fish farming activities in Egypt, in particular the World Bank project.

### III. PROJECT ANALYSIS

#### III - A. Economic Feasibility

The economic analysis shows that the project as a whole is highly beneficial for the Egyptian economy. Considering the two components separately, it is clear that the production component is a commercial activity that can readily be measured by a simple profitability criterion. As discussed below, an analysis of the homestead farms shows them to be highly profitable with an IRR over 21 percent. (The small farmer units are expected to function in a manner quite similar to the homestead farms and, consequently, only the analysis of the latter is discussed in detail here.)

However, a different standard must be used to judge the institutional support component, including the National Center, the hatcheries, the fry collection centers, and participant training. Research and extension activities cannot be evaluated in terms of their commercial profitability, as they do not sell their services and the benefits they provide are received by the client rather than the organization providing the services. The benefits from research will depend on the success of future projects. Consequently, only a rough estimate of expected benefits can be made at this time. To make this estimate, the internal rate of return for the planned expansion of fish farming -- including the AID-sponsored, FAO and World Bank projects -- has been calculated as if it were one project, providing an indirect measure of the value of the Center and the project as a whole. This somewhat unusual procedure is appropriate here because the Center will be an integral part of the fish farming industry, providing research and extension services necessary to its expansion. The analysis of the project as a whole shows it to be highly beneficial, with a rate of return over 23 percent, as discussed below.

#### Summary of Analytical Results

Both the homestead farms and the revolving credit fund are financially viable. The homestead farms have an IRR of 21.3% over 20 years, given the assumptions discussed below. This high rate of return should be sufficient to attract and retain progressive farmers in the project. The cash flow analysis shows that, from the point where the farmer takes over the constructed ponds, the project generates a positive cash flow in each year, providing the farmer

with an income several times that he could earn in alternative employment (generally the public service).

These results, however, are quite sensitive to some variables. In particular, if construction costs rise from LE .30 to LE 1 per cubic meter, the IRR drops to 11.8. The project is still viable, however, as measured by the cash flow. Project profitability is also affected by the terms of the loan, especially the period over which it must be repaid and, to a lesser extent, by the interest rate.

Because of substantial economies of scale in pond construction, a larger unit provides a much higher rate of return. A farm of 30 feddans (twice the proposed 15), for example, has an IRR of well over 50%. To create farms of this size, however, would serve only to establish a privileged class of farmers, operating at a scale far beyond that attainable by the typical villager.

At present, the government subsidizes the production of carp fry and the collection of mullet fry. While this practice introduces distortion into the fish farming price structure, it is not significant, because fry are not a major cost component, even at the estimated free market price. Furthermore, subsidization of fry production is an established policy in Egypt, as elsewhere. The two carp hatcheries and the two mullet collection centers will be government-run and will sell fry to the farmers at the current subsidized prices. The necessary operating subsidy will be provided by the GOE. The mullet hatchery, combining the functions of research and fry production, will also require an operating subsidy, especially in the early years. Because of the research component, AID will share the cost of this subsidy.

In order to determine the desirability of the project as a whole from the point of view of the Egyptian economy, the IRR was calculated considering the entire expansion of the fish farming sector as a single project, as discussed above. This analysis demonstrates that the proposed project is highly beneficial to the Egyptian economy. Taken as a whole, the planned expansion of fish farming will provide a 23.5 percent rate of return over a 20-year time horizon.

#### Other Economic Considerations

a. Project growth rate. The total 1,200 feddan Stage I (homestead) area will be established over a two-

year period. Thereafter, Stage II farms will be established over three years at an increasing rate. At the end of five years, a total of 5,000 feddans, 2,100 in homesteads and 2,900 in small and medium-size farms, will be in operation. It is expected that the fish farms will not reach full production until the third year of operation.

b. Technology. Farmers will produce 70% tilapia, 20% carp and 10% mullet, using fertilizer and chicken manure as the primary inputs and leaving the fish in the ponds for a 9-month growing period (March - Nov.). The recommended technology is a simple, low-capital (i.e., "appropriate") technology that does not rely on imported feeds and produces small fish for consumption by the rural poor, as well as larger fish to ensure an adequate profit. Other, more intensive technologies involving the use of high-protein grain-based feeds have the potential to produce a substantially higher profit rate at current prices. However, the availability of these feeds to the small farmer on a timely basis is problematic at best. As the farmers gain experience and the distribution system improves, farmers will undoubtedly move to the more advanced technologies, including supplemental feeding, 2-year rotations, aeration, etc. These technologies are further discussed in Annex 15. The assumed input/output relationships may thus be viewed as conservative. Although the ponds will be designed for filling and draining by gravity, it may be desirable to pump water from one pond to another during harvest to conserve water. Thus, the cost of operating a pump has been included, although in most cases it will not be needed.

Price. The ponds will produce 1 MT/feddan of 70% tilapia, 20% carp, and 10% mullet. It is assumed that for political reasons 25% of the harvest, made up of the smaller tilapia plus 8% of the larger tilapia, must be sold at a low price through the Fish Marketing Company (FMC) or another government agency. The average price per ton may thus be computed as LE 458 as shown in Annex 15.

c. Input availability. The project is self-sufficient in fish fry. The principal inputs that must be obtained on the market are fertilizer (principally superphosphate), manure, and ice. Although fertilizer will be purchased by the farmers at the official price from the government (the only legal source), the higher free-market price has been used to be conservative. Chicken manure in sufficient quantities is available in the project area, although the farmers must collect it at the poultry farmers' convenience and store it until it is to be used. Two large commercial

livestock projects are planned for areas adjacent to the project area. These may provide an additional source of manure in later years if needed. Two private ice plants currently operate in Zagezig near the project site. A third plant to be operated by the government is in the planning stages. These plants will supply the amount of ice necessary for chilling and transporting the fish. In addition, two large AID-financed ice plants to be built in Ismailia and Mansoura could supply ice to the project area. It should be noted that the peak ice demand for fish harvest coincides with the winter low in ice demand for other purposes.

d. Credit. Credit will be provided through the revolving credit fund in the Agricultural Bank. The fund will make 15-year loans to fish farmers at the market interest rate, presently 8 percent. The bank will retain 1-2% as a management fee and the remaining interest will be recycled to help maintain the fund's real value. The 15-feddan homestead farms will require loans of LE 12,051 per farm in the first year to cover the purchase of the ponds and surrounding land and the first year's operating costs, and LE 2,560 in the second year (LE 803 and LE 171 per feddan respectively). The small farmer ponds will be constructed largely with the farmers' own labor and are expected to be somewhat simpler in design. The estimated cost per feddan of LE 800 for the first year (construction and operation) and LE 100 for the second year is thus a conservative estimate. Annex Table 12-a shows the operation of the fund for the first 7 years. The administration of the fund is dealt with further in Section III-D.

e. Labor availability. It is expected that each homestead farmer will employ one laborer on a full-time basis to supplement his own and his family's labor for the performance of the basic tasks required to operate the farms, including canal maintenance and security. Care of the ponds and initial harvesting will occur during the period from March to October and will be accomplished by this labor force. The final fish harvest occurring in late November and December is the heaviest user of labor, and will require the assistance of temporary laborers. This peak demand falls during the slack period in labor demand for agriculture when labor is freely available in the area. Some labor beyond that of the farmer and his permanent employee may also be required in January, February and March for pond preparation, filling and stocking, although this will be relatively minor and should pose no problems.

The seasonal nature of labor availability will also influence the selection of a technology for constructing the production

ponds. Construction of the initial 53 homestead farms to be completed in the first year would require a crew of over 2,400 persons if all work were to be accomplished by hand during the three months of highest labor availability, based on the assumption that each laborer could move 4 cubic meters per day. It is doubtful that a work force of this size could be assembled from the project area alone. However, the desirability of providing rural employment and the shortage in Egypt of heavy duty construction equipment suitable for working in swamps suggest that construction should be labor intensive.

f. Marketing. Present plans call for the entire output of the project to be marketed in the Sharkia/Ismailia area. Because of a persistent shortage of fish in the local markets, no problem is anticipated in absorbing the level of production envisaged. Zagazig, which is a major urban center of over 250,000, is quite close to the main project site. Other large cities including Ismailia, Port Said and Cairo itself provide potential markets for any overflow. The market to be constructed at Zagazig will include cold storage facilities, increasing the period during which fish produced can be held before sale.

The harvest will be spread over a six-month period, beginning in June and peaking in late November and December. Fifty percent of the fish will be harvested in the latter period. The long harvest period will facilitate marketing as well as increasing total production and providing the farmer with a steadier income flow than one-time harvesting. The farmer will generally harvest the fish with the assistance of family and hired labor. Some farmers may choose to contract the final harvest out to local entrepreneurs who will also transport the fish to market. Such services are available in the project area.

The fish produced will reach the final consumer through four channels, of which the private sector marketing network will be the most important. Private salesmen will collect the fish, already washed and iced during the harvesting process, and transport them to market. The output of the project can readily be handled by the present marketing network, which - furthermore - will be strengthened by the Zagazig market and the availability of technical assistance from the National Center. Direct sales to the consumer will provide the second channel. These are expected to be particularly important in the case of village producers. Third, on-farm consumption including in-kind payments to laborers will absorb a small but significant portion of the output and will be a primary channel by which fish reach the rural poor. Finally, a

portion of the output may be marketed by the Fish Marketing Company or governorate authorities. Such sales will include primarily smaller tilapi (less than 40 g.), which have low marketability through other channels. The private sector will be the predominant marketing mechanism and in no case will distribution through public channels exceed 25 percent of the total harvest.

g. Spread effects. The project will generate additional demand for machinery repair, transport, and marketing services. It will therefore increase the income and employment of those already providing these services as well as creating additional employment. The project will create opportunities for small scale enterprises in such industries as net making and repair, construction of crates and containers, and manufacture of small boats. The project will generate an additional rural income totalling LE 2.29 million, including both payments to suppliers of inputs and factor payments. Thus, assuming a multiplier of 3, this income can be expected to generate additional demand for consumer goods and services in the rural areas of over LE 6 million.

#### B. Social Soundness Analysis

The proposed project addresses important socio-economic concerns, including seasonal unemployment, protein-food shortages, and unemployment among recent graduates. It both attacks these problems directly and builds a base for the larger-scale programs planned for the future. Furthermore, social considerations have played an important part in project design.

Development of the fish farming industry and its support institutions face three major social problems:

- a. Fish pond culture is virtually unknown in Egypt. This presents an opportunity but it also poses a problem of acceptability. Egyptian farmers are not unusually risk-averse, when presented with a profitable undertaking, but they do require a concrete presentation of the costs and benefits to be expected.
- b. Fish farming to date has been confined to large private operations and even larger government farms. These operations have little relevance to the needs of small farmers and cannot serve as a model for them. Positive action is required to alter this course toward a more equal distribution of benefits.

c. Research efforts to date have been limited in scope and have tended to degenerate into provision of fry for production activities. Low and sporadic funding as well as administrative difficulties deserve part of the blame. An even greater problem is the difficulty of attracting high quality researchers to remote centers offering little chance for professional inter-action and where reinforcing contact with progressive farmers is nonexistent. A related problem is the lack of continuity once outside assistance ends.

The proposed project will attack these problems by building a base from which fish farming can more readily expand. The fish farming complex will include not only a research center provided with the technical expertise, equipment, and funds necessary to carry out significant applied research, but also a nucleus of progressive fish farmers in homestead farms around the center and an extension service to link the two. The extension service will also spread the research results to other area farmers established in the second production phase and to farmers involved in other aquaculture programs. The homestead farmers, themselves college-educated, will contribute to the formation of a progressive work environment and they will provide a continuing stimulus to encourage the researchers to address practical problems and to bring pressure for continued funding after the AID support has ended.

The center location provides ready access to three major agricultural universities and another aquaculture research center. This will help to combat the problem of isolation, which has proven damaging to other facilities.

The need for continuity has been recognized by the Ministry of Agriculture. This potential problem is countered by the long period of substantial expatriate technical assistance and the heavy amounts of participant training provided. Furthermore, the GOE has agreed to maintain the operating expenses at their full level for at least five years after AID assistance is completed.

The phase I homestead farms provide a method that is potentially very effective in demonstrating the desirability of fish farming on a scale that is appropriate for villages and private farmers. In selecting homesteaders, preference will be given to applicants from the project area and to those with farming experience. This will mean, first, that they will be more likely to stay once they are established. Second, it will provide the informal communication links to area farmers that are critical to recruiting participants

for the second phase of production farms. The demonstration potential of the homestead farms will be exploited through field days, the preparation of extension materials and informal contacts.

Several minor problems should be noted:

a. The capture of wild mullet for stocking has met some resistance from coastal fishermen who believe this practice reduces the natural stocks upon which their livelihood depends. Biological evidence on this issue is not available at present, although the environmental analyses now underway will examine this issue. The project itself addresses this concern in two ways. First, a research and extension project designed to reduce mullet fry mortality during collection and transport will, if successful, enable a much larger area to be served with the fry presently harvested. Second, project-sponsored construction of a production hatchery will remove the pressure on natural mullet fry sources.

b. Bullrushes from the marsh have in the past been used to make decorative mats for wall and floor coverings. As far as can be determined, the practice of this craft has been largely discontinued. Remaining marshland, in any case, would provide an adequate supply.

c. A royal duck-hunting facility once popular with tourists presently occupies part of the site for the National Fish Farming Center. Public use of this facility has all but ceased. A section of the shooting ponds will be converted to production and experimental ponds and the buildings will be put to constructive use by the station.

### III - C. Technical Feasibility

The basic technologies to be used in the fish hatcheries, nurseries, and production ponds are well known and have been used with success in numerous other developing countries. Many of them are currently being applied by private and state farms in Egypt, and similar practices are being used at the governorate farm adjacent to the project site. The only possible exception to this statement is the mullet hatchery, which will employ a technology developed in Hawaii. This technology will be applied here on a larger scale than has been used to date in Hawaii, where demand

for mullet fry will not support a production hatchery. All indications are that the chance of success is very high in this case, given the nearly ideal environmental conditions at Al Gaseel and the availability of top-quality technical expertise. A hatchery will ensure the supply of mullet fry for the project and serve as a pilot for future hatcheries. The development of artificial hatcheries is especially important since natural fry sources are highly vulnerable to industrial pollution and other ecological changes.

Two technical issues affecting project implementation deserve special attention:

1. Location. The proposed site at Abbasa is centrally located with respect to the probable areas of new fish farm development. It is near Cairo, and the soil and water characteristics of the site are excellent. Governorate officials are seriously interested in this new industry and a pilot scale experimental farm is operated on the site by the IOF under contract to the governorate.

The soils and water resources of the area surrounding the proposed Center site are ideally suited for aquaculture, as is discussed in detail in the feasibility report. The desirability of initially developing research, demonstration, training and production farms in one general area should be emphasized. During the developmental stages of this new industry close liaison between farmers and government support services will be essential. It is also desirable that early development take place in a location ideally suited to fish farming so that adaptation of existing technology to local conditions will be relatively easy.

Land suitable for agriculture should not be used for aquaculture under Egyptian conditions of severe land shortage. The proposed site for the Center and Stage I production farms is officially classified as swamp or marginal land. If it were to be made suitable for agriculture, the area would require draining and measures to counteract the high soil salinity, both of which would be extremely costly. The resulting farmland would still be of low productivity. Thus, the site is far better suited to fish farming than agriculture.

Available information indicates that several thousand feddans of land unsuitable or marginal for agriculture are available for aquaculture development in Sharkia and Ismailia Governorates, both in large tracts appropriate for private farms and in smaller marshes, ponds and lowlands near villages. 3,800 feddans of this land will be developed during the second phase of the project.

2. Intensity. A wide range of fish production levels can be achieved in a given area depending upon the level and type of inputs used. The three-species polyculture system used in Egypt will produce 200 to 300 kg/feddan without fertilization, feeding or supplemental inputs. Conversely, very high production levels (10 tone or more/feddan) are possible if inputs such as fertilizers, high quality feeds, water exchange, aeration, high stocking rates and frequent harvesting or transfer of fish are all used. As with a cattle feedlot operation, a high level of management capability and relatively low costs for major inputs are prerequisites for profitable operation at the highest production levels.

A great variety of intermediate-level production possibilities exists for varying levels of input combinations. These combinations cannot be completely evaluated for Egyptian conditions until an experimental pond complex is in operation. Nevertheless, estimations of production levels with various inputs can be made on the basis of production records in other countries. The members of the feasibility study team (see feasibility report, pp. 23 - 26) evaluated the present situation and recommended a level of inputs likely to produce an attractive margin of profit for fish farmers in Egypt considering input costs and management skills. The result of this analysis is the recommendation that moderately low stocking rates be used together with superphosphate fertilizers and small amounts of manures to insure maximum utilization of the natural productivity of ponds.

The most profitable level for these inputs will be determined through the applied pond culture research program at the Center. Although the recommended initial practices will be the use of manure and superphosphate fertilizers only, research may show that other practices are more profitable and appropriate for Egyptian conditions. For example, it may be worthwhile to add agricultural byproducts, feeds or other wastes at various times to increase production. The practices recommended by the feasibility team are expected to be profitable for Egyptian farmers and can be used until more efficient practices have been established. In any case, the level of production can be expected to increase continually as adaptive research on feeding levels, stocking rates and new species progresses and as the management skills of individual fish farmers improve.

Practices will, of course, change with changing economic conditions, land prices, demand for fish and prices of inputs. Specifically, the current low-intensity recommendation is based on the relative abundance of water and

suitable land compared to other inputs. If water becomes a binding constraint in the future or technologies are developed that make more currently-unproductive land suitable for agriculture, farmers should be encouraged to intensify production.

### III - D. Administrative feasibility

Three Egyptian organizations will participate in the administration of the project. The Sub-Ministry for Aquatic Resources within the Ministry of Agriculture will have overall responsibility, working with AID and the primary contractor. The Institute of Oceanography and Fisheries (IOF), a division of the Academy of Scientific Research and Technology, will be involved in the research operation and improvement of hatchery capacity. The Agricultural Credit Bank, at present a part of the Ministry of Agriculture, will administer the loan fund.

The project will increase the demand on the administrative capacity of these agencies, to some degree. This increase, however, represents a quantitative rather than a qualitative change. Each of the agencies has had considerable experience in managing similar programs. Furthermore, the creation of a National Committee for Aquaculture Development within the Ministry of Agriculture, and the long-term assistance provided by the contractor will contribute to achieving the necessary degree of coordination and administrative capacity.

Of the five principal project components, the National Center requires the highest input of administrative effort. The Center's goal (to establish a national capacity for research and extension) is complex and somewhat diffuse, rather than concrete and limited as in the case of the hatcheries, the collection centers and the market. Egypt's experience indicates the difficulty of maintaining the momentum in a research program, building links between research and service to farmers, and developing a research agenda that gives applied research the highest priority. These problems dictate that the Center be managed by the agency responsible for increasing aquaculture production, i.e., Aquatic Resources, rather than by an organization dedicated to research such as the IOF. The IOF's considerable expertise in research will be tapped through contracts between the Center and the IOF.

The IOF is currently the lead agency in Egyptian fisheries research. Production activities at Serov, Al-Mex and other research stations are carried out by the IOF in support of the activities of the Sub-Ministry for Aquatic Resources. An important aspect of the project

will be the expansion and strengthening of these operations, including their technical management and record-keeping functions. The new hatchery and collection facilities at Abbasa, Al-Gameel and Al-Garby (to be established) will be administered by Aquatic Resources directly, through the National Center.

On the production side, the administration of the fish farms will be the responsibility of the farmers themselves, working through private cooperatives. Coordination of several production operations by the farmers is critical to the success of the homestead farms in particular, since they are concentrated in one area served by a single network of canals and a single marketing network. Assistance in farm and cooperative management will be provided by the contract team.

The Agricultural Credit Bank, which will administer the revolving loan fund, has the capacity to handle the projected loan volume. The Bank was chosen as the vehicle for the loan fund over other credit institutions with more previous involvement in fisheries precisely because its standard of operating efficiency in recent years has been high. Its expertise in supplying critical inputs such as fertilizer will also contribute to the smooth functioning of the production operations. The heaviest loan volume will fall in the initial year of homestead operations, when roughly 50 loans will be made by one branch, the Village Bank in Abu Hammad. The loans will be standardized and Center personnel will assist the farmers in preparing documentation. Consequently, no serious administrative problems are anticipated in this phase.

The land to be utilized for the Stage I homestead farms is at present owned by the GOE, with title held by the Aw-qaf Ministry subject to disposition by the Governor of Sharkia. Construction of the ponds will be accomplished by a contract administered by the National Committee, which will hold title to the land during the construction period and will pay for the construction through grant funds. The cost of construction of the initial 1,200-feddan farm area is estimated at \$391,000. It is expected that title will pass from Aw-qaf to the Ministry of Agriculture at a nominal charge. Title to the land will pass to the Agricultural Bank once the ponds have been constructed. The land with the ponds and associated structures will thus form part of the \$5.040 million capital to be "paid in" to the revolving loan fund and will in effect serve as collateral for the farmers' loans. The Bank will, in turn, pass title to the individual farmers when the loans have been repaid.

### III - E Environmental Concerns

An increase in fish farming will affect the environment through several channels, and conversely, environmental concerns are an important element shaping project design. The principal areas to be considered with regard to this project are: a) the possibility of an increase in bilharzia, b) the reduction in area of natural wildlife habitats, and c) the impact of water quality and availability on fish farming in the project area.

Bilharzia. The principal environmental concern raised by the establishment of fish ponds is the potential for an increase in bilharzia (schistosomiasis). The expansion of irrigation systems associated with the construction of the Aswan High Dam has caused concern about the spread of this disease in Egypt. Bilharzia is at present endemic to the areas where fishponds will be built. However, ponds that are properly built and managed will have a minimum of the submerged vegetation needed by the snail vectors of the disease. Periodic drying of ponds will also limit the formation of permanent snail populations in the ponds, and salinity levels are high enough in some areas to exclude these snails. Proper sanitary facilities for farmers and laborers will also be provided. This is an important measure to break the parasite's life cycle. In light of these measures, it is doubtful that the construction of ponds will increase the incidence of bilharzia in development areas.

To further protect against this eventuality, a U.S. biologist and a GOE biologist will monitor snail populations in the ponds and canals at the center and surrounding fish farms, particularly the bilharzia vector snails *Bulinus* and *Biomphalaria*. This small but important activity will be conducted under the guidance of a U.S. malacologist who specializes in snail vector populations involving human schistosomes. Control experiments will be conducted so that appropriate measures can be taken if and when vector snail populations reach a critical point. Pesticide and herbicide concentration levels will be identified that will control the snails without affecting the fish or fish food organisms.

A GOE scientist from the Bilharzia Institute will monitor the incidence of schistosomiasis in those people engaged in

fish farming activities in the immediate area of the Abbasa Center. He will work closely with the Center biologists in preparing adequate methods to deal with any cases that are identified.

Wildlife Habitats. The project will utilize wasteland near Abbasa. Part of this area is marshland serving as a habitat for migratory waterfowl and other wildlife, and is used as a duck-shooting facility. While the area of swamp will be reduced by the project, at least half of the duck-shooting area will remain in its present state. Consequently, it is not believed that the impact on wildlife will be substantial. Furthermore, migratory and other wildlife may use the fish ponds to some degree for resting and feeding. The elimination of the swamp as a breeding ground for undesirable insects and other pests should be viewed as a positive environmental impact.

Water Quality and Availability. Fish pond culture is a heavy user of water. The water used for fish cultures must be free of pesticides and other pollutants to avoid damage to fish and risk to consumers. For this reason, drainage water can only be used for fish ponds if water quality is carefully monitored. Consequently, irrigation water will be used as the primary source of water. The extremely low concentrations of pollutants in the irrigation water do not pose a danger to fish or human consumers.

The peak period in water demand for fish ponds falls during February. At this time, water demand for irrigation is generally high because of the forced hiatus in irrigation during the cleaning of the canals in January. The Abbasa area, however, is adjacent to the main Ismailia sweet-water canal, which is filled year round. If water supply proves a problem in other areas of Sharkia, ponds may be filled in December, drainage water may be used (if it is of acceptable quality), or water conservation measures may be taken in pond management.

Discharge water from ponds will be rich in nutrients. Addition of this enrichment to receiving lakes and the sea will slightly increase the productivity in receiving waters. Increased productivity in these waters, as long as it is not excessive, should be regarded as a positive influence, increasing natural fish harvests. Pesticides and herbicides will not be used in the fish rearing procedures presently contemplated except in the control of snails.

Other concerns. The ponds will not create a breeding ground for undesirable insects. Mosquito-breeding habitats will be

eliminated by the control of aquatic weeds and the stocking of fish that eat the immature stages of the mosquitoes.

Some concern has been expressed that impounding water in ponds would further charge the water table in surrounding lands where the water table is already too high, but this is not expected to be a problem. The tight nature of the soils in the areas deemed suitable for fishpond development will minimize seepage losses. Pond drainage canals will restrict the movement of water from the pond area through the soil and, in fact, may provide better drainage and lower water tables from the levels now existing in project areas.

Additional Environmental Analysis. The project design reflects the mission's concern with possible environmental impact and incorporates a high-level of environmental monitoring. Nevertheless it is apparent that there are a number of environmental concerns which, although they are not expected to have a negative impact on the human population, would have an impact on certain aspects of the project itself and which must be taken into consideration in final engineering design. This study will begin immediately, using project design funds, so that any necessary changes can be incorporated into the final engineering designs without delaying project implementation. It is proposed that the study be carried out through an AID "requirements contractor." Roughly 10 person-months will be required for the study. It is further proposed that the project be approved prior to completion of these environmental analyses with the stipulation that the final engineering design should incorporate the study's findings.

The results of both the environmental analyses and the A&E work will be presented at the time the request for the second incremental authorization, to finance construction, is made.

#### IV. FINANCIAL PLAN

##### IV - A. Source of Funds

It is recommended that the full amount required - \$27,500,000 - be provided as a grant. Of this amount, \$13,200,000 (48%) will be dollar cost and \$14,300,000 (52%) will be local currency cost. It is recommended that the pounds required be dollar-funded due to the projected shortage of excess currency.

The GOE will provide the land for the National Center and homestead farms, staff salaries, Egyptian staff housing and part of the operating expenses. The value of their contribution will total \$3,900,000 (all local currency), 12.4% of the project cost. Total project costs are thus \$31,400,000.

In evaluating the GOE contribution, which is somewhat smaller than it has been in other projects, it should be recognized that this project is only one among several in the fish farming sector. The GOE is contributing substantially to these efforts, including the World Bank and FAO-assisted projects as well as several projects that the GOE is financing wholly on its own. Viewed in this context, it is clear that the GOE has made a substantial commitment to fish farm development and that the relatively small GOE contribution is therefore appropriate in this instance.

IV - B. Application of funds

As described in Section II-D (Inputs), the project will cost a total of \$31,400,000. This cost is itemized in detail in Table IV-C-2. The breakdown of this cost by project component may be summarized as follows:

<u>Component</u>	<u>Cost</u> <u>(\$ 000)</u>	<u>% of total</u>
National Committee	88	.4
National Center	10,352	46.3
Serow Carp Hatchery	542	2.4
Mullet Collection Facilities	435	1.9
Mullet Hatchery	1,958	8.8
Zagazig Market	100	.4
Participant Training	2,513	11.2
Production Farms	6,216	27.8
Other	151	.8
	<hr/>	<hr/>
Subtotal	22,355	100
Inflation & Contingency	<u>9,044</u>	40.5
Total	31,400 <sup>1/</sup>	

1/ Minor discrepancies in this and succeeding tables due to rounding errors.

TABLE: IV-C-1  
Summary Cost Estimate & Financial Plan  
(\$ 000 )

Source Use	AID		GOE
	\$	LE	LE
<b>A. By output</b>			
1. National Committee	23	7	58
2. National Fish Farming Center	5,961	3,612	779
3. Other Supporting Institutions	1,198	1,179	658
a. Serow Carp Hatchery	223	195	124
b. Mullet Collection Centers	156	133	146
c. Mullet Hatchery	769	801	388
d. Zagazig Market	50	50	-
4. Participant Training	2,104	203	204
a. Long term	1,670	107	184
b. Short term	434	96	20
5. Production Farms	-	5,040	1,176
6. Other	88	63	-
<u>Total</u>	<u>9,374</u>	<u>10,104</u>	<u>2,875</u>
<b>B. By input</b>			
1. Technical Assistance	4,138	1,100	-
2. Construction and A&E	332	3,443	203
3. Commodities	2,773	262	-
4. Land	-	-	1,768
5. GOE Salaries	-	-	582
6. Operating Expenses	27	56	118
7. Participant Training	2,104	203	204
8. Revolving Credit Fund	-	5,040	-
<u>Total</u>	<u>9,374</u>	<u>10,104</u>	<u>2,875</u>
Inflation (10%/yr.)	2,423	2,668	601
Contingency (15%)	<u>1,406</u>	<u>1,516</u>	<u>431</u>
<u>Total</u>	<u>13,203</u>	<u>14,288</u>	<u>3,907</u>

TABLE IV-C-2  
 Costing of Project Outputs/Inputs

	Cost (\$ 000)		
	U.S.	GOE	TOTAL
1. National Working Group	<u>30</u>	<u>58</u>	<u>88</u>
Technical Assistance			
(2.4 mm @ \$ 12,500)	30		
GOE staff		58	
2. National Center	<u>9573</u>	<u>779</u>	<u>10352</u>
(Including carp hatchery)			
Technical Assistance	4747		
Long-term (300 mm)	(3820)		
Short-term (60 mm)	( 927)		
Architecture & Engineering	216		
Construction	2424	203	2843
Commodities	2164		
Land (200 fed. @ \$ 980/f)		196	
Operation	22	28	50
GOE staff (4.5 year period)		352	
3. Other supporting institutions	<u>2377</u>	<u>658</u>	<u>3035</u>
a. Carp Hatchery Serow	<u>418</u>	<u>124</u>	<u>542</u>
Architecture & Engineering	18		
Construction	164		
Commodities	224		
Operations	12	23	35
Land (30 fed. @ \$ 1400/f)		42	
GOE staff (3.75 year period)		59	
b. Mullet collection facilities (2)	<u>289</u>	<u>146</u>	<u>435</u>
Construction	118		
Commodities	157		
Operations	14	32	46
GOE staff (2.75 & 3.75 year period)		82	
Land (2 feddans @ \$ 16,100)		32	
c. Mullet Hatchery	<u>1570</u>	<u>388</u>	<u>1958</u>
Construction	735		
Commodities	490		
Operations	35	35	70
GOE staff (2 year period)		31	
Technical Assistance	310		
Land (20 Feddans @ \$ 16,100)		322	
d. Zagazig Market	<u>100</u>		<u>100</u>
4. Participant Training	<u>2307</u>	<u>204</u>	<u>2511</u>
Long-term (110 person-years)	1779	184	1963
Short-term (140 person-months)	530	20	550

	Cost (\$ 000)		
	U.S.	GOE	TOTAL
5. Production Farms	<u>5040</u>	<u>1176</u>	<u>6216</u>
Credit Fund	5040		
Land (1200 feddans@ \$980/f)		1176	
6. Other	<u>151</u>		<u>151</u>
Land Survey	14		
Interim Specialise	137		
Total:	19478	2875	22353

Note: Contingency and inflation  
not included

Table IV-C-3  
Projection of Expenditures by Fiscal Year

	FY 78	FY 79	FY 80	FY 81	FY 82	FY 83	TOTAL	
	AID	GOE						
1. <u>National Committee</u>								
<u>Technical Assistance</u>	3	30	11	11	11	11	30	58
GOE Staff	3	30	11	11	11	11	-	58
2. <u>National Center</u>								
(including carp hatchery)	216	3480	438	2993	81	1160	84	929
<u>Technical assistance</u>		809		1063		1154		926
Long-term (300 mm)		(610)		(865)		(910)		(760)
Short-term (60 mm)		(199)		(198)		(144)		(166)
<u>Architecture &amp; Engineering</u>	216							
Construction		1368	203	1056				
Commodities		1290		866				
Land (200 fed. @ \$ 980/r)			196					
Operation		5	8	3	6	6	3	8
GOE staff			39	78	78	78	78	78
3. <u>Other supporting institutions</u>	18	355	58	347	39	1306	371	181
a. <u>Carp Hatchery Serow</u>	18	185	42	208	12	5	21	2
Architecture & Engineering	18							
Construction		73		91				
Commodities		112		112				
Operations			5	1	5	5	2	7
Land (30 fed. @ \$1400/r)			42					
GOE staff				11		16		16
b. <u>Mullet collection</u>								
<u>facilities (2)</u>		70	16	139	27	76	28	4
Construction (incl. A&E)		30		58		30		
Commodities		40		77		40		
Operations			4	1	6	6	4	11
GOE staff				10		22		25
Land (2 feddans @ \$ 16,100)			16		16			

Table IV-C-3 (Continued)

	FY AID	78 GOE	FY AID	79 GOE	FY AID	80 GOE	FY AID	81 GOE	FY AID	82 GOE	FY AID	83 GOE	TOTAL AID	TOTAL GOF
c. <u>Mullet Hatchery</u>							1225	322	175	30	170	16	1570	388
Construction (incl. A&E)							735						735	
Commodities							490						490	
Operations									15	15	20	20	35	35
GOE staff										15		16		31
Technical Assistance									160		150		310	
Land (20 feddans @ \$ 16,100)								322						322
d. <u>Zagazig Market</u>													100	
4. <u>Participant Training</u>			700	67	760	66	847	70					2307	204
Long-term (110 person-years)			613	64	582	60	582	60					1777	184
Short-term (140 person-months)			87	3	178	6	265	10					530	20
5. <u>Production Farms</u>			2800	1176					455		1785		5040	1176
Credit Fund			2800						455		1785		5040	
Land (1200 feddans @ \$980/r)				1176										1176
6. <u>Other</u>	139		12										151	
Land Survey	14												14	
Interim Specialist	125		12										137	
Sub-total	373	3	7377	1750	4100	197	3313	536	1565	186	2750	200	19478	2875
Inflation	-	-	738	175	861	41	1094	177	720	86	1677	122	5091	601
Contingency	56	-	1107	262	615	30	497	80	235	29	412	30	2922	431
<u>Total</u>	429	3	9222	2187	5576	268	4904	793	2520	301	4839	352	27491	3907

TABLE IV-C-4  
Schedule of obligations (\$'000)

	FY 78	FY 79	FY 80	FY 81	FY 82	Total						
	\$ LE	\$ LE	\$ LE	\$ LE	\$ LE							
1. National Committee	23	7				23 7						
Technical Assistance (2.4 mm @ \$ 12,500)												
2. National Center (including carp hatchery)	1162	395	2955	2757	834	210	691	172	318	79	5961	3612
Technical Assistance	1054	287	881	227	832	207	691	171	318	79		
A & E	108	108										
Construction			121	2303								
Commodities			1947	217								
Operation			6	10	2	3		1				
3. Other supporting institution	-	18	601	652	375	435	154	56	68	18	1198	1179
a. Carp Hatchery Serow	-	18	222	173	1	3		1			223	195
A & E		18										
Construction			9	155								
Commodities			212	12								
Operations			1	6	1	3		1				
b. Mullet collection facilities			77	67	59	50	20	16			156	133
Construction			3	56	3	42	1	13				
Commodities			74	4	56	3	19	1				
Operations				7		5		2				
c. Mullet hatchery			252	362	315	382	134	39	68	18	769	801
Construction			19	349	18	349						
Commodities			233	13	232	12						
Operations					3	4	9	9	5	5		
Technical Assistance					62	17	125	30	63	13		
d. Zagazig Market			50	50							50	50
4. Participants	994	87	728	75	382	41					2104	203
5. Production Farms (Credit fund)				2800		227		1120		893		5040
6. Other	88	63									88	63
Land Survey		14										
Interim specialist	88	49										
Subtotal	2267	570	4284	6284	1591	913	845	1348	386	990	9374	10104
Contingency	340	85	643	943	239	137	127	202	58	148	1406	1516
Inflation	209	37	949	915	584	345	446	768	235	603	2423	2668
Total	2816	692	5876	8142	2414	1395	1418	2318	679	1741	13203	14288
Total	3508		14018		3809		3736		2420		27491	
Obligation required (million)	3,508		14,000		3,800		3,700		2,500		27,500	

## V. Implementation Plan

The project will be carried out over a five-year period. Implementation of the principal project components will be phased in over the first three years of the project, so that there is no sharp increase in the demands placed on the administrative capabilities of the GOE. Project phasing will also bring facilities on stream only as they are needed and will allow project managers to adjust the scheduling during implementation to bring a component forward, delay it or, if appropriate, cancel it. Consequently, project implementation will consist of the following three steps:

1. Actions to be Taken Prior to Signing the Grant Agreement. In order to provide additional information on certain environmental concerns which may have an effect on final design requirements, it will be necessary to bring a contractor to Egypt to begin an environmental study prior to signing the grant agreement. This study, estimated to require a total of 10 person-months, will begin immediately, using an IQC, so that the initial results are available as soon as possible for incorporation in the final engineering design. During this period contracting procedures will begin for A&E firms to develop this design, for the interim specialist and for the prime contractor. An attempt will be made to identify minority and small business firms appropriate for this contract during prequalifications. The necessary Congressional Notifications will also be submitted during this period, following Washington review.
2. Actions in the Current Fiscal Year. Activity in FY 78 will be limited to beginning the A&E work and providing technical assistance. It is expected that the A&E work will be performed by an American firm or by an Egyptian firm with assistance from a U.S. requirements contractor. The interim fisheries specialist will begin work during this period to assist the National Committee for Aquaculture Development in its start-up operations. Selection of the prime contractor will also proceed to the issuing of the RFP and construction firms will be prequalified as soon as the A&E has sufficiently progressed.
3. Implementation of Principal Project Components. Once environmental and engineering work is completed, full project implementation will proceed. It is expected that these conditions will be met by early 1979, at which time the FY 79 authorization, including construction funds, will be requested. Once these funds are authorized, the project will proceed as follows:

a. FY 1979. A&E work for the National Center and other principal facilities will be completed early in the fiscal year and construction will begin. The prime contract will be let in February or March, allowing the team leader to begin work in March or April. Research and extension work will begin at the Center during the latter part of FY 79.

b. FY 1980. By December 1979, construction will be completed on the National Center's main facilities (including contract teams' housing), the second hatchery and 500-800 faddans of production ponds. The first 50 homesteaders will be selected and enter training in late 1979, so that their farms can be stocked in March '80. They will complete their first harvest in December '80, although production will not reach its full level for these farmers until 1982. They are expected to operate at 60% efficiency in 1980 and 80% in 1981. FY 1980 will also see the beginning of mullet fry collection at Al-Gameel and the departures of the first group of participants.

c. FY 1981. By the end of FY 1981, all construction of support facilities will be completed. The Phase I production areas will be fully operative and Phase II sites will have been identified. The emphasis during this period will be on bringing all of the support institutions up to their full operating levels and on initiating the small farmer production program with the beginning of construction in 15 villages and 20 private farms.

d. FY 1982. The operation of the support institutions will be further strengthened during this period by the technical assistance team. The first group of small farmer production units will begin production and the final capital tranche will be paid into the revolving fund.

e. FY 1983. During this period, the technical assistance team and the AID support will wind down. Activities such as the mullet hatchery will seek other donor funding if needed, and the GOE will be fully responsible for all operating expenses. The full 5,000 faddans of production farms will be in operation, although the final group of small farmer and private farms will not be stocked until 1984. The final evaluation will be carried out during this period. The farms established in this period will reach their full operating levels in 1986, utilizing the output of the mullet hatchery, which will reach full production in 1985.

The following table summarizes the schedule for implementation, which is shown in detail in Annex 11.

TABLE: V-1Summary of Implementation Schedule

	<u>Est. Date</u>	<u>Completion Project Months</u>
1. Contracting and Preliminary Work		
Prog signed	8/78	1
Interim specialist arrives	9/78	2
A&E work completed	3/79	3
HCC let	3/79	8
Team leader arrives	4/79	9
2. Construction		
Construction contracting process begins	4/79	9
U.S. Housing completed (Center)	8/79	13
Center hatchery completed	10/79	15
Research & extension facilities completed	12/79	17
All Center facilities completed	5/80	22
Stage I production ponds completed	12/80	29
Zagazig market completed	9/79	14
Serow hatchery completed	12/79	17
Al-Gamsel Collection Station completed	2/80	19
Al-Gerby Collection Station completed	2/81	31
Mullet Hatchery completed	10/81	39
3. National Working Group		
Agenda and regulations adopted	7/78	0
National plan approved	11/79	16
4. National Center		
Director named and Center established	1/79	6
First participants begin study	12/79	17
Applied research begins	7/79	12
Extension program in operation locally	2/80	19
Small farmer technology developed	1/82	42

	<u>Est. Date</u>	<u>Completion Project Months</u>
5. Other supporting institutions		
Serow fry production reaches 10 million/yr.	5/82	46
First fry collection at Al-Gameel Collection Station	3/80	20
First fry collection at Al-Gerby Collection Station	3/81	32
Research begins at mullet hatchery	10/81	39
First production crop of mullet fry hatched	3/83	56
Mullet hatchery reaches full production	3/85	80
6. Production component		
Loan fund established	10/79	15
Initial 50 farmers recruited and trained	1/80	18
Initial harvest completed on 800 faddans	12/80	29
1,200 faddan area in full operation	12/83	65
Potential stage II sites identified	9/80	26
15 village farms and 20 private farms established (750 faddans)	9/81	38
30 village farms and 30 private farms established (1,250 faddans)	9/82	50
50 village farms and 31 private farms established (1,800 faddans)	9/83	62
5,000 faddans reach full operation	12/86	101

## VI. EVALUATION ARRANGEMENTS

It is recommended that three evaluations be conducted at two-year intervals starting after the first year of the project. Because the three components of this project -- the National Center, the phase 1 (homestead) production and the phase 2 (small farmer) production -- are distinct as to purpose and structure, the evaluators must consider each separately. The overall "success" of the project requires that each component perform roughly as planned. However, each component can succeed or fail on its own.

First evaluation (month 12): At this time a brief evaluation should be conducted to verify that the project is on schedule and within cost estimates, and to identify any problems that could hinder the later phases. The evaluation should determine whether the Center has been constructed and staffed, whether a substantial portion (greater than 50 percent) of the 1,200-feddan homestead site is ready for the farmers, whether farmers have been identified and the revolving fund set up, etc. This is essentially a routine progress check and can be performed by Mission personnel. It will require 1-2 person-weeks.

Second evaluation (month 36): At this time stage 1 production should be well established, the center should be operational and plans for stage 2 production should be prepared. It is recommended that a 3-person TDY team be sent from AID/W for 1 month to evaluate:

- a) the Center (is research underway? Are extension services being provided? Are short courses being offered?);
- b) the homestead farms (are all farms operational? Are farms profitable? Are farmers dropping out or defaulting on loans?); and
- c) plans for the small farmer production stage.

This evaluation will meet the AID requirement for in-depth evaluation prior to funding beyond the third year.

Third evaluation (month 60): The final evaluation should re-examine the issues considered in the second evaluation. In addition, it should pay special attention to the progress of the small farmer production (in particular the success in reaching low-income farmers) and the prospects for the long-term viability of the Center. Evaluators should also determine where returned participants are working. The evaluation should include an overall determination of project success or failure and develop recommendations on the creation of future national research and extension centers,

in Egypt or elsewhere. It is recommended that a 2-person team be provided on TDY from AID/W for a 1-month period to conduct this evaluation.

In order to lay the groundwork for conducting meaningful evaluations, it will be necessary to obtain baseline social and economic data for the areas involved. The collection of this data will be performed by the National Center as part of its extension function. It will be the responsibility of the contractor to ensure that adequate data is collected, both social and economic, to allow later evaluators to determine the results of the project.

Although it is beyond the scope of the project paper, it should be noted that a fourth evaluation at least two years after project completion would be highly desirable. Information on the progress of the Center after AID funds cease and the long-term viability of the production activities would be highly useful for future project design. It is estimated that such a study, if desired, would require approximately 6 person-months, requiring an allocation from PD&S funds of roughly \$60,000.

The conditions precedent and covenants of the grant agreement will incorporate the substance of the following:

Conditions Precedent

In order to permit the project to be implemented as quickly as possible and with the desired degree of AID oversight, it is recommended that the conditions precedent be established in three phases, as follows:

1. Initial Disbursement. Disbursement for the interim fisheries specialist, the A&E work and the first group of participants will require a minimum set of conditions precedent. These will include: a) the designation of an official of appropriate rank within the Ministry of Agriculture as the project director b) the presentation of specimen signatures and a list of authorized representatives (4.1(b) of the standard provisions), and c) evidence of the delegation of responsibilities for the project to the National Committee for Aquaculture Development and the nomination of all of its legally-required members. These conditions must be met within 60 days of signing the grant agreement.

2. Construction and Operation of Supporting Institutions and Stage I Production. Conditions precedent to disbursement for these activities will include the following:

a) Construction of the National Center and other facilities will require evidence of the execution of contracts for construction, commodities and technical services as appropriate, evidence that the A&E designs are acceptable to AID, meet all legal requirements and are responsive to the findings of the Environmental Assessment, evidence that the land required for the facilities is available free and clear through title or long-term lease, and evidence that the GCE has allocated the staff and budget required for the first year's operations (and subsequently for subsequent years). No time-limit will be set for meeting these conditions. However, the implementation schedule as planned would require these conditions to be met by early 1979.

b) Disbursement for construction of Stage I farms will require evidence of availability of at least 800 feddans, under title or long-term lease, for this purpose, evidence that the Agricultural Bank or other suitable agency agrees to act as the administrator for the revolving fund (subject to finalization of its procedures) and evidence of the availability of irrigation water in sufficient quantities free of charge.

c) Establishment of the revolving fund will require AID approval of operating procedures, including the terms of the loans, collateral required and accountability; evidence that these procedures conform to the laws of the ARE, and AID approval of the procedures for selecting homestead farmers.

d) Disbursement for technical services, including the prime contract, will require evidence of execution of contracts with a firm acceptable to AID.

3. Stage II Production. The disbursement of funds for the second and third tranches of the revolving fund will require a) evidence that baseline socio-economic data for the project area has been gathered, and b) AID approval of the procedures for operation of the fund.

#### Covenants

The covenants of the grant agreement will include the following in addition to the standard grant covenants:

- 1) The private sector will be the preferred means of distribution for fish produced on the production farms. ~~In no case will fish distribution through~~..... In the event that it is considered desirable to depart from this means of distribution, the GOE and A.I.D. will consult prior to implementation of such a change.
- 2) Revenues from the Zagazig market will be received directly by Sharkia Governorate or other governmental organization operating the market. Rental charged will be sufficient to defray operating expenses. Fish sellers currently in business will be given preference in allocating space to vendors.
- 3) AID or its agents may conduct such evaluations as it deems appropriate both before and after the completion of assistance. These evaluations will include measurements of social and economic baseline data for the project area, collected during the first two years of project implementation.

#### Negotiating Status

The GOE has cooperated fully in the design of this project, which is in response to a request for assistance from the Ministry of Agriculture. The GOE has expressed its agreement with the project design as described in the paper and no difficulty is anticipated in obtaining a grant agreement following formal AID approval.

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

Life of Project: \_\_\_\_\_  
From FY \_\_\_\_\_ to FY \_\_\_\_\_  
Total U.S. Funding \_\_\_\_\_  
Date Prepared \_\_\_\_\_

Project Title & Number: Aquaculture Development - 263-0064

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program or Sector Goal: The broad objective to which this project contributes: Increase availability of high quality protein foods.</p>	<p>Measure of Goal Achievement: Total supply of fish in Egypt increases at a rate greater than population growth and an increasing percentage is supplied by pond culture rather than imports.</p>	<p>Ministry of Agriculture estimates, Ministry of Trade reports.</p>	<p>Assumptions for achieving goal target: Increased domestic fish production leads to increased availability of fish (i.e., does not simply displace imports). Land and other inputs used for fish culture are not usable for other agricultural production.</p>
<p>Project Purpose: To provide the capability for sustained development of the fish farming industry on an economic basis through improved institutions for planning and coordination, applied research, training, and extension.  To increase fish production by 4,000 tons per year by 1986.</p>	<p>Conditions that will indicate purpose has been achieved: End of project survey. Average production at 1 MT/fed. Research operation staffed, conducting ten applied research projects and capable of serving national needs. 5000 feddans of fish farms with production in Sharkia of 4000 MT/yr. Improved services to farmers, 200% increase in fry supply, operating extension program in four governorates. Realistic national plan approved by Cabinet.</p>	<p>National Center records Agricultural Bank records Visual Observation Zagazig Market records</p>	<p>Assumptions for achieving purpose: National Work Group is effective coordination mechanism. Center stimulates pond construction and provides service throughout Delta/Fayoum. Most trainees remain active in Egypt aquaculture. Sufficient suitable candidates available for training.</p>
<p>Outputs: Establish National Aquaculture Working Group. Establish National Fish Farming Center at Abbasa. Establish 1,200 feddan model fish farming operation in Abbasa. Promote fish production on an additional 3,800 feddans by 1983. Train 45 Aquaculturists.  Inputs (see section IV for detailed input breakdown) TEAID: Technical Assistance Grant funds Participant training  GOE: Personnel (Insharia) 1,400 feddan site in Abbasa. Operating expenses Housing for GOE personnel</p>	<p>Output 1: National plan approved at cabinet level by Jan. 1982. 1 National Center with fully-staffed research, extension and hatchery divisions in operation by 1983. Working group meets at least once per month. 2,100 feddans of homesteads, 1900 feddans of village farms and 1000 feddans of private farm established in Sharkia and Ismailia by 1984. At least 85% of homesteaders still operating their farms in 1984. b. Demonstration Farm (Type and Quantity) 30  US-trained aquaculturists working in Egyptian fish farming sector in 1986  See Section IV)</p>	<p>National Committee and National Center records Project records Visual Observation Agricultural Bank records  Project records.</p>	<p>Assumptions for achieving outputs: GOE nominates Working Group members and initiates activity. 80 agriculture grads identified for training as homesteaders. Market remains strong for fish. Only minor adaptive research needed for successful fish farming in Egypt. A high level of interest can be generated in fish farming among Egyptian farmers. Experiment station approach will be effective in Egypt.  Assumptions for providing inputs: Site is made available by Ministry of Waqfa. Governorate of Sharkia maintains support.</p>

Part I	ANNEX 2		
AID HANDBOOK: 3, App 5C	TRANS. MEMO NO. 3:19	EFFECTIVE DATE February 15, 1978	PAGE NO. 5C(2)-1

FORM - 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 sub-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?

**A. GENERAL CRITERIA FOR PROJECT.**

1. App. Unnumbered; FAA Sec. 603(b)

(a) Describe how Committees on Appropriations of Senate and House have been or will be notified concerning the project;

(b) Is assistance within (fiscal/annual Year Budget) country or international organization allocation reported to Congress (or not more than \$1 million over that figure plus 10%)?

(a) Congressional Notification will be submitted following Washington approval.  
(b) Congressional Notification will be issued and will be completed prior to obligation of any funds for construction.
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?
 

a) Yes (financial and engineering study)  
b) 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?
 

None required
4. FAA Sec. 611(b); App. Sec. 101. If for water or water-related land resource construction, has project met the standards and criteria as per Memorandum of the President dated Sept. 5, 1973 (replaces Memorandum of May 15, 1962; see Fed. Register, Vol 38, No. 174, Part III, Sept. 10, 1973)?
 

Yes. Cost benefit study was performed.
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?
 

Yes

PROJECT NO. 50107-01	EFFECTIVE DATE February 15, 1973	TRANS. REF. NO. 3119	AID HANDBOOK 3, App. 5C
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6. FAA Sec. 609, 619. Is project susceptible of execution as part of regional or multi-lateral 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 multi-lateral organizations or plans to the maximum extent appropriate?
7. FAA Sec. 601(a); (and Sec. 201(f) for development loans). Information and conclusions whether project: (1) 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.
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. 633(n). 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.
10. FAA Sec. 612(d). Does the U.S. own excess foreign currency and, if so, what arrangements have been made for its release?

#### FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria
1. FAA Sec. 102(c); Sec. 111; Sec. 201a. Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production, spreading investment out from cities to small towns and rural areas; and (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions?

The project is not susceptible to execution as a regional or multi-lateral project, although it will be complementary to two such projects. It is hoped that the National Fish Farming Center will develop into a facility of utility to the region as a whole.

- a. Project will not directly increase international trade
- b. Project will foster private initiation and competition
- c. Project will strengthen co-operatives and local credit institutions.
- d. No effect.
- e. Project will improve efficiency of public and private operators
- f. No effect

All services and a large portion of the commodities will have their source and origin in the U.S. All services and a large portion of the commodities will be procured from U.S. private enterprise. The Grant Agreement will so provide.

Yes. Release by the GOE is not a problem at present.

Not applicable.

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b. FAA Sec. 103, 103A, 104, 105, 106, 107. -- is assistance being made available (include only applicable paragraph -- e.g., 4, 5, etc. -- which corresponds to source of funds used. If more than one fund source is used for project, include relevant paragraph for each fund source.)

- (1) [103] for agriculture, rural development or nutrition; if so, extent to which activity is specifically designed to increase productivity and income of rural poor; [103A] if for agricultural research, is full account taken of needs of small farmers;
- (2) [104] for population planning or health; if so, extent to which activity extends low-cost, integrated delivery systems to provide health and family planning services, especially to rural areas and poor;
- (3) [105] for education, public administration, or human resources development; if so, extent to which activity strengthens nonformal education, makes formal education more relevant, especially for rural families and urban poor, or strengthens management capability of institutions enabling the poor to participate in development;
- (4) [106] for technical assistance, energy, research, reconstruction, and selected development problems; if so, extent activity is:
  - (a) technical cooperation and development, especially with U.S. private and voluntary, or regional and international development, organizations;
  - (b) to help alleviate energy problem;
  - (c) research into, and evaluation of, economic development processes and techniques;
  - (d) reconstruction after natural or manmade disaster;
  - (e) for special development problem, and to enable proper utilization of earlier U.S. infrastructure, etc., assistance;
  - (f) for programs of urban development, especially small labor-intensive enterprises, marketing systems, and financial or other institutions to help urban poor participate in economic and social development.

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

c. FAA Sec. 107(a) (2)(B)(i). 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)?

d. FAA Sec. 107(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing?

e. FAA Sec. 107; Sec. 113. Extent to which assistance reflects appropriate emphasis on, (1) encouraging development of democratic, economic, political, and social institutions; (2) self-help in meeting the country's food needs; (3) improving availability of trained worker-power in the country; (4) programs designed to meet the country's health needs; (5) other important areas of economic, political, and social development, including industry; free labor unions, cooperatives, and Voluntary Agencies; transportation and communication; planning and public administration; urban development, and modernization of existing laws; or (6) integrating women into the recipient country's national economy.

f. FAA Sec. 107(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civic education and training in skills required for effective participation in governmental and political processes essential to self-government.

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g. FAA Sec. 201(b)(2)-(4) and -(8); Sec. 201(c); 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?

n. 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.

2. Development Assistance Project Criteria (Loans only)

Not applicable

a. FAA Sec. 201(b)(1). Information and conclusion on availability of financing from other free-world sources, including private sources within U.S.

b. FAA Sec. 201(b)(2); 201(d). Information and conclusion on (1) capacity of the country to repay the loan, including reasonableness of repayment prospects, and (2) reasonableness and legality (under laws of country and U.S.) of lending and relending terms of the loan.

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?

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?

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PROJECT NO. EGY 41-8	EFFECTIVE DATE February 16, 1973	FINANCIAL MEMO NO. 3:13	AID HANDBOOK J, App. 5C
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a. FAA Sec. 602(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?

f. FAA Sec. 601(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?

3. Priority Criteria Safety for Security  
Assistance

FAA Sec. 601. How will this assistance further promote economic or political stability?

4. Additional Criteria for Alliance for Progress

[Note: Alliance for Progress projects should add the following two items to a project checklist.]

a. FAA Sec. 251(b)(1), -(3). 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(b)(2), 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 CAS) in its annual review of national development activities?

This assistance will contribute to the meeting of Egyptian food needs and will increase small farmer incomes and rural employment opportunities.

Not applicable

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ANNEX 4  
Modified PID Facesheet

(TM 3:19) Appendix 5A to HB 3, Part I

AGENCY FOR INTERNATIONAL DEVELOPMENT <b>PROJECT IDENTIFICATION DOCUMENT FACESHEET</b> <small>To Be Completed By Originating Office</small>				1. TRANSACTION CODE <input checked="" type="checkbox"/> A - AID <input type="checkbox"/> C - Charge <input type="checkbox"/> D - Debit		AID	
3. COUNTRY/IDENTITY Egypt				4. DOCUMENT REVISION NUMBER <input type="checkbox"/>			
5. PROJECT NUMBER (7 digits) 263-0064		6. BUREAU/OFFICE A Symbol NE B Code 03		7. PROJECT TITLE (maximum 40 characters) Aquaculture Development			
8. PROPOSED NEXT DOCUMENT A. <input checked="" type="checkbox"/> PRP B. <input type="checkbox"/> SP C. DATE 07/78				10. ESTIMATED COSTS (\$000 or equivalent, \$1 = ) FUNDING SOURCE % of Project A. AID Appropriated 27,500 B. OTHER 1 C. U.S. 2. 3,200 C. Host Country D. Other Donor(s) TOTAL 31,400			
9. ESTIMATED FY OF AUTHORIZATION/OBLIGATION A. INITIAL FY 78 B. FINAL FY 86							
11. PROPOSED BUDGET AID APPROPRIATED FUNDS (\$000)							
APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. FIRST FY		LIFE OF PROJECT	
		C. Grant	D. Loan	F. Grant	G. Loan	H. Grant	I. Loan
1) SA	143	077		3,500		27,500	
2)							
3)							
4)							
TOTAL				3,500		27,500	
12. SECONDARY TECHNICAL CODES (maximum six codes of three positions each)							
012	044	053	080	120			
13. SPECIAL CONCERNS CODES (maximum six codes of four positions each)							14. SECONDARY PURPOSE CODE
EF	RL	R/AG	TECH	968	CCCP		
15. PROJECT GOAL (maximum 200 characters) To increase the availability of high-quality protein foods in Egypt.							
16. PROJECT PURPOSE (maximum 400 characters) To provide the capability for sustained development of the fish farming industry on an economic basis through improved institutions for planning and coordination, applied research, training, and extension. To increase fish production by 4,000 tons per year by 1986.							
17. PLANNING RESOURCE REQUIREMENTS (staff/funds)							
18. ORIGINATING OFFICE CLEARANCE Signature Title Date Signed MM DD YY 06 27 77				19. Date Document Received in AID/W, or for AID/W Documents, Date of Distribution MM DD YY			

AID 1-20-2 (3-78)

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## ANNEX 5

Draft Project Description for Grant Agreement

The purpose of this project is a) the establishment in Egypt of the capability for sustained development of the fish farming industry on an economic basis through improved institutions for planning and coordination, applied research and extension, and b) the increase fish production by 4,000 tons per year by 1986 through an increase in the area devoted to fish farming.

The project will establish and support the following facilities:

1. National Committee for Aquaculture Development. Technical Assistance will be provided to support the planning and coordination activities of the Committee, including the preparation of a national plan.
2. National Fish Farming Center at Abbasa. The Center, to be under the direction of the Ministry of Agriculture, will be established on a 200-feddin site near the duck-hunting facility at Abbasa. The Center will have a total GOE staff of 67 and will include divisions for research, extension, and administration, as well as a carp hatchery and a mullet fry nursery. Center facilities will include laboratories, offices, storage facilities and housing for US contract and GOE personnel, as well as approximately 100 feddans of hatchery and research ponds.

The Center will conduct applied research to develop packages of optimal production practices for fish farming operations in Egypt, including techniques for village farms and mixed poultry/fish operations. It will also conduct applied research in the areas of fish breeding, handling and utilization, nutrition and fish pathology. The Center will not conduct basic research and a research committee composed of representatives of each division as well as the US Contract team will oversee the research activities to ensure that the agenda is oriented to the solution of practical problems.

The extension division will develop an extension service providing assistance to fish farmers, both those established under the project and others in the area served. The program will serve the Sharkia/Ismailia area in the early years, expanding to serve the World Bank project areas and eventually all of Egypt. In addition to 6 full time extension agents, support and senior personnel, the program will provide training to 6 extension interns per year to build a national extension capability in fish farming. The extension program will operate a field station at Abbasa and will open additional stations as needed. It will also provide training for fish farmers and conduct short courses in areas of relevance to fish farming. A training committee similar to the research committee will oversee all training activities at the Center. The extension division will also be responsible for the collection of baseline socioeconomic data necessary for evaluation.

- 2 -

The Abbasa hatchery nursery will produce 6-10 million carp fry annually and will provide nursery facilities to produce 3.4 million mullet fry of 2-5 gram from .15-gram fry collected at Al-Mex.

3. Carp Hatchery at Serow. The natural hatchery at Serow will be improved and its output will be supplemented by the construction of an artificial hatchery, raising the production of carp fry from 1.5 million annually to 10-17 million. The new carp hatchery facilities will be operated by the Institute of Fisheries.

4. Mullet Collection Station. Two mullet collection facilities will be constructed at Al-Gameel and Al-Girby on the Mediterranean coast. These facilities will collect 40-60 million mullet fry annually. The collection station at Al-Mex, operated by the Institute of Oceanography and Fisheries, will receive technical assistance in fry transport to assistance in reducing fry mortality from 80% to 50%.

5. Mullet Hatchery. To ensure the supply of mullet fry in the future, a pilot mullet hatchery will be constructed at Al-Gameel or Al-Gerby, producing 6 million fry at full operation and developing an operational technique that can be applied elsewhere in Egypt and the Middle East.

6. Zagazig Fish Market. A modern fish market will be constructed at Zagazig, the capital of Sharkia. Space in this facility, which will provide refrigeration and adequate sanitary equipment, will be rented to local entrepreneurs by the Sharkia government at an economic price.

7. Participant Training. Training will be provided to 75 individuals in fisheries management, fish pathology, engineering, food services, fisheries biology and other areas. Both US and third-country training will be provided. 10 individuals will receive training to the Ph.D. level, 35 will receive Master's-level training and 50 will receive a total of 140 months of short-term training. It is expected that those receiving training will return to work in the fish farming sector and that some will complete thesis degree requirements through work at the National Center and other Egyptian facilities.

8. Production farms. The project will establish 5,000 feddans of private sector production farms in Sharkia and Ismailia governorates. The farms will be funded through a revolving credit fund to be established within the Agricultural Credit Bank. The fund will make 15-year loans to fish farmers (both individuals and cooperatives) at its usual rate of interest. The production area will be reached in two stages. In the first stage, 1,200 feddans will be constructed by the project and distributed to 80 recent agricultural grads over two years. Loans will be provided to cover the cost of pond construction, equipment, and all operating expenses for the first two years. The farmers will assume control of their farms roughly three months before the scheduled first year stocking and are expected to achieve full production of 1 MT per feddan of water

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(10 MT per farm) by the third year. In the second stage a total of 3,800 feddans will be established over three years. Although the final mix may vary, the desired composition for this total area is 900 feddans of home-stead farms (60 units), 1,750 feddans operated by village cooperatives (70 units), 1,500 feddans of mixed poultry/fish operations managed by women's cooperatives (30 units) and 1,000 feddans of medium-size private fish farms (20 units). These operations will receive loans to cover construction, capital equipment and two years of operating expenses.

9. Implementation and Management. Technical assistance through the project will be administered primarily through a host country contract (HCC). The prime contractor will be responsible for administration and execution of this project element. The Under-Secretary for Aquatic Resources, as project director, will be responsible for supervision of the contract, with the assistance of the USAID project officer.

In order to speed project implementation, some services will be provided prior to signing of the HCC. These include the services of an interim fisheries specialist, the architectural and engineering work on the National Center and Serow hatchery, and, if possible, the initial construction work at Abbasa and Serow.

The Ministry of Agriculture, or the grantee, will administer all new facilities to be established. Facilities operated by the IOF that will receive assistance under the project, including the Sharkia governorate farm near the National Center, the Serow hatchery, and the Al-Mex Collection Station, will remain under the control of the IOF. In addition, it is anticipated that the IOF will participate in the National Center and other project activities through contractual arrangements with the Ministry of Agriculture. The production farm component will operate through the private sector to the greatest possible extent, especially with regard to the marketing of output.

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## ANNEX 6

THRESHOLD DECISION BASED ON  
INITIAL ENVIRONMENTAL EXAMINATION

Project location: Egypt  
Project Title: Aquaculture Development

Funding:	FY 78	3.5 million
	FY 79	14.0 "
	FY 80	3.8 "
	FY 81	3.7 "
	FY 82	2.5 "

IEE Prepared By: R. J. Edwards  
USAID/Cairo

Date: Aug. 4, 1978

Environmental Action Recommended: Negative determination in that there are no concerns which would be expected to have any significant negative effect on the human environment and which would require an environmental assessment. However several concerns have been identified which might have an impact on the design or implementation of the project itself and for which additional environmental analysis should be undertaken concurrently with the initial phases of project implementation. The results of these analyses will then be taken into consideration during preparation of final engineering design requirements and/or implementation plan.

NE Bureau Decision:

APPROVED: *James J. B. ...*  
DISAPPROVED: \_\_\_\_\_  
DATE: 7/8/78

GC/NE:GBisson *9/5/78* Date ...  
NE/PD/ENGR:JCassanos *8/2* Date ...

INITIAL ENVIRONMENTAL EXAMINATION  
NARRATIVE DISCUSSION

1. Project Location: Egypt
2. Project Title: Aquaculture Development
3. Funding:
 

FY 78	3.5 million
FY 79	14.0 million
FY 80	3.8 million
FY 81	3.7 million
FY 82	2.5 million
4. IEE Prepared By: R. J. Edwards  
USAID/Cairo Date: Aug. 4, 1978
5. Environmental Action Recommended: No environmental Assessment required, but additional environmental analysis required during initial phases of project implementation and prior to finalization of engineering designs.

6. Discussion:

This project will establish a National Fish Farming Center and 5,000 feddans of privately-operated fish farms. It will support an additional 31,000 feddans of new fish ponds being built by other donors. At full operation, the project will produce 4,000 tons of marketable fish annually and provide jobs for over 1,000 individuals. The principal environmental impacts to be considered are a) the reduction in size of a natural swamp now used in part as a duck-shooting facility and b) the potential increase in the risk of bilharzia, if appropriate measures are not taken. The project may have a minor impact on the local water table, the quality of drainage canal water, and insect ecosystems. These and other concerns are described in more detail in the environmental analysis immediately following.

The Mission believes that the project design includes adequate provisions for overcoming these potential environmental problems and monitoring any environmental changes. Technical assistance will be provided to eliminate any incidence of bilharzia associated with pond culture. At least 600 feddans of swamp will remain in their natural state to provide a habitat for migrating water fowl.

It is recommended, however, that additional environmental analysis be undertaken immediately to insure that the final design is responsive to environmental needs to the maximum extent. It is proposed that this study should be carried out by an AID "requirements contractor" and completed prior to final engineering design. In order to avoid undesirable delay in project implementation, the Mission recommends that the project be authorized with the understanding that the results of this additional analysis is taken into consideration in final engineering design and in implementation plans.

Preliminary Environmental Analysis  
Aquaculture Development Project 263-0064  
Prepared by I.E. Wallen USEPA

AID/Egypt, has prepared a project paper (263-0064) recommending life of project authorization of \$ 27.5 million to assist the Egyptian Government in establishing a research and extension capability in aquaculture and in increasing the acreage in private farms for fish production.

The project will assist in establishing:

- a national fish farming center at Abbasa
- a first phase of 1,200 feddans pond fish production area at Abbasa
- a second phase of 3,800 feddans of pond fish production in Sharkiya and Ismailia Governorates
- two carp hatcheries (Abbasa and Serow)
- two mullet fry collection centers on the Mediterranean coast
- a mullet hatchery near one of the collection centers
- a commercial market in Zagazig.

Support to Egyptian agriculture will be given through planning, training, production and marketing. The National Fish Farming Center, will serve research, training, demonstration, and extension functions to develop a cadre of experienced small and medium scale farmers and homesteaders. Located near Abbasa, the Center initially will serve Sharkiya and Ismailia governorates.

It is anticipated that eventual expansion will permit servicing of the entire country especially through extension programs.

Land Use: A research-demonstration center would be developed around a 110 feddans GOE fish farm site near Abbasa. About 1,200 feddans of undeveloped wastelands would be added as farms around the site. Although approximately 10,000 feddans of additional wastelands may now

be available in the general area, it is anticipated that increments of pondfish farming would be dispersed within Sharkiya and Ismailia governorates. A second phase of this project calls for 3800 feddans of such dispersed fish farms.

Although there is rumored to have been farming at the Abbasa site in past centuries, the only recent use of the land has been for duck hunting and in development of a GOE pilot scale experimental fish farm. The land itself is officially classified as swamp. With a high soil salinity and much standing water, it appears to be unsuitable for agriculture. Ponds constructed in the site and using water from a nearby Nile irrigation canal, may initially have a normal salinity as high as 3 ppt. Although acceptable for fish culture, particularly with flushing, it would be unlikely to be more than marginal for agriculture.

Other than for the fish farms, the land requirements would be small for the mullet hatchery and fry collection and handling on the coast and for the commercial market.

Migratory waterfowl use the Egyptian Delta for wintering grounds and from late October to early March there may be concentrations of up to thousands of birds in the government hunting area and surrounding lands. The conversion of the 1200 feddans of wetlands area around the 110 feddans hunting preserve from its present situation of nearly continuous emergent aquatic plants to open ponded areas will create a situation of unknown significance. It would be desirable for a study to be made by an expert of the relative use by waterfowl of this specific area and other marsh/swamp areas in the Delta to determine how much of the available waterfowl wintering grounds would be modified by the project?

In order to harvest the fish it is anticipated that the ponds will be drained in the late Fall or Winter. Whether this will have a significant effect on the water table or the water level in the existing waterfowl preserve is not known.

The use of adjacent land for rice farming should be an indication that there would be no problem in maintaining ground and ponded water levels as they have been.

Waterfowl may now use the land proposed for the project as feeding grounds. With the planned change to fish ponds and

fertilization of the ponds there should be increased nutrient availability. Whether or not the increased nutrients will be useful for ducks will depend on the management practices developed by the Fishery Center. There could be increased or decreased value for waterfowl.

It is suggested that an inventory of the plants available as duck food at the site be made by a qualified expert and that data be gathered concerning the availability of such food at the alternative wintering grounds for migratory waterfowl. Proper management of the fish production ponds would eliminate emergent plants and maintain a high plankton population for feeding fishes. Although the waterfowl would be able to feed on some of the fish pond areas, the farmers would be greatly concerned that their fish crop not be harvested by waterfowl.

From a land use standpoint, the project would appear to be neutral to beneficial for existing uses and to be of substantial economic benefit to the landholders for the new purpose.

Two land use problems are inherent in the existing proposal: (1) location of ponds and (2) adequacy of water resources. In the first case, new agricultural techniques may be developed or modified or cultural practices become such that the existing wastelands will be converted to agriculture. A tentative plan exists for use of nearby sites for citrus cultivation. Experience with such use may reveal the feasibility of use of the land for agriculture. With limited flatland available in Egypt, with suitable soil, alternative locations may be more feasible for fish ponds.

The second point concerns water supplies. To fully accommodate maximum fish production a pond should be capable of being filled with water, and/or drained, several times a year in order to avoid catastrophic losses from overfertilization, pollution, or weed growths. Although local water storage ponds and pumps would be feasible at the Abbasa location, the planned water source appears, at present, to be safe from pollution problems. However, there are potential problems which must be considered.

Herbicides are believed to be used to control aquatic plants in the main canal. The chemicals are not always properly applied nor are they always of a composition considered in the United States to be safe. Since the canal parallels major transportation arteries, there is a chance of spills of hydrocarbons or other chemicals. The Center must be prepared to assure that water polluted in these or other ways is not permitted to enter the fish ponds. If such a spill occurred at a time of water demand at the Center, there would need to be an alternative source of water for enough time to assure that the hazardous substances were no longer threatening the fish.

Also, the location of fish ponds in agricultural land can result in the escape of pesticides used in the control of crop pests into the water supply often with devastating results for the fisheries, either by killing them or by rendering them unsafe to market. Initial location of the experimental facility in an area unlikely to be contaminated would avoid this damage to the water supply.

The preceding discussion is intended more as a caution than as a limitation on location of the facility. Good management practices at the current location can supply both good water and an abundant supply. Furthermore, the impact of location of a fish pond complex at the existing proposed location would tend to be positive in improved land use.

Water Quality: The source of water to fill the ponds is a canal from the Nile River which also provides the water for the Suez Canal cities of Port Said, Ismailia and Suez, as well as for intermediate cities and irrigated land. The GOF has assured USAID that there is sufficient water to support this additional requirement. The Nile River water is shunted from the river downstream from Cairo and may contain industrial wastes, accidentally spilled chemicals and naturally suspended materials to render it less than ideal for a fish culture program. The hazards to fish production may however, be minimized through water management techniques at the site.

As indicated earlier, the soil has a rather high salt content and the ponded water may be of salinity, perhaps as high as 3‰ after solution from the pond. During the fish culture process, the water be fertilized and natural growth of fish food organisms will generally be encouraged.

At least once each year, it is considered to be necessary to drain the ponds. Generally this water will go into a drainage canal and empty into the sea or a lake where the nutrients would become available for natural fish production.

Information is needed on the pathway of the drainage canal to its outlet, either on the lake or the Mediterranean.

As indicated in the USAID feasibility study, the salinity level of the ponded water may become significant in the area. Carp are sensitive to salinities of about 2-3 parts per thousand. Tilapia and mullet would not be a problem, however, carp are anticipated to make up about 30% of the marketed fish. Techniques of management including flushing or dilution of the water are likely to be feasible at the site, and the capability of protecting the carp harvest should be provided.

There is a superabundant growth of emergent plants in the ponds already developed by the governorate as well as in the swampland of the proposed site. Cattails and bamboo make up the majority of the plants, however, there are grasses, bullrushes, water lilies and many other species. No herbicide use is planned however, it may be more practical to use this method of control than the system of hand cutting presently being employed. A private farm of larger size than that contemplated for the new site, but located nearby, has apparently been lost to aquatic emergent plants. A program of control should be developed and made a part of the project. Grass carp have been considered for use, but not in sufficient numbers to crop the plants.

The fish feeding program for the Sharkiya governorate project includes 3 tons of bran and 1 ton cottonseed cake per feddan during the season. It is likely that this will not produce good fish growth in the very high pH ponds. There needs to be consideration of use of nitrogen fertilizer to increase the production of plankton as food for small fishes. Chicken manure would provide a source of nitrogen. Care would have to be taken in the control of flies where manure is stored.

The change in water quality from the project, would tend to enhance the productivity of a normally less productive environment. The fertility released to the drainage ditch should be useful again in the Mediterranean.

Natural Resources:

Insofar as is known, there are no mineral or other geologic resources in the area. The soil is poor and non-productive. A duck hunting area would be reduced in size and marginal duck feeding capability would be added. The project would take non-productive land and convert it to productive use; thus having no detrimental effects on resources. The use of fertilizers should enhance the natural value of the area.

Although there is cropping of a wild bullrush species from the area for use in basket and mat weaving, another species of rush is an agricultural crop in the surrounding area, and it should continue to provide new materials for this purpose. Although about 30 of the 1200 feddans of new area may produce wild rushes, alternative sources of rushes are generally present.

Since there is competing use for the mullet fry to be collected from along the shores of the Mediterranean Sea, it is recommended that there be no delay in establishment of a mullet hatchery and that early priority be given to this part of the project. Pondfish farmers will be aware of the higher value of mullet on the fish market and are likely to spend a disproportionate part of their time in attempting to achieve maximum production of mullet.

In addition, the salinity of the water is more conducive to mullet than to carp production. This mullet problem, will be all the more sensitive because of the desire of marine fisherman to maintain the Mediterranean production as well as in consideration of other fish culture efforts. With limited mullet, construction of a hatchery would appear to be in the best interest of GOE overall activities.

Cultural Resources: The affected areas are in a wasteland, swampy territory not known to be interesting from a cultural standpoint. Heritage areas will not be affected, insofar as could be established locally.

Socioeconomic Considerations: The GOE has considered alternative uses of the land for urban development, agriculture, forestry, and industrial development and GOE has recommended that the best use of the land would be for aquaculture. Some of the land in the general vicinity is being considered as a site for citrus groves for export, however, the marginal land to be used for the project is not considered suitable for that purpose.

Health: The primary health concern of the project is with Bilharziasis (Schistosomiasis). This highly debilitating disease is endemic in the area with about 30% of the population affected. The use of molluscicides, annual drainage of the ponds, sanitary facilities for workers, homesteaders, and farmers, and continuing health surveillance would be essential for the project to succeed.

The mosquitofish Gambusia is native to the swamp and would be stocked in all ponds at all times to assist with mosquito control. These small predatory fish would assist in minimizing the problem, however, housing and cultural practices would be important along with medical surveillance to avoid problems with Malaria, filariasis and other potential mosquito borne diseases.

Related Projects: The GOE is committed to a substantial effort in aquaculture through hatcheries and demonstration farms as well as plans for support from several sources (FAO, World Bank, Norway, Canada, USSR, Japan, Denmark). Provision has been made for coordination of these projects through the establishment of a National Committee for Aquaculture Development, which is chaired by the Under-Secretary for Aquatic Resources, and includes the involved GOE ministries. The project will create a National Fish Farming Center which under the Ministry of Agriculture, will become a major resource for the Near Eastern region.

Conclusion: Pond culture of fishes in Egypt is a small poorly developed industry. The project proposes to establish a superstructure for institution building in the form of a National Fish Farming Center under a National Committee for aquaculture development chaired by the Under-Secretary for Aquatic Resources. Facilities and services are proposed to establish and maintain homestead size fish farms. The land to be used currently is wasteland with limited use for duck hunting and bullrush production. The project would increase protein production and provide permanent employment and support for upwards of 1000 persons in farms and in the Center.

Although care would need to be exercised to avoid the occurrence of serious health problems from snail and mosquito transmitted diseases, and pollution and other water quality controls would be required, care in the preparation of final design requirements and proper monitoring during project implementation should afford adequate protection.

IMPACT IDENTIFICATION AND EVALUATION FORM

<u>Impact Areas and Sub-areas</u>	<u>Impact Identification and Evaluation</u>
<b>A. <u>LAND USE</u></b>	
1. Changing the character of the land through:	
a. Increasing the population	<u>    N</u>
b. Extracting natural resources	<u>    N</u>
c. Land clearing	<u>    L</u>
d. Changing soil character	<u>    U</u>
2. Altering natural defenses	<u>    N</u>
3. Foreclosing important uses	<u>    L</u>
4. Jeopardizing man or his works	<u>    N</u>
5. Other factors	
_____	_____
_____	_____
<b>B. <u>WATER QUALITY</u></b>	
1. Physical state of water	<u>    L</u>
2. Chemical and biological states	<u>    L</u>
3. Ecological balance	<u>    M</u>
4. Other factors	
_____	_____
_____	_____
<u>I/N</u> - No environmental impact <u>L</u> - Little environmental impact <u>M</u> - Moderate environmental impact <u>H</u> - High environmental impact <u>U</u> - Unknown environmental impact	

IMPACT IDENTIFICATION AND EVALUATION FORM

C. ATMOSPHERIC

- 1. Air additives N
- 2. Air pollution N
- 3. Noise pollution N
- 4. Other factors
- \_\_\_\_\_
- \_\_\_\_\_

D. NATURAL RESOURCES

- 1. Diversion, altered use of water N
- 2. Irreversible, inefficient commitments N
- 3. Other factors
- \_\_\_\_\_
- \_\_\_\_\_

E. CULTURAL

- 1. Altering physical symbols N
- 2. Dilution of cultural traditions N
- 3. Other factors
- \_\_\_\_\_
- \_\_\_\_\_

F. SOCIOECONOMIC

- 1. Changes in economic/employment patterns L
- 2. Changes in population N
- 3. Changes in cultural patterns N
- 4. Other factors
- \_\_\_\_\_
- \_\_\_\_\_

IMPACT IDENTIFICATION AND EVALUATION FORM

G. HEALTH

1. Changing a natural environment

\_\_\_\_\_

2. Eliminating an ecosystem element

\_\_\_\_\_

3. Other factors

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

H. GENERAL

1. International impacts

\_\_\_\_\_ N

2. Controversial impacts

\_\_\_\_\_ N

3. Other factors

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

I. OTHER POSSIBLE IMPACTS (not listed above)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Prepared By: R. J. Edwards Date: 8/4/78

Project Location: EGYPT

Project Title: AQUACULTURE DEVELOPMENT

ANNEX 7

Detailed Financial Estimate

7a. Technical Assistance  
(\$000)

	FY 78	FY 79	FY 80	FY 81	FY 82	FY 83	TOTAL		
	\$ LEq.	\$ LEq.	\$ LEq.	\$ LEq.	\$ LEq.	\$ LEq.	\$	\$	
<b>Team Leader</b>		125 38	125 35	125 35	125 38	125 38	625	175	
<b>Civil/Aqua Engineer</b>		125 38	125 25	125 25	125 28	125 28	625	135	
<b>Hatchery Specialist</b>		125 38	125 25	125 25	125 25	125 25	625	135	
<b>Extension Specialist</b>		125 35	125 25	125 25	125 25	125 25	625	135	
<b>Food Technologist</b>		-	75 20	125 25	125 25	50 18	375	85	
<b>Pond Production Spec.</b>			125 35	125 25	-	-	250	60	
<b>Subtotal</b>		500 140	700 168	750 160	625 135	550 125	3125	725	
<b>Short-term (60mm)</b>		155 44	143 55	170 74	120 46	87 35	675	252	
<b>TOTAL</b>		<u>655 184</u> 839	<u>843 220</u> 1,063	<u>920 234</u> 1,154	<u>745 181</u> 926	<u>637 158</u> 795	<u>3800</u>	<u>977</u> 4,777	
<b>Other TA:</b>									
<b>Interim Specialist</b>	80 48	8 4					88	49	
<b>Mullet Hatchery</b>					125 35	125 25	250	60	
<b>Land Survey</b>	14							14	
<b>Subtotal</b>							<u>330</u>	<u>123</u>	
<b>TOTAL</b>		<u>80 59</u> 139	<u>663 188</u> 851	<u>843 220</u> 1063	<u>920 234</u> 1154	<u>870 216</u> 1086	<u>762 183</u> 945	<u>4138</u> 5238	<u>1100</u>

7-b. Project Training Plan<sup>1/</sup>

<u>Training Needs</u>	<u>No. of Individuals</u>			<u>Total</u>
	<u>FY 79</u>	<u>FY 80</u>	<u>FY 81</u>	
Long-term	15	15	15	45
Ph.D	( 4)	( 3)	( 3)	(10)
M.S.	(11)	(12)	(12)	(35)
Short-term	5	10	15	30
Total				<u>75</u>

<u>Training Needs</u>	<u>No. of Person-Months</u>			<u>Total</u>
	<u>FY 79</u>	<u>FY 80</u>	<u>FY 81</u>	
Long-term	456	432	432	1320
Ph.D. (@4 yrs.)	(192)	(144)	(144)	(480)
M.S. (@2 yrs.)	(264)	(288)	(288)	(840)
Short-term (@4.7 mo.)	23	47	70	140
Total				<u>1460</u>

<u>Training Needs</u>	<u>AID</u>			<u>GOE</u>		<u>Total</u>
	<u>\$</u>	<u>LE Eq.</u>	<u>Total</u>	<u>LE Eq.</u>	<u>\$</u>	
Long-term	1670	107	1777	185		1964
Ph.D.	(606)	(24)	(630)	(67)		(698)
M.S.	(1064)	(83)	(1147)	(118)		(1266)
Short-term	434	96	530	19		549
Total	<u>2104</u>	<u>203</u>	<u>2307</u>	<u>204</u>		<u>2511</u>

<sup>1/</sup> See also Annex 13.

<u>7-c. Construction</u>			
(including architecture and engineering services)			(\$000)
		<u>AID</u>	<u>GCE</u>
1. National Fish Farming Center, Abbasa		<u>2640</u>	<u>203</u>
Laboratory (576 m <sup>2</sup> )		161	
Extension center and offices (576 m <sup>2</sup> )		126	
Housing: American Staff (6 x 120 m <sup>2</sup> )		140	
GCE Senior Staff (6 x 120 m <sup>2</sup> )			140
Apts. GCE Junior staff (10 x 60 m <sup>2</sup> )			63
Equipment shed (250 m <sup>2</sup> )		28	
Feed building (40 m <sup>2</sup> )		6	
Piping, water supply		70	
Electricity		44	
Roads		98	
Sewer System		105	
Hatchery building (600 m <sup>2</sup> )		168	
Well		14	
All station ponds		1680	
2. Serov Carp Hatchery		<u>182</u>	<u>-0-</u>
Hatchery building (600 m <sup>2</sup> )		168	
Well		14	
3. Mullet Collecting Stations (2)		<u>118</u>	<u>-0-</u>
Buildings (200 m <sup>2</sup> x 200 LE/m <sup>2</sup> )		56	
Roads (0.5 km x 3 m x 3.5 LE/m <sup>2</sup> )		14	
Water Supply		14	
Concrete holding tanks		8	
Misc.		14	
Engineering		12	
4. Mullet Hatchery		<u>735</u>	<u>-0-</u>
Laboratory (1000 m <sup>2</sup> x LE 200/m <sup>2</sup> )		280	
Shop (270 m <sup>2</sup> x LE 150/m <sup>2</sup> )		59	
Tanks & raceways (1500 m <sup>2</sup> x LE 100/m <sup>2</sup> )		210	
Feed & equipment building (200 m <sup>2</sup> x LE 150)		42	
Piping & water supply		56	
Roads & paving		21	
Electricity		14	
Engineering		53	
5. Zagazig Market		<u>100</u>	<u>—</u>
	<b>TOTAL:</b>	<b>3775</b>	<b>203</b>

Note on Sources:

The unit costs used in estimating the costs of construction have been derived from a number of sources.

Estimates for building construction costs and materials are based on information supplied by USAID Capital Development and Engineering, supplemented with information from other project design teams, particularly the housing project engineers.

Estimates for the cost of road construction, power lines, canals and excavation were supplied by the Ministry of Agriculture Projects Office and the Institute of Oceanography and Fisheries, in addition to USAID CDE. The Ministry of Agriculture also provided estimates on land reclamation costs.

The cost of pond construction was estimated from a number of sources. The costs currently being incurred in pond construction for the 1000-feddan FAO Al-Zawya project provided the basis for these figures, supplemented with costs for alterations on the governorate farms at Abbasa and estimates from several private farmers, both near Abbasa and elsewhere. These estimates covered a wide range of technologies, from hand-labor to heavy construction equipment. Although no single, clear cut structure emerges, it appears that hand-labor is somewhat less expensive than heavy equipment, although it is of course much more time-consuming.

<u>7-i. Commodities</u>	(\$'000)
1. National Aquaculture Center, Abbasa	<u>ATD</u>
Laboratory equipment	<u>2164</u>
Food Science, Microbiology, Limnology, Fisheries Bacteriology	980
Extension equipment (Photo/audio-visual/duplicating)	294
Special hatchery equipment	196
U.S. residences Air conditioners, refrigerators, freezers, stoves, furniture	98
Fats and motors	5
Heavy equipment	256
1 DLGP tracklayer	140
2 Dump truck 5	84
1 Fork lift	12
2 Skip loaders	21
Vehicles	126
1 School bus 25 passengers	70
2 Pick ups 3/4 ton	28
1 Van 3/4 ton	14
1 Station wagon	14
American staff	84
2 pickups 3/4 ton	
1 Van 3/4 ton	
2 Sedans	
<u>1 Station wagon</u>	
5 x 10,000 LB - \$14,000	
Pumps	39
Generators	27
Library	59
2. Serow Carp Hatchery	<u>224</u>
Special hatchery equipment	<u>196</u>
Pumps	14
Misc.	14

7-d. Commodities (continued)	
	<u>AD</u>
3. Mullet Collecting Stations	<u>157</u>
Air compressors 2 x 25 hp/ea.	22
Pumps	42
Generator	22
Misc.	14
1 Light utility truck	14
1 Fry transport truck	42
4. Mullet Hatchery	<u>490</u>
Vehicles	
3 Light utility trucks	21
3 Fry transport trucks	63
Pumps	84
Generator	14
Compressors	28
Special hatchery equipment	<u>287</u>
TOTAL	3035

Project Component

National Center

Serow Hatchery

Al Gameel

Al Gerby

Mullet Hatchery

TOTAL

National Center

Serow Hatchery

Al Gameel

Al Gerby

Mullet Hatchery

TOTAL

## Notes:

- a) Does not include GOE
- b) AID will pay all oper  
will pay the remainde  
each provide one half  
the work during the

## 7-f. GCE Staff at full operation (monthly salary in parenthesis)

	<u>Annual Cost (LE)</u>
a. National Working Group	8400
2 Senior staff (150)	( 3600)
4 Support staff (100)	( 4800)
b. National Fish Farming Center	54480
10 Senior staff (140)	(16800)
12 Support and Junior staff (100)	(14400)
6 Extension agents (100)	( 7200)
10 Graduate research assistants (40)	( 4800)
6 Extension interns (40)	( 2880)
10 Labor and security (30)	( 3600)
13 Drivers and mechanics (40)	( 6240)
c. Serow Carp Hatchery	11280
2 Senior staff (150)	( 3600)
4 Support staff (100)	( 4800)
8 Labor and security (30)	( 2880)
d. Al Gameel Collection Station	8820
7 Senior staff (150)	( 1260)
4 Support staff (100)	( 4800)
5 Labor and security (30)	( 1800)
2 Drivers (40)	( 960)
e. Al Girby Collection Station	9360
1 Senior staff (150)	( 1800)
4 Support staff (100)	( 4800)
5 Labor and security (30)	( 1800)
2 Drivers and mechanics (40)	( 960)
f. Mullet Hatchery	15480
3 Senior staff (150)	( 5400)
6 Support staff (100)	( 7200)
8 Labor and security (30)	( 2880)
<b>Total 128</b>	<b>LE 109,260</b>
	<b>\$ 152,964</b>



\$ - LE Breakdown of U.S. Costs

-2- 74.

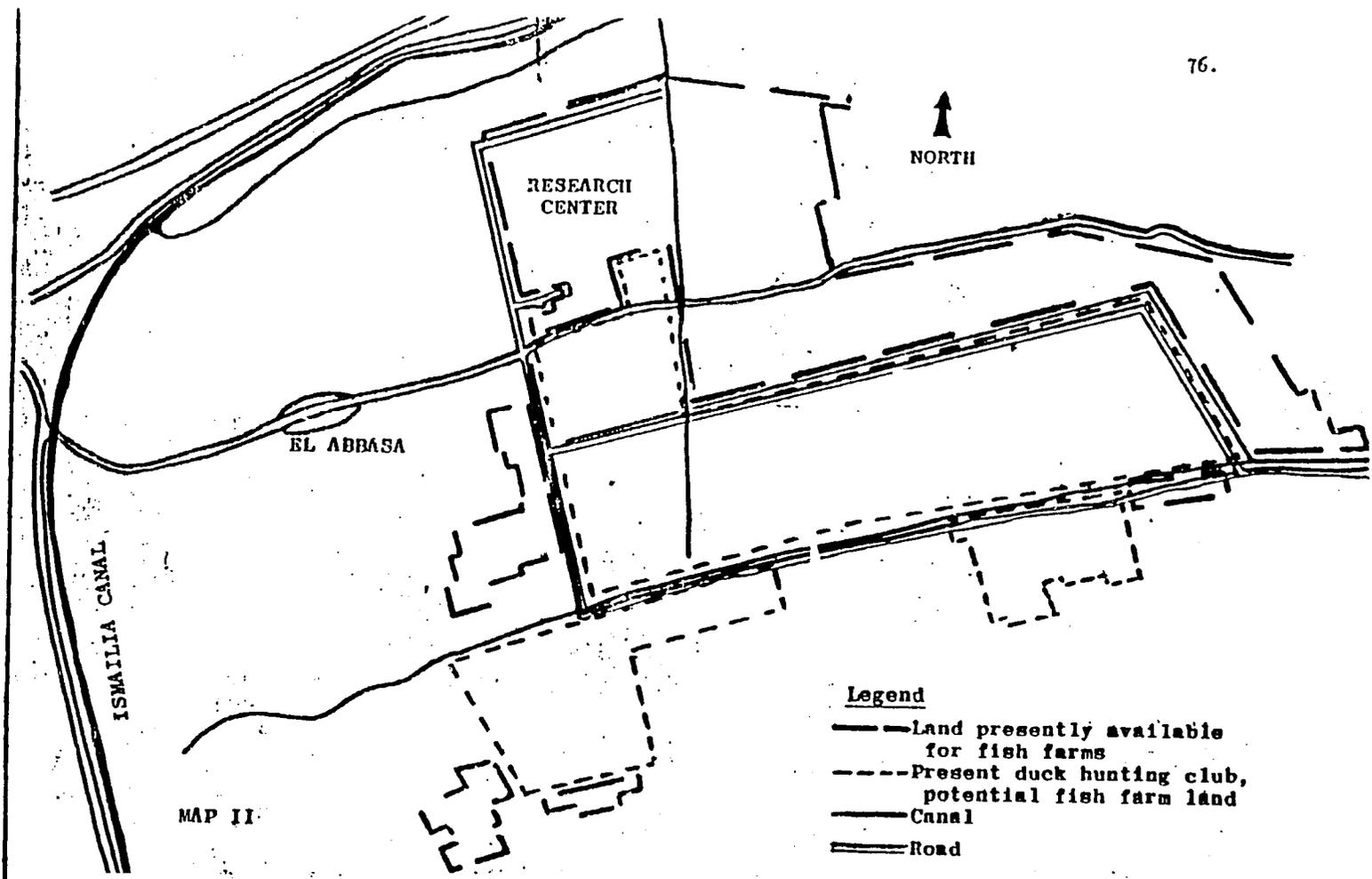
	FY \$	78 LE	FY \$	79 LE	FY \$	80 LE	FY \$	81 LE	FY \$	82 LE	FY \$	83 LE	Total \$	Total LE
<b>4. Part. Training</b>			<u>647</u>	<u>53</u>	<u>693</u>	<u>67</u>	<u>764</u>	<u>83</u>					<u>2104</u>	<u>203</u>
a. IT			576	37	547	35	547	35					1670	107
b. ST			71	16	146	32	217	48					434	96
<b>5. Prod.</b>				<u>2800</u>										
a. Fund				2800						<u>455</u>		<u>1785</u>		<u>5040</u>
										455		1785		5040
<b>6. Other</b>	<u>80</u>	<u>52</u>	<u>8</u>	<u>4</u>									<u>88</u>	<u>63</u>
a. Survey		14												14
b. TA	80	45	8	4									88	49
<b>Sub-total</b>	<u>188</u>	<u>185</u>	<u>2748</u>	<u>4629</u>	<u>2559</u>	<u>1541</u>	<u>2229</u>	<u>1084</u>	<u>878</u>	<u>687</u>	<u>772</u>	<u>1978</u>	<u>9374</u>	<u>10104</u>
<b>Inflation</b>	-	-	275	463	537	324	736	358	404	316	471	1207	2423	2668
<b>Contingency</b>	28	28	412	694	384	231	334	163	132	103	116	297	1406	1516
<b>Total</b>	<u>216</u>	<u>213</u>	<u>3435</u>	<u>5786</u>	<u>3480</u>	<u>2096</u>	<u>3299</u>	<u>1605</u>	<u>1414</u>	<u>1106</u>	<u>1359</u>	<u>3482</u>	<u>13203</u>	<u>14288</u>
	429		9221		5576		4904		2520		4841		27491	

ANNEX 3

MAP I Delta Area

MEDITERRANEAN SEA





MAP II

- Legend
- Land presently available for fish farms
  - - - Present duck hunting club, potential fish farm land
  - == Canal
  - == Road

6-1. NATIONAL AQUACULTURE CENTER, ABASSA

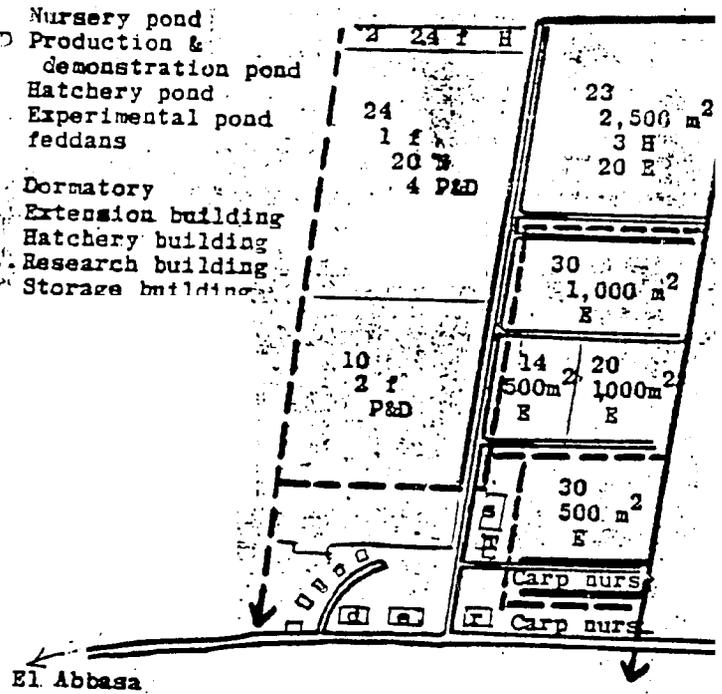
Scale: 1:25,000

NATIONAL AQUACULTURE CENTER  
RESEARCH CENTER

North

Legend

- N Nursery pond
- P&D Production & demonstration pond
- H Hatchery pond
- E Experimental pond
- f feddans
- d Dormatory
- e Extension building
- h Hatchery building
- r Research building
- s Storage buildings

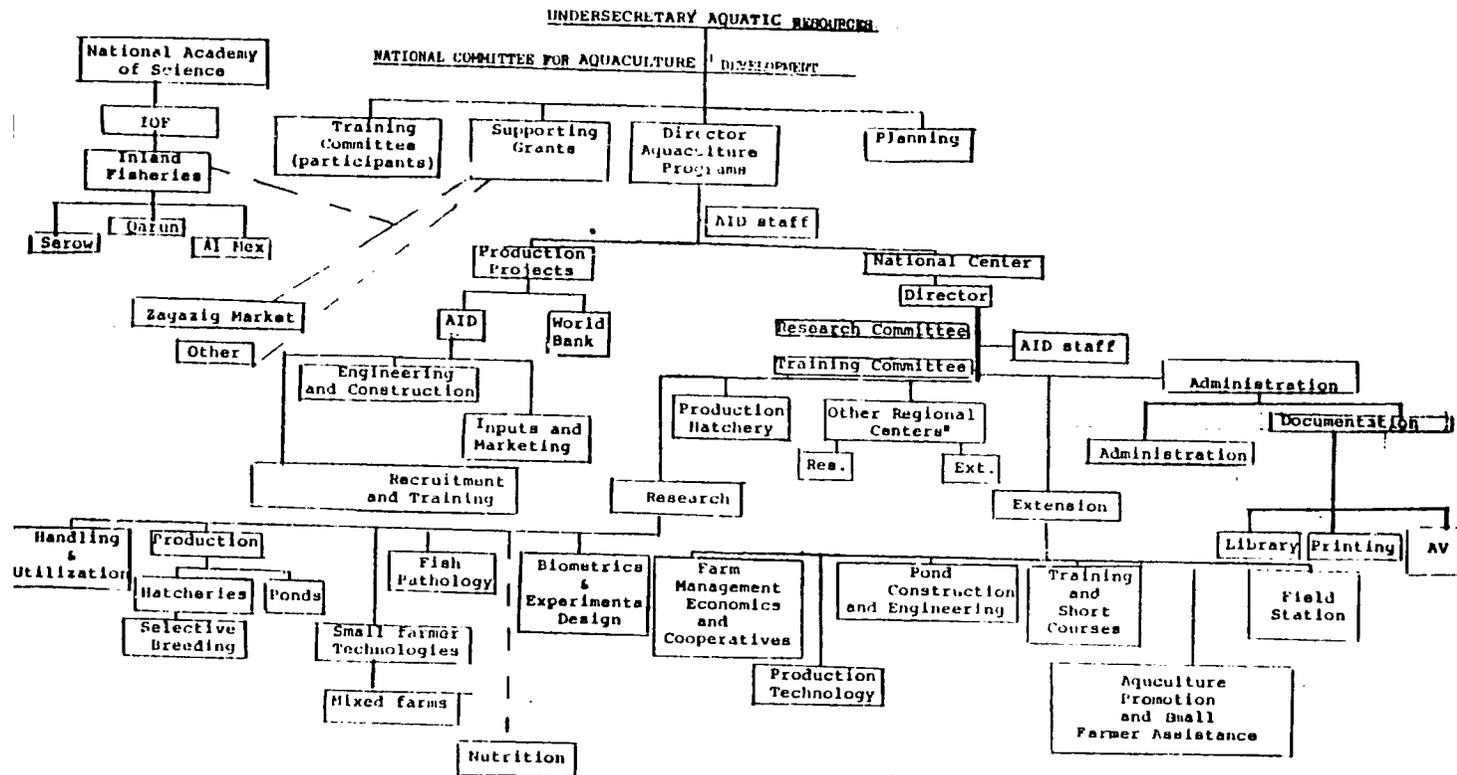


- == road
- supply canal
- - - drain canal

Scale 1:10,000

ANNEX 9  
PROJECT ORGANIZATION CHART

78.



\*To be implemented at a later date

## Annex 10

Hatchery Needs for the Fish Farming Sector

The currently-used polyculture system requires a mixture of tilapia, carp and mullet. Of these, tilapia is the only species that occurs naturally and does not require stocking (although improved breeds would have to be stocked). Carp fry are obtained solely from hatcheries while mullet fry are collected in the Mediterranean, where they occur naturally.

At stocking rates presently envisaged, the requirements for carp and mullet fry are as follows:

	<u>Annual Fry Requirements</u>	
	(millions)	
	<u>Carp</u>	<u>Mullet</u>
Present demand	1.5	35
FAO Project (Zawya)	1.2	5
World Bank Project	36.0	108
USAID Project	<u>6.0</u>	<u>7</u>
Total	44.7	155

These numbers represent conservative estimates, since they do not include fry needed for potential fish farm expansion by the GOE or private farmers. A new lake south of Fayoum may also generate a demand for 10 million mullet/year. Furthermore, mullet collection is highly vulnerable to water pollution, ecological cycles, and natural disasters, so that it is not a reliable source over the long range.

Current plans call for the demand to be met as follows:

	<u>Annual Fry Supply</u> (Millions)	
	<u>Carp *</u>	<u>Mullet</u>
Current facilities	1.5	35
FAO Project Hatchery (Zawya)	<u>3.75</u>	<u>          </u>
<u>Subtotal</u>	5.25	35
USAID carp hatcheries and mullet collection	<u>16-27</u>	<u>40-60</u>
Abbasa hatchery	( 8-10 )	
New Serow hatchery	( 6-10 )	
Technical Assistance to Serow	( 4-7 )	
Mullet Collection Stations	<u>          </u>	<u>40-60</u>
	<u>Total</u>	<u>75-95</u>
	<u>Deficit</u>	<u>60-80</u>

Thus, while the AID project is self-sufficient in both carp and mullet fry, available supply cannot meet the expected demand of the sector as a whole. The deficit in carp fry can be met through including a hatchery capacity in the World Bank project. Mullet collection from natural sources, however, cannot be greatly expanded above the planned level. Expected demand can thus only be met through hatcheries. Although mullet hatchery technology has only been employed to date on a small scale, the probability that a production-scale hatchery would succeed in Egypt is believed to be very high.

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\* 2-gram fry, assuming 75 % mortality of .2-gram fry to reach 2 grams, and a final stocking rate of 1200/feddan.

Production from the proposed hatchery--6 million fry/year-- will not overcome the total deficit. However, a successful pilot hatchery will lay the foundation for a hatchery capacity sufficient to meet the demand. The alternatives are a reduction in fish pond expansion or a change to a less profitable combination of species.













Annex 12  
Economic Analysis Tables

12a. Operation of the Credit Fund

<u>Credit Fund</u> (LE '000's)	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
balance forward	-0-	1443	1110	588	21	25	340
new funds	2000	-0-	-0-	325	1275	-0-	-0-
net payments	-0-	65.7	113.2	182.1	292.8	475.6	494.1
bank fee	-0-	8.9	15.3	24.5	39.4	61.1	63.6
loans	639	461	669	1075	1565	180	
new balance	1361	1047	554	20	24	321	834

Project

feddans in project	800	1200	1950	3200	5000		
new feddans	800	400	750	1250	1800		

Construction  
and 1 year  
operation

@ 12051/ homestead	639	325					
@ LE 800/ feddan other farms			600	1000	1440		

2nd year  
operation

@ LE 2560/ homestead		136	69				
@ LE 100/ feddan other farms				75	125	180	

Total loans	639	461	669	1075	1565	180	
Repayments @8%		75.6	53.8	78.1	125.6	182.8	21.0
Repayments @6%		65.7	47.4	68.9	110.7	161.1	18.5
Bank fee		8.9	6.4	9.2	14.9	21.7	2.5
Total repayment		65.7	113.2	182.1	292.8	475.6	494.1
Total fee		8.9	15.3	24.5	39.4	61.1	63.6

LE-b Capital and Operating Expenses  
for Homestead Farms  
(LE)

<u>Capital</u>	<u>Cost</u>
Two 5-feddan ponds	5492
Construction	( 4092)
Inlets/Outlets	( 800)
Pumps	( 600)
1 house	3000
Equipment	1000
<u>Subtotal</u>	<u>9492</u>
Contingency (10%)	949
<u>Total</u>	<u>10441</u>
 <u>Annual Operating Expense</u>	
Own wage	500
Labor	360
Equipment Op. and Maint. (10% of K)	100
Pump Operation	200
Ice	500
Fry	38
Superphosphate	102
Manure	185
<u>Subtotal</u>	<u>1985</u>
<u>Total</u>	<u>100</u>
<u>Total</u>	<u>2085</u>

Loan payment for capital + 2 yrs. operating expenses at 8%  
for 15 yrs.: LE 1707

12-c Cash flow and Rate of  
Return for Homestead Farms

	Year	0	1	2	3	4	....	16	....	20
<u>Income</u>	Loan: cap.		4600							
	ops.		2085	2085						
	conting.		475	475						
	fish sales		-2748	3664	4580	4580...	4580..	4580		
	Total		9908	6224	4580	4580...	4580..	4580		
<u>Expenses</u>	Capital	4892 <sup>2/</sup>	4600							
	Operation		2085	2085	2085	2085...	2085	..2085		
	Contingency		475	475						
	Loan repay.		1408	1707	1707	1707....	0..	-		
	Total	4892	8568	4267	3792	2742	2085	2085		
NET INCOME		-4892	1340	1957	788	788	2495	2495		

IPR=21.3%

<sup>1/</sup> Assuming a price of LE 458/MT and production of 600 kilos in the first year, 800 in the second and 1000 thereafter.

<sup>2/</sup> The cost of pond construction is not an out-of-pocket expenses for the farmer, who receives the farm already prepared for production. He must repay this cost as part of his loan, however.

12-d. Cash Flow and Internal Rate of  
Return for Expansion of Fish Farming Sector  
(\$000)

<u>Costs</u>	78	79	80	81	82	83	84	85	86	87.....97
1. AID Project - inst.	380	6327	4298	3850	1296	1165	503 <sup>1/</sup>	503	503	503
- prod.			775	530	880	1405	2025	585	585	585
2. World Bank & FAO -prod. <sup>2/</sup>	2605	200	10297	11015	11734	12451	13170	3790	3790	3790
-hatcheries <sup>3/</sup>			227	447	473	271	76	75	75	75
Subtotal	2985	6527	15588	15842	14383	15292	15774	4953	4953	4953
Conting.	448	979	2338	2376	2457	2294	2306	743	743	743
TOTAL	3433	7506	17926	18218	16540	17586	18140	5696	5696	5696
<u>Revenues</u>										
1. AID Project			206	378	714	1215	1980	2295	2481	2481
2. World Bank/FAO <sup>2/</sup>		581	775	4457	9109	14923	20737	26551	28876	30039
TOTAL		581	981	4835	9825	16138	22717	28846	31357	32520...32520
NET REVENUES	-3433	-6925	-16945	-13383	-6715	-1448	4577	23150	25661	26824...26824
IRR=23.45										

<sup>1/</sup> staff and ops = 10% commod.

<sup>2/</sup> World Bank Estimates

<sup>3/</sup> AID estimates

Annex 13Participant Training

The project will provide long-term training for 45 participants. 35 will receive two years of training (to the M.S. level or equivalent) while 10 will receive four years training (to the doctoral level or equivalent). In addition, short-term training averaging 4-5 months per person will be provided for 30 individuals.

Training requirements.

Although the precise mix of training provided must be determined as the project develops, it is expected that the following areas will be stressed.

Major Areas

- Fisheries Biology & Aquaculture.
- Food Science
- Engineering
- Economics and Farm Management
- Genetics & Fish Breeding (including Mullet)

Minor Areas

- Biochemistry /toxicology-
- Fish Pathology
- Fish Nutrition

It is expected that the Ph. D. training will be concentrated in the first 5 areas while the MS and short-term training will

be spread over the entire range of specialities required for the development of the fish farming sector.

Both US and third-country training will be provided. The latter will be especially important in short-term training for Center management personnel to familiarize them with aquaculture programs in other LDCs. US and third-country resources that may be drawn on are shown in Table I.

#### Timing.

The departure of participants will be timed so that roughly one-third will begin training in each of the second, third and fourth years of the project. Thus the initial group of trainees will return before the technical assistance team departs, and the team will be able to provide an input into the selection of the later groups.

#### Level of training

The goal of the participant training component is the creation of a body of trained personnel capable of supporting all aspects of aquaculture development in Egypt. Such a trained cadre does not now exist and, in contrast to other fields, training opportunities in appropriate areas in Egypt are limited or non-existent. The few training programs that do exist lack sufficient direction and support, with the result that emphasis is placed on overly academic questions such as biological classifications that do not prepare graduates to deal with practical problems. Furthermore, the current leadership in the industry generally received their training in the Eastern bloc, and many

of them are trained only in a single, narrowly defined area.

If the industry is to develop the capacity for sustained, independent growth, it will be necessary to train a group of individuals capable of directing applied research programs and setting up training programs independently as well as providing leadership and planning at the national level. This need cannot be met only with Master's level and short-term training. Therefore, a limited amount of doctoral-level training will be required in this case. Project plans call for the training of 10 individuals to the doctoral level. Since some will inevitably find jobs in other Middle Eastern countries or in private industry, it is estimated that this training will produce 5 to 8 individuals who will be able to contribute to the national leadership in the fish farming sector.

Table I

Partial List of Training Resources for Aquaculture

<u>Location</u>	<u>Subject Matter</u>
<u>US.</u>	
US Fish & Wildlife Service Arkansas (& elsewhere)	Fry handling & other aspects
Auburn University, Ala.	Aquaculture generally
Oceanic Institute, Hawaii	Mullet breeding/rearing
NMFS Station, Texas & Calif.	Plankton production
Univ. of Calif. (Davis), Calif.	Fish reproduction & genetics, farmers organizations & other aspects
Univ. of Rhode Island	Food Science
Georgia	Economics
Alabama	Research & training
Florida	Production & marine research
Arkansas, Texas & Mississippi	Research, large scale production, extension, economics, marketing, engineering, feed production, live fish transport & fish processing.
Idaho	Tilapia production & thermal outfall
Washington	Running water systems, hatcheries, fish nutrition & other aspects
<u>Third Country</u>	
Germany (Eamburg Fisheries Institute)	Carp culture & hatcheries
India (Central Inland Fisheries Institute, Barrachpore)	Carp culture & hatcheries

Brazil (USAID-Auburn Freshwater  
Aquaculture Center)

Monosex      tilapia

Philippines (ICLARM)

Mullet and small farmer  
practices

Taiwan

Tilapia & Small farmer practices

## ANNEX 14

Contractor Responsibilities

The principal contractor will work together with the Ministry of Agriculture to implement the project over a five-year period. At the end of this period, it is expected that all institutions and facilities described in the project paper will be in place and functioning at their full operating level (with the exceptions of the mullet hatchery and the stage II production farms, which will require another two-to-three years to reach full production capacity).

Present plans call for the project to be implemented through four contractors. In addition to the prime contractor, whose responsibilities are discussed below, there will be a PSC fisheries specialist to manage the project prior to the principal contract team's arrival, an A&E contractor to finalize the design work on the National Center and a construction contractor to begin construction work. The latter will be supervised by the interim fisheries specialist and, upon his arrival, by the principal contract team leader.

The principal contract team will consist of six long-term resident advisors and 60 mm of short-term advisors as follows:

1. Team leader. The team leader will serve as project technical manager. This position will therefore require both substantial administrative capability and a sound knowledge of fish farming programs. She/he will work with the GOE Project Director and the Director of the National Center throughout the entire project period to establish applied research, extension, hatchery and other institutions needed to support the Egyptian fish farming industry.
2. Civil/Aquaculture Engineer. The engineer will be responsible for overseeing all construction and design activities in the project and will also respond to requests made to the National Center to for assistance in designing fish farming facilities.
3. Hatchery Specialists. Expertise in hatchery management will be required for the Serow and Abbasa carp hatcheries, the mullet collection center at Al Mex, Al Gameel and Al Gerby and to the fry transport activities nationwide. Assistance may also be provided for the World Bank project and private enterprises in carp and tilapia fry production. This assistance may be provided by one individual or the contractor may elect to bring a carp specialist for the early years of the project and then substitute a mullet specialist when work beings on the mullet hatchery. It is probable that an additional person with expertise in plankton production will also be brought on at this time to work at the mullet hatchery for a two-year period.

ANNEX 14 (continued)

4. Extension Specialist. This individual will assist in setting up an extension service to operate out of the National Center. While extension services will initially be provided primarily in the Sharkia and Ismailia areas, it is expected that the service will be expanded to serve the World Bank areas and ultimately the entire country. In addition, to setting up the extension operation itself, including printed materials and liaison with other extension services, the specialist will be responsible for designing the training program for the extension interns and will provide assistance to the World Bank and other projects as requested.

5. Food Technologist. This individual will supervise research on the processing, transport and marketing of fish. She/he will oversee the development of the project marketing operation and provide assistance to Zagazig market. In addition, the technologist will be responsible for developing appropriate technologies for processing fish such as salting and sundrying.

6. Pond Production Specialist. A specialist in pond production will be provided during FY 80 and FY 81 to assist in the establishment of the homestead farms and speed development of the technologies to be used by the village and mixed poultry/fish operations. She/he will also be responsible for identifying the most profitable mix of inputs suitable for Egyptian conditions. The specialist term may be extended if it is deemed appropriate.

Short-term Specialists. The prime contractor will provide short-term assistance totalling approximately 60 person-months. An important member of this team will be a specialist in farm management coops and credit (12 months in FY 79 and 80 and 3 months in FY 81) responsible for training the homestead farmers in needed management skills, developing workable procedures for the credit fund and assisting the farmers to deal with the bank and other institutions. She/he will also provide assistance in forming a cooperative for the homestead farmers and in working with established village cooperatives. The team will also include a malacologist/parasitologist (two-week visits yearly for five years) to monitor the risk of bilharzia and propose a course of action if needed. Further expertise will be required in the areas of fish breeding (7 mm in FY 80, 81 and 82) fry transport (7 mm in FY 80 and 81), fish nutrition (8 mm in FY 80, 81 and 82 and 83), and fish diseases and parasites (7 mm in FY 81, 82 and 83). The contractor will also provide ongoing technical assistance totalling 14 mm in these and other specialities as required over the life of the project.

## ANNEX 15

Alternative Technologies for Fish Pond Management

Under present plans, the fish farms will employ a technology intermediate between the natural pond condition (i.e. no feeding) and an intensive systems involving substantial amounts of supplemental feeding. The recommended systems raises the production of natural fish food through application of manures and fertilizers (.34 MT of superphosphate and 1.85 MT of animal manure per feddan per year). This method is simple to manage, requires very low amounts of capital (less than LE 30/feddan for inputs) and poses little danger of input shortages.<sup>1/</sup>

Given the current prices for fish<sup>2/</sup> the technology proposed yields a substantial profit, as discussed in Section III-A and Annex 12.

<sup>1/</sup> Egypt at present exports superphosphate. If animal manure should be unavailable in sufficient quantities, supplies can be supplemented with ammonium sulfate.

<sup>2/</sup> The price for fish used throughout this paper is a weighted average calculated as follows:

<u>Type of Fish</u>	<u>Amount Produced</u> (k)	<u>Price</u> (LE/k)	<u>Weighted Average</u> (LE)
Tilapia	700	.34	238
Small	(210)	.10	
Large	(490)	.44	
FMC	(40)	.32	
Free market	(450)	.45	
Carp	200	.45	90
Mullet	<u>100</u>	1.30	<u>130</u>
	Total 1000		458

ANNEX 15 (Continued)

Other technologies exist, however, which produce markedly greater quantities of fish by increasing the amount of feeding. These technologies, which involve additional feeding, have the potential to produce a return for the farmer equivalent to the recommended system. Assuming that the additional feeding and harvesting could be carried out using the same labor and equipment as the system recommended, the relative costs and returns of the various technologies are remarkably similar, as shown in the following table:

Table 15-1  
(Per feddan of water area)

<u>Technology</u>	<u>Cost of inputs</u> (LE)	<u>Total Costs<sup>a/</sup></u> (LE)	<u>Yield</u> (MT)	<u>Gross Return</u> (LE)	<u>Net Return</u> (LE)
1. Superphosphate and manure	28.7	379	1	458	79
2. Superphosphate, manure, rice bean and cottonseed cake	172.7	655	1.6	733	78
3. Superphosphate, manure and pelleted feed	364.7	929	2.2	1008	79

Technologies employing the supplemental feeds alone are much less profitable than the recommended set of practices. These feeds must be imported, leading to high cost and uncertain availability, both now and for the foreseeable future. Therefore, it is not recommended that technologies employing supplemental feeds be utilized at the present time. However, as the demand for protein foods increase and as land and water resources become more scarce, these technologies will become more attractive. Greater management skills will also develop over time, giving Egypt the capability to employ these more complex technologies with the desired results. It is anticipated that fish farming will evolve gradually from the extensive system proposed here to a more intensive system involving supplemental feeding, as well as other capital-intensive methods such as aeration, sophisticated water control systems, and high stocking rates.

<sup>a/</sup> Assuming an additional LE 50 per MT harvested for ice and an increase in the loan to cover additional inputs.

ARAB REPUBLIC OF EGYPT  
 MINISTRY OF AGRICULTURE  
 MINISTER'S OFFICE

340  
 15-5-78

ACTION NO.	17/1/100
ACTION TAKEN	26
DATE	25

Cairo, May, 14, 1978.

Dear Mr. Brown:

Great emphasis is currently being placed on the increased production of food from all sources in Egypt. It is anticipated that fish production, and in particular the pond production of fish, will play an important and increased role towards meeting the large unmet demand for non plant protein. In this regard the Ministry of Agriculture is undertaking a program to develop a fish farming capability, and to increase the output of fish through pond production. The Ministry, in cooperation with a United States Agency for International Development project design team has recently identified several specific areas as having the potential for increasing fish production, and developing complementary production capability which would benefit from assistance that could be provided by the United States. These include the following:

1. The establishment of a National Fish Farming Center at Abbasa.
2. The provision of funds to supply capital to be used on a revolving basis for the establishment of production ponds by private farmers.
3. Assistance for the establishment of two mullet collecting stations at Al Gameel and Al Girby, and a mullet hatchery at Al Gameel.
4. Assistance for hatchery development at Abbasa, and improvement at Serow for non mullet species.
5. Assistance for the training of appropriate project related personnel and fish farmers.
6. Assistance for determining a village level program for increasing production of village pond fish producers.
7. Assistance with the development of a pilot model Fish Market at Zagazig.

The Undersecretary of State for Aquatic Resources will be the Project Director and will be in charge of coordinating the project.

The Ministry of Agriculture will send through the Ministry of Economy an official request for technical assistance from the Government of the United States of America, through the Agency for International Development, to develop and implement the foregoing aquacultural activities.

We hope that this project will receive your kind consideration.

Sincerely,

*M. M. Dawoud*

M.M. Dawoud

Minister of Agriculture

Mr. Donald S. Brown  
 Director  
 U.S. Agency for International Development  
 American Embassy  
 CAIRO.

101a.

ARAB REPUBLIC OF EGYPT  
MINISTRY OF AGRICULTURE  
MINISTER'S OFFICE

(2)

Cairo, July 31, 1978.

The Ministry of Agriculture officially requests technical assistance from the Government of the United States of America, through the Agency for International Development, to develop and implement the foregoing aquacultural activities.

We hope that this project will receive your kind consideration.

Sincerely,



M. M. Dawood  
Minister of Agriculture

Mr. Donald S. Brown  
Director  
U.S. Agency for International Development  
American Embassy  
Cairo.

Annex 17Decree Creating National Committee  
for Aquaculture Development

Ministry of Agriculture

Ministerial decree No. 2147 date 4/8/1978

The Minister of Agriculture, Agrarian Reform and Rural  
Development

After reviewing law 58/1971 with regard to Government  
employees, law 60/1971 of the General Organizations and  
the Public Sector companies amended by law 111/1975,  
law 61/1971 of the Public Sector employees,  
the Presidential decree No. 641/1976 transferring certain  
Authorities to the Ministry of Agriculture,  
the Ministerial decree No. 305 dated 1/10/1977 forming  
the Sub-Ministry for Aquatic Resources in the Ministry of  
Agriculture,  
the memorandum by the Undersecretary for Aquatic Resources  
dated 3/28/1978,

Decided

1. To form a working group to execute and follow-up the  
aids given by the U.S.A. and the World Bank in the fish  
farming project to upgrade the level of the new fish  
farmers in the A.R.E. as follows:
  - a. The Undersecretary for Aquatic Resources

- b. A member from the I.O.F.
- c. A member from the Land Reclamation Authority
- d. A member from the Fish Marketing Co.
- e. Specialists from the Undersecretary of Aquatic Resources office
- f. An economic official from the Ministry of Agriculture.

And the committee can be assisted by whomever it thinks is useful.

2. The duties of this working group are as follows: to plan, control the execution, discuss the policy of developing fish farms and coordinate the work within the field, training, extension education, establish model fish farms and research.
3. All responsible authorities should execute this decree

Minister of Agriculture  
Agrarian Reform and  
Rural Development

/s/

ENG. Ibrahim Shoukry

ANNEX 18Rationale for Emphasis on Fish Farming over other Aspects  
of Aquaculture

The project proposed concentrates on the fish farming subsector of Egyptian aquaculture and will not directly contribute to other subsectors, such as high seas fisheries or enclosed lake fisheries (husha). This decision, which was taken following the initial AID evaluation team's report, December, 1976, was based on the following considerations:

- a. The GOR is particularly interested in fish farming and their request for assistance was directed specifically at fish farming. Thus a project in this area would be most responsive to Egypt's perceived needs.
- b. Promising alternatives for increasing the catch from the high seas and coastal fisheries are limited. The principal problem is what appears to be a permanent decline in fish populations due to a decline in silt flow from the Nile aggravated by persistent over-fishing by a number of Mediterranean countries.
- c. The coastal lake fisheries offer some potential for increasing production. However, pollution from industrial development along the coast increasingly threatens the viability of these fisheries. Land reclamation is also proceeding rapidly in this area and it would be unwise to proceed with development of lake fisheries until the GCE decides definitely to allocate the lakes to fishing. Finally the husha farms, which are an important element of lake fisheries, are officially illegal. It was felt that this would place such serious barriers in the way of project implementation that it would be unwise to pursue development in this area at this time.
- d. Considerable potential exists for further development of Lake Nasser and other inland lakes (particularly Qarun). However, several other donors, including the U.K. and Norway, are providing assistance in this area and further support is judged to be unproductive at this time. Assistance to Lake Nasser development remains an alternative for a later project.

In light of these considerations, the project feasibility study and design teams concentrated their efforts in the area of fish farming, which offers considerable promise for high returns given the present condition in Egypt and provides the best alternative for development at this time.

Other Donor Activities

The substantial opportunities for growth in the fish farming sector over the next decade have attracted a high degree of interest from a number of international donors in addition to AID. The principal donors involved to date are FAO and the World Bank.

FAO. As part of an overall program including a high level of technical cooperation and study tours, the FAO is assisting the GCE to establish a 1000-feddan pilot fish farm in Al-Lawya (Kafr al-Sheikh). Most of this area will be operated as governmental fish farms. The complex will also include a GCE-financed carp hatchery.

World Bank. The World Bank is completing plans for a large fish farming project in Egypt. Engineering studies are now underway for the first phase of construction for the 30,000-feddan area planned. Although the exact areas remain to be determined, it is expected that the project will initially concentrate in the Fayoum, identified as the most suitable location for fish farming after the Abbasa area. The full details of the Bank's project will not be available until their project team completes its work (now scheduled for December), but presently available information suggests that the Bank will provide a loan of \$50 million to finance a mixture of private and public farms.

Roughly half of the 30,000-feddan area will be devoted to 500-feddan public sector farms, and the remainder will be private farms, each with 15 feddans of water area. Thus, since these units will not be small farmer units in the Egyptian context, the Stage II farms of the proposed AID project represent the only fish farming activity that will specifically involve small farmers.

The World Bank project will not include a substantial component for training, research or other development of support institutions. (Some development of hatcheries will be required.) The Bank's project will therefore depend on the proposed AID project for these necessary services, including the training of extension agents, applied research, and support of planning at the national level. The coordination between AID, FAO, and the Bank that has been developed to date will be encouraged by the operation of the National Committee, which is charged with overseeing both the AID and World Bank projects.

Other Donors. A Canadian project to test methods for cage and pen culture of fish has been approved. A fish pond component is being considered for several planned livestock projects to be supported by the German economic assistance office. To date most other international assistance has concentrated on the development of lake fisheries.

Annex 20  
611 (e) Determination and Discussion of  
Maintenance Requirements for Government Facilities

The proposed project will, first, strengthen Egyptian support institutions for the fish farming industry by improving national planning and coordination, establishing a National Center for Fish Farming to provide applied research, extension and training, and increasing the production of carp and mullet fry. Second, it will establish 5000 feddans of private fish farms, including homesteads, village cooperative farms, medium-sized private farms and mixed fish/poultry operations.

The support facilities established will be administered by the Ministry of Agriculture in cooperation with the Institute of Oceanography and Fisheries. These organizations will provide all personnel needed to operate the facilities throughout the life of the project. The GOE contribution to operating expenses will be gradually increased during project implementation so that they are providing 100 percent of operating expenses during the final year of AID assistance. Following termination of AID assistance, the GOE will also be responsible for capital expenditures to replace equipment and any other expenses. It is estimated that the institutions that are established will require ongoing annual support as follows:

	<u>Cost</u> (1978 LE '000)
Staff	109
Commodities and operations	52
New equipment (estimated at 10% of initial requirements)	<u>212</u>
TOTAL LE	373

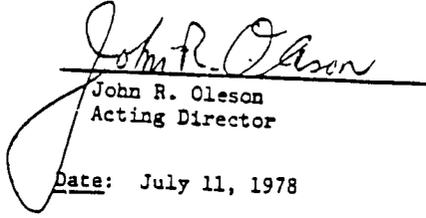
These costs have been discussed with the Ministry of Agriculture. Ministry officials have expressed their belief that this level is within the budget of the Ministry. Appropriations for the Ministry of Agriculture to support fish farming expansion have been tentatively set at LE 4 million annually over the next five years. A similar level can be expected in later years. While much of this amount will be utilized for salaries (including those of the project facilities), sufficient funds will remain to maintain the National Center and other facilities for the foreseeable future.

It is not expected that the new institutions will require a substantial increase in the number of employees of the Ministry. Most of the personnel provided will be drawn from among those already employed by the Sub-Ministry for Aquatic Resources or the IOF. The participant training provided will raise the productivity of these individuals and give them the skills necessary to manage the Center and other facilities.

The AID program in Egypt is relatively new and consequently no long-term experience with prior projects exists on which to base an estimation of future GCE support. To date, however, the GCE has provided full cooperation in the implementation of AID projects and their continued cooperation and support is anticipated.

The production farms provide an attractive profit margin to the individual farmer and do not require on-going external support. Credit is available for expansion or further investment through the regular procedures of the Agricultural Bank.

Based on these considerations, I hereby certify that the Arab Republic of Egypt has the financial and human resources necessary effectively to maintain and utilize the proposed project.

  
John R. Oleson  
Acting Director

Date: July 11, 1978

ANNEX 21Draft Project Authorization Request  
for Allotment of Funds

1. Pursuant to Part II , Chapter 4, Section 532 of the Foreign Assistance Act of 1961, as amended, I hereby authorize a grant to the Arab Republic of Egypt (the "Cooperating Country") of not to exceed three million five hundred thousand United States dollars (\$3,500,000), to finance the foreign exchange costs and help finance the local currency costs of the project as described in the following paragraph.

The project will assist the cooperating country to increase the production of high quality protein by a) strengthening the institutions for applied research, training, extension and hatcheries supporting the fish farming industry and b) establishing 5000 feddans of privately-owned fish ponds in Sharkia and Ismailia Governorates.

I approve the total level of A.I.D. appropriated funding for the project of not to exceed 27.5 million United States dollars (\$27,500,000), of which \$3,500,000 is authorized above, during the period FY 1978 through FY 1982. \$24,000,000 will be available for additional increments during that period of grant funding, subject to the availability of funds in accordance with A.I.D. allotment procedures.

I hereby authorize the initiation of negotiation and execution of the project 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 conditions, together with such other terms and conditions as A.I.D. may deem appropriate.

A. Source and origin of goods and services. Except as A.I.D. may otherwise agree in writing, goods and services financed by A.I.D. appropriated United States dollars shall have their source and origin in the United States or the Arab Republic of Egypt.

B. Conditions precedent to initial disbursement. Prior to any disbursement, or the issuance of any commitment documents under the project agreement, grantee shall except as A.I.D. may otherwise agree in writing furnish in form and substance satisfactory to A.I.D.:

- (1) A statement of the person or persons acting as grantee's representative, plus a specimen signature of each such person ;
- (2) Evidence that the National Committee for Aquaculture Development has been established, and has been given full administrative authority to coordinate and implement this project;

2.

(3) Evidence of designation of an official of appropriate rank within the Ministry of Agriculture as the project director; and

(4) Such other information and documents as A.I.D. may reasonably request.

C. Covenants. The Grantee shall agree to provide or cause to be provided for the project all funds in addition to this grant, and all other resources required to carry out the project effectively and in a timely manner.

ANNEX 22Glossary of Technical Terms

Aquaculture. Any activity to produce animal protein in water, including fish farming, shellfish production, and other means.

Carp. Cyprinus carpio. One of three species to be utilized in the production system. Carp is not native to Egypt, but it has been widely used there in fish farming.

Collection. The gathering of mullet fry from the shores of the Mediterranean, where they are naturally occurring. Collection is generally accomplished with nets.

Fingerling. Immature fish roughly 2-4" in length.

Fish Farming. The production of fish in artificially stocked ponds.

Fry. Recently-hatched fish smaller than fingerlings.

Hatchery. A facility for producing fry by natural or induced spawning.

Homestead. The land granted by the Ministry of Agriculture to recent agricultural graduates.

Mullet. Mugil cephalus and Mugil cepito (grey mullet), fish species native to the Mediterranean area that will be used in the production system.

Nursery. A facility for holding and feeding fry until they are ready for transport and for stocking in production ponds.

Tilapia. Tilapia nilotica and Tilapia zillii, fish species native to Egypt to be used in the production system.

ANNEX 23JUSTIFICATION FOR DOLLAR FUNDING OF LOCAL CURRENCY COSTS

Over the life of the Project, \$14,300,000 will be used to capitalize a revolving credit fund to support homestead and village Aquaculture operations, to finance architecture and engineering services for pond development, and to provide local currency support for U.S. project technicians. Local cost financing will be made available to the sub-ministry of Aquaculture in accordance with procedures to be established between USAID and the appropriate Egyptian Government authorities.

Financing of local currency with dollar funds represents an additional real resource to the Egyptian economy and provides an incentive for the Egyptian Government to implement new initiatives that otherwise it might not be able to undertake. The use of existing U.S. owned local currency to fund project local currency costs would add no additional real resources to the economy. Given the Egyptian Government's need to restrict the growth in the money supply to correspond to the growth in real resources in the economy, the inflationary impact of using U.S.-owned local currency would have to be offset by reduced Egyptian disbursements of other programs. Maintaining this fiscal balance is also required under the terms of the current IMF Standby Agreement with Egypt, which the U.S. and other donors have strongly supported.

If U.S.-owned local currency were used for all the Egyptian pound costs associated with this project, it is doubtful that the Ministry of Agriculture could enter into this agreement since it would have to sustain budgetary cutbacks in other areas. Given the above considerations and the fact that this project is consistent with the direction of the Foreign Assistance Act to undertake activities designed to improve the economic position and quality of life of the rural poor, the use of dollar funds to finance local currency costs should be authorized.

Current projections indicate that U.S.-owned excess local currency will be drawn down rapidly over the next several years. An inter-agency group is developing plans for the use of these currencies in future years. The group is assuming that the support of AID projects will not constitute a major use of these funds in view of other competing priorities for their use. Our tentative projection is that significant amounts of excess local currency funds will not be available for the project during the peak period of implementation.

Based on the above reasons, section 612 (b) of the Foreign Assistance Act should be waived to permit the dollar financing of local currency costs.