

**Mid-Term Evaluation of the  
Aquaculture Development Project  
Egypt**

**AID Project Number 263-0064**

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### Acronyms and Conversions

A & E	Architects and Engineers
AID	United States Agency for International Development
AID/Cairo	Agency for International Development/Egypt Mission
FMC	Fish Marketing Company, Ministry of Supply
GAFRD	General Authority for Fish Resources Development of the Ministry of Agriculture
GOE	Government of Egypt
HCC	Host Country Contract
IOF	Institute of Oceanography and Fisheries, Nat'l Academy of Sciences
JMM	James M. Montgomery, Consulting Engineers, Inc.
JMM/KNBS	A joint venture, prime contractor for technical assistance.
KCMI	Kramer, Chin and Mayo, Inc, Consulting Engineers. Prime contractor for design and construction supervision.
KNBS	KNBS Consulting and Civil Engineers
MC	Modern Contractors, Inc. Prime Construction Contractor
MHC	Model Homestead Complex at Abbasa
MOA	Ministry of Agriculture
NAC	National Aquaculture Center at Abbasa
PACD	Project Action Completion Date
PBDAC	Principal Bank for Development and Agricultural Credit
PB Sabbour	Parsons, Brinkerhoff, Sabbour, S.A, sub-contractor to KCMI
PIL	Project Implementation Letter
PIO/C	Project Implementation Order/Commodities

PP            Project Paper

PSC          Personal Services Contract

SMC          Systems Management Group, USAID/Cairo

TA            Technical Assistance

Trans-  
century      Transcentury Corporation, project commodity supplier

#### Weights and Measures

1 kilogram (kg)      = 2.2 pounds

1 metric ton            = 1,000 kg  
                              = 2,204 pounds

1 kilometer            = 0.621 miles

1 feddan                = 1.04 acres

#### Exchange Rate

1.00 Egyptian Pound (L.E.) = U.S.\$0.83168

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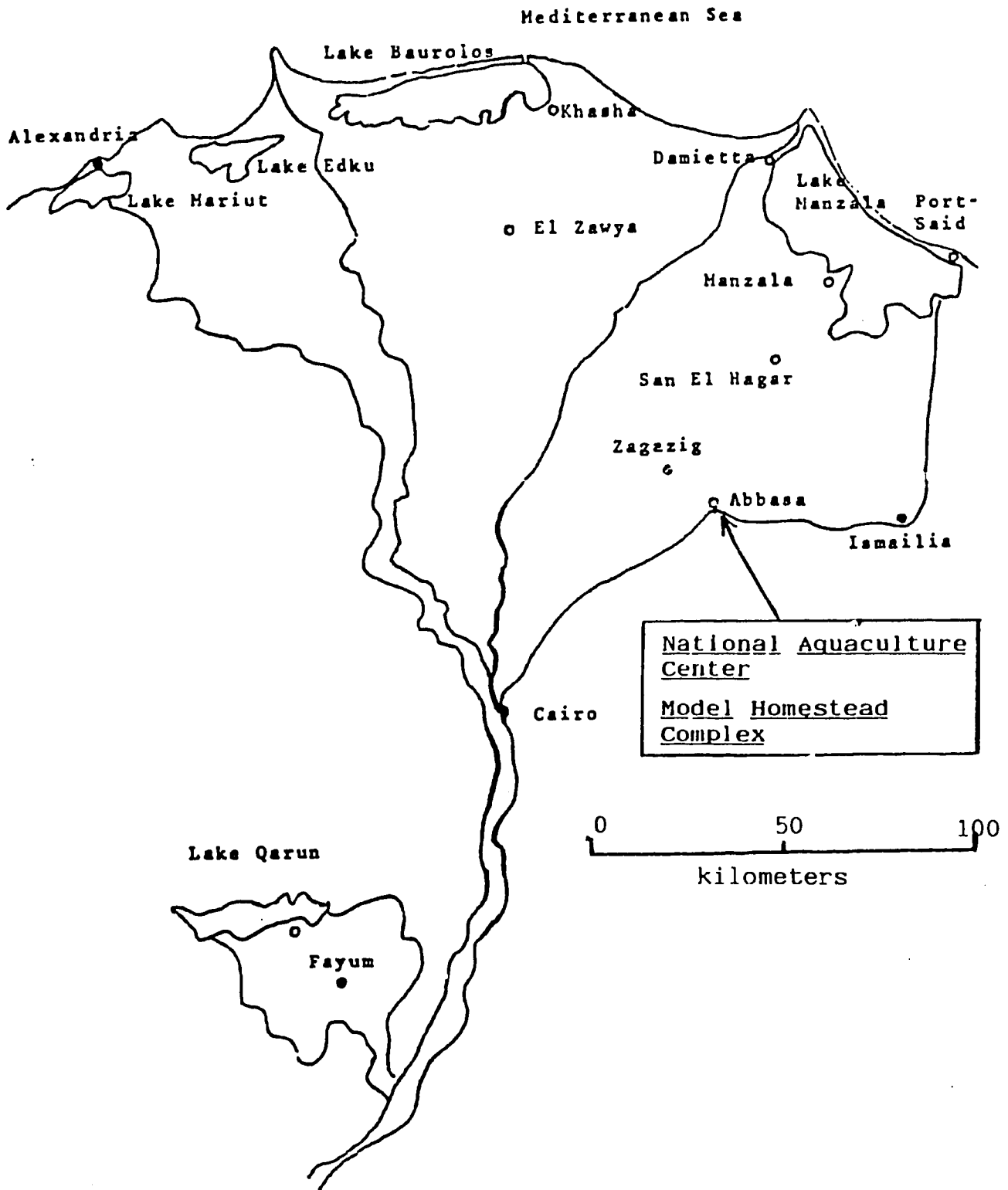


Figure 1. The Delta Region of Egypt. Source: Feasibility Report: Egyptian Aquaculture. USAID/Cairo, December 3, 1977.



## 1. Summary

The AID Aquaculture Development Project (263-0064) was funded in 1978 at \$27.5 million with the goal of supporting increased fish production through aquaculture.

1.1 Present Situation: The project has been at a standstill since August 1984 with the construction of planned facilities deleted, cancelled, or partially completed. Seven long term trainees are still in the US and two have returned with Master's degrees. None of the projects outputs have been completed.

1.2 Changes in Project Assumptions: Most of the initial assumptions as to GOE commitment to aquaculture, the demand for more fish, and the need for an institutional support system for aquaculture are valid today. Several assumptions have changed with the experience of the project:

- (1) The National Committee for Aquaculture Development has not provided an effective mechanism for project coordination and national planning and is assumed not to be useful for these ends.
- (2) Short term training is expected to be more useful in meeting project purposes than additional long term training.
- (3) The assumption that fish farming as conceived in the context of this project is attractive to private sector investment in homesteads needs to be proven.
- (4) Only a revised project purpose, limited to building the National Aquaculture Centre facility (building, research ponds, and housing) and (if economically feasible) 1200 feddans of production ponds is realizable within the available budget and an extended PACD. Improved institutions for management, planning, applied research, and extension support to a lower standard than envisaged in the Project Paper is assumed to be acceptable, attainable, and useful to meet the needs of the growing fish farming industry.

1.3 Prospects for successful completion: All revised project outputs can be completed within the funded budget and an extended PACD. Both the GOE and AID have shown enthusiasm for the renewal of effort required to successfully complete the project and to meet its original purposes.

1.4 Recommendations: The project outputs are expected to be fulfilled by:

- (1) Resolving the outstanding conflict between the Ministry of Agriculture and Modern Contractors. This would be shown to have been accomplished by an exchange of letters between the two parties expressing agreements on all outstanding points. This should be the responsibility of Y. Hassan and is expected to be ready by 1 March 1985.
- (2) Contracting two aquaculture specialists: and engineer and an "aquapolitician" who can assist the MOA in the implementation of this project. They would be expected to assist in the modification of the design and should be seconded to the MOA before 1 April 1984. An efficient contract mode must be selected (PSC, PHCC, or through P.B. Sabbour and seconded to the MOA), a letter of request from the MOA solicited, and funding provided. This is the job of the Project Officer. The specialists would act as liaison on behalf of the MOA to meet AID requirements for continued support.
- (3) Modern contractors agreeing to return to work on a staged construction schedule, beginning with all tasks required to put the NAC buildings in to operation, including the garage but excluding canal process water. The second stage will be all tasks required to put the redesigned NAC ponds into operation, including those served by canal process water and the water supply to the existing governorate fish farm. P.B. Sabbour should be responsible for making the necessary design changes, drafting the staged schedule, delivering the instructions from the MOA to Modern Contractors, and providing the letter of agreement from Modern Contractors. This should be accomplished by 15 April 1985 for the first stage of construction.
- (4) Resolving design issues and an agreement on the cost of implementation of change orders. Design modifications can be provided by P.B. Sabbour assisted by the aquaculture engineering specialists provided with AID funding to the MOA. The redesign work and preparation of change orders and drawings is expected to require three months of real time and should be completed by 1 July 1985. The responsibility for these changes would be P.B. Sabbour's.

- (5) Deciding on the revised costs to implement the change orders and keeping the project within budget, Modern Contractors should submit the estimates before 1 August 1985, having been provided with drawings as completed between April and July by P.B. Sabbour. The MOA aquacultural engineer should be made responsible for maintaining liaison among all principals and keeping to budget and timetables.
- (6) Providing a financial analysis of the proposed 1,200 feddan homestead production ponds and deciding on the financial viability and equity form of the proposed private sector involvement in the homestead scheme. AID can then make a decision on its participation or rejection of private sector investment in the homesteads. In the event of a positive decision, a credit program must be developed with the PBDAC to finance the proposed homesteader participation. Responsibility for this analysis should lie with the Project Officer who will assign an AID economist, to be assisted by the MOA aquaculture specialist. The decision on AID participation in the homesteads should be finalized before 1 August 1985 to permit funding and scheduling of project implementation of training credit application and production protocols.
- (8) Continuing short term training to provide a cadre of aquaculture specialists who can provide the support services from the National Center to the constituent fish farmers throughout the Delta. Responsibility for the development of training programs should lie with the MOA training specialist (Mr. Shenawi) assisted by the contracted MOA aquaculture specialists. Training programs should be well underway by September 1985.
- (9) Soliciting a proposal from the Institute for Oceanography and Fisheries for a mullet brood stock development program at one of its existing marine water stations. This should be the responsibility of the IOF who would be assisted by the MOA aquaculture specialist as required. The proposal should be submitted to the AID Project Officer by 1 June 1985 for review and funding, if appropriate to the long term needs for commercial mullet hatchery technology development of the nation.
- (10) Permitting long term trainees presently in the US to continue their studies as appropriate to the needs of the Aquaculture Project. Their training grant might be moved out of the project budget to permit their studies to continue without the pressure of the present PACD. This should be done immediately by the AID Project Officer in conjunction with the MOA training officer and the AID training office. The permission should be completed by 1 March 1985.

- (11) Deleting the requirement for a functional National Committee for Aquaculture Development to be responsible for project coordination and implementation procedures. The responsibility should rest with an individual, most likely the Chairman of the General Authority for Fish Resources Development. He will delegate the work load to the project staff and his specialist assistant as he requires. This structural change should be clarified by 15 March 1985. AID regulations may require an addendum to the Project Paper reflecting this change. The Project Officer will be responsible for promulgating the change in the proper form.

## 2. Project Background

A detailed background is provided as Annex I.

2.1 Between December 1976 and July 1978 AID identified fish farming as offering the best potential for increasing the production of fish available to Egyptian consumers.

The Project Paper, August 1978, contained the design for a five year, \$27.5 million project to establish:

- o A National Aquaculture Center at Abbasa to provide training, applied research, and extension services to aquaculture.
- o A 1200 feddan production area consisting of 80 homesteads adjacent to the Center to serve as a model for private sector fish farming.
- o Credit facilities for the homesteads to rollover and support an additional 3800 feddans of fish farms in a second phase to include village fish ponds and cooperatives. Inputs were not provided for the second phase.
- o Support facilities outside the proposed National Center including two carp hatcheries, a mullet hatchery (provisional), and two mullet fry collecting stations.
- o Long and short term training for Egyptian aquaculturalists abroad and support for national planning activities through a National Committee for Aquaculture Development that would support applied research marketing and production activities throughout Egypt, including a market at Zagazig.

2.2 Separate host country contracts were signed for A&E to design facilities (1979) and technical assistance (1980) to provide advice to MOA on implementation of training, extension and applied research required to achieve the project purpose.

2.3 Delays to A&E input were at least partially due to AID insistence on design changes, partly to contractor overdesign, and in large measure to the shortage of technical expertise in AID and MOA that could successfully monitor A&E output for implementation.

- 2.4 Early and continual constraints to technical assistance were a product of contractor mismanagement, construction delays which left the team without a focus of operation, and MOA changes in their terms of reference. The combination of factors led to the cancellation of the TA contract in 1983, despite some useful input by individual team members.
- 2.5 Cost overruns and delays resulted in decisions to delete ancillary project facilities (hatcheries and market) and finally to cancel the A&E contract. These changes established adversery relationships among the component organizations and confused project implementation.
- 2.6 An "embezzlement" scandal in 1983 involving a principal of the American TA contractor, and implicating several MOA officials, led to further unilateral decisions to cancel the TA contract and delete the mullet collecting stations and the homestead production ponds. This further exacerbated the adversary relationship.
- 2.7 A construction contractor with little experience in earthmoving, together with A&E design errors, further delayed project implementation. A legal battle between this contractor and the MOA resulted in a complete cessation of construction in August 1984.
- 2.8 Recent overtures by the Minister of Agriculture have led to renewed discussions. All principals have taken steps toward the resolution of previous constraints and are hopeful that the project can be brought to a successful completion.

### 3. Evaluation Methodology

- 3.1 The Aquaculture Development Project, 263-0064, Project Paper recommended that an in depth evaluation take place when stage I of the project was well established and plans for stage II were prepared for implementation. This was meant to take place in month 36 (July 1981) when the National Aquaculture Center programmes were well under way, the homestead farms operational, and plans for small farmer aquaculture production in hand (PP section VI page 45).
- 3.2 The original purpose of the evaluation was to measure progress toward the establishment of a research and extension capability for aquaculture and to assess the first stage of commercial production prior to establishing further private sector fish ponds.
- 3.3 The purpose of this present evaluation is to assess the status of the project, clarify the reasons for its sad state, and extract the lessons to be learned from the mistakes. The evaluation is to provide recommendations and a plan of work that will guide the project to a successful completion and permit it to achieve its modified purposes.
- 3.4 Background information for this evaluation came from documents available at the Ministry of Agriculture (MOA) and AID including; reports of meetings, correspondence, contracts, contractors' reports, and in-house memos. These data were supplemented by interviews with MOA, AID, and contractor personnel involved and/or familiar with the project. Some of the MOA and AID staff closest to the project have since departed Cairo or retired, they were not interviewed but representatives of the terminated contractors were interviewed.

#### 4. External Factors

- 4.1 There were no major changes in the project setting or government policies that hindered the implementation of the Aquaculture Project. On the contrary, the Minister of Agriculture has placed a high priority on the production of fish from aquaculture as part of his food security initiative. Due to the limited land available for food production and the suitability of otherwise non-productive land aquaculture has continued to play a growing role in MOA policy and it has completed, or has under construction, nearly 10,000 feddans of public sector and homestead fish farms in addition to four operating carp hatcheries, mullet seed collection and distribution facilities and a fish marketing company. The proposed National Aquaculture Center (NAC) is to be the focus for applied research, training, and extension services for the entire aquaculture sector, which now includes 50,000 feddans of private sector fish ponds. For these reasons the MOA is extremely anxious to see the project completed and to have it include both the National Aquaculture Center and the Model Homestead production complex.
- 4.2 The delays to project implementation were all caused by elements within the tripartite structure of AID-MOA-Contractors.



## 5. Key Project Assumptions

- 5.1 The investment in a project to produce fish correctly assumes the existence of an unfulfilled demand for fish. The official annual per capita consumption statistic is 5.5 kg. This does not reflect the full estimated inland catch from the lakes and rivers of the delta, which would increase the per capita consumption to 8.1 kg per annum. The assumption of a further strong demand can be shown by:
- o The present local market acceptance of up to ten tons per day of low priced fish from regional government fish farms:
  - o Present acceptance of small (less than 80 g) fish;
  - o The acceptance of large quantities of carp at firm prices. Carp is a new and unfamiliar species of fish and fish buyers are usually very conservative about new introductions; and
  - o The annual importation of more than 100,000 tons of low priced food fish.
- 5.2 The assumption that the National Aquaculture Center would provide the training, research and extension required to support the growth and development of fish farming in Egypt is still valid. The proposed institutional development and support facilities proposed by the project are indeed crucial to an orderly and sustained growth of the aquaculture sector in Egypt. Presently there are no training facilities for fish farmers, no extension services for aquaculture, and no focus of applied research to support fish production.
- 5.3 An important assumption is the continued support of the GOE for aquaculture. This commitment appears in 1985 to be even stronger than it was in 1978. This can be shown by:
- o The speeches of the Minister of Agriculture:
  - o The establishment of 10,000 feddans of government and homestead fish farms and four government hatcheries, and other initiatives (See Annex II Fish Farming Projects in Egypt)
  - o The establishment of a General Authority for Fish Resources Development; and
  - o Permission for free market sale of fish to encourage the private sector.

- 5.4 The assumptions that aquaculture makes productive use of otherwise unsuitable marshy or saline lands and that it makes use of labor out of the normal agricultural season are still valid. However, private sector aquaculture is generally a technique used to produce higher priced fish and crusteans for export or for the urban markets, rather than low priced carp and tilapia. Public sector aquaculture for the production of large quantities of low priced fish is usually a subsidized activity.
- 5.5 The original assumption that fish farming will be attractive to the private sector has apparently been shown without the establishment of the National Aquaculture Center (NAC). There are presently 50,000 feddans of private fish farms in the Delta region. The NAC is expected to offer pre-investment information and post-investment support to provide investment confidence in aquaculture. Demonstration of successful aquaculture production is still assumed to afford a major stimulus to investment but has not yet been shown for the homestead complex as conceived for this project.
- 5.6 The assumption that most trainees will remain in Egyptian aquaculture has been partially demonstrated. Three long term trainees have returned to work and a fourth is expected in July. Four Master's degree recipients have remained in the US to apply for PhD degrees. Egyptian tradition values education, and a higher degree provides the fastest route for advancement. The higher the degree, the greater the individual's flexibility for personal success. The consultant believes that the longer a trainee remains away from the project the further it recedes from his immediate concern. A revised assumption might expect that a long-term trainee's commitment would be stronger after a series of short-term training, courses, work in the sector, advancement, further training and further work and advancement. An implicit assumption is made that there are and will be sufficient opportunities in private sector fish farming to keep qualified people in aquaculture even though they move between the public and private sectors.
- 5.7 The assumption that the National Committee would provide the most effective mechanism to coordinate national planning was perhaps incorrect. The original committee formed in 1978 seldom met; a new committee was formed in 1984 to discuss problems in operations, budgets, and the management of existing government fish farms and to forward decisions to the appropriate executive for implementation. There is a real need for orderly growth of the industry and for coordination between public and private sector fish farm development,

between applied and basic research, and between the national need for low priced fish protein and the encouragement of the private sector. Although a National Committee might be a useful venue for airing these concerns, the consultant believes that decisions in Egypt are more likely to be made after dialogue and negotiation between principals rather than by a committee.

## 6. Progress Since the Last Evaluation

- 6.1 The first in-house project evaluation of October 1982 reported that the Aquaculture Development Project was 30 months behind schedule and construction was not scheduled for completion before Autumn 1983. The technical assistance team was thought to be contributing to improved GOE institutional capability in aquaculture; this contradicted a June 1982 Audit Report that recommended termination of the technical assistance contract unless performance was improved.
- 6.2 Since that evaluation the project was the center of a "visible political issue" based on alleged abuse of GOE funds by a principal of the American technical assistance contractor. Subsequently, AID pressure on the MOA, and related MOA disagreements with the Egyptian construction contractor, brought the project to a near standstill.
- 6.3 In February 1983 the USAID/Cairo Systems Management Group (SMG) produced the "Kingery Report" which concluded that both the US and the GOE have strong commitment to the project; its outputs "are vital to the success of the overall aquatic resource development plans of the GOE". The project appeared achievable but could not be finished within the allotted budget or permitted time frame. To successfully complete the central purpose of the project within its allocations, the SMG recommended that the support facilities (hatcheries, mullet collecting stations and the fish market) be deleted from the project and that the construction of homestead ponds and the associated credit program be cancelled; only the NAC facility was to be completed and the technical assistance extended to overlap the returning trainees. The evaluation recommended that the PACD be extended to December 1987 to give the contractor a chance to successfully finish the construction and incorporate certain design changes recommended by the technical assistance team.
- 6.4 The Consultant believes that the conclusions of the "Kingery Report" are essentially valid today.
- AID's subsequent pressure on the MOA to cancel the TA contract was no doubt at least partially motivated by the contractor's involvement in the scandal. The result was that MOA and AID established an adversary relationship.
- 6.5 Progress on the project has essentially ceased except for seven long term trainees still in the US and ongoing commodity purchases and shipments.

## 7. Inputs

### 7.1 Technical Services: A & E

7.1.1 The MOA contracted (HCC) with KCOMI in September 1979 after 5 months of negotiations. By November KCOMI's outlined concept was prepared and on 5 February they submitted design concepts for a \$39 million aquaculture complex. After a request to stay within the original budget of \$3.8 million, KCOMI returned after only 21 days with revised designs for a \$15 million facility. The rapid slashing of \$24 million from the original design was mostly likely the major source of present design inadequacies. The lack of qualified personnel in AID or the MOA to monitor these changes before approving them institutionalized the design errors. Until today they persist despite recommendations from the 1983 technical evaluation and from the technical assistance team for design changes.

7.1.2 A & E inputs were the initial cause of project delays and cost overruns. In February 1981 KCOMI, in a letter to AID, explained that these problems were due to:

- o AID misunderstanding of the project complexity; 504 drawings were required instead of the 128 specified by contract;
- o AID insistence on custom built housing; this alone required 126 construction drawings;
- o Unrealistic scheduling;
- o Land tenure problems that required redesign due to site change;

For these reasons MOA requested that AID, replace the Project Officer. This was immediately done.

7.1.3 The KCOMI contract with MOA was terminated in July 1982 to save project funds. MOA questioned the usefulness of KCOMI supervision of P.B. Sabbour since there was no regular KCOMI presence in Egypt. AID believed that P.B. Sabbour (the local subcontractor) could provide (and was providing) the technical assistance necessary to supervise the construction contractor in the interpretation of project design. KCOMI believed that this termination relieved them of responsibility for design errors and the revision or interpretation of design changes. (This point is still mooted by some Egyptian lawyers.)

7.1.4 At present the A & E prime contract is held by the MOA since KCOMI's subcontractor, P.B. Sabbour, refused to accept responsibility for KCOMI's design. There are apparently no civil engineers within the MOA, certainly none within the GAFRD, to provide design supervision or monitoring. Some assistance is provided by an engineer at the Ministry of Irrigation. Additional engineering services such as design revision, are reportedly now being provided to the MOA on request by its subcontractor, P.B. Sabbour. Neither engineer has the experience in aquaculture required to the functional utility of the fish ponds for aquaculture use.

## 7.2 Technical Assistance

- 7.2.1 By separating A&E from TA in the Aquaculture Development Project, AID separated the "hardware" from the "software" so that the TA was forced to either alter its designs to suit the A&E firms facilities or alter the A&E designed facilities to suit its own training, research, production, and extension methods. Either case established another potential source of criticism, disagreement and conflict. It is doubtful whether the basic errors in the KCOMI design that surfaced with their revised concept in February and June 1980 would have remained unchanged very long had KCOMI been responsible for the technical assistance assigned to work within the design constraints.
- 7.2.2 The team leader of the technical assistance contractor, James M. Montgomery/Khairi Nests Brudin and Stone (JMM/KNBS) arrived in December 1980. AID immediately became aware of the conflict between the partners, but the financial irregularities of one of the partners was treated as an internal management issue by AID. Continued warnings from the AID Project Officer were ignored by AID management until it became a political issue implicating several high MOA officials.
- 7.2.3 The Technical Assistance was conceived in the project paper to provide assistance to the National Committee for Aquaculture Development in its role as coordinator and planner of government activities in fish farming; (approx. one-fifth of the team leader's time was to be spent with the National Committee during the first year of his tour. Project Paper page 13), with particular attention to the AID and World Bank Projects. The TA team were to oversee A&E work in cooperation with the GOE project director:

"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..." "The central responsibility of the contractor is to assist the GOE in establishing the (NAC) and the 5000 feddans of production ponds" (Project Paper, page 17)

7.2.4 Several factors combined to prevent the TA team from effectively fulfilling these terms of reference.

\* They arrived out of synchronization with NAC construction; delays in construction left their Abassa housing unfinished and the TA team without a venue or focus for operation.

\* Coordination of the project was meant to come from the National Committee with the assistance of the Interim PSC Aquaculture Specialist. This would have included coordination between engineering and aquaculture prior to initiation of construction. The committee apparently did not deal with the problem.

\* Their terms of reference had apparently been changed by MOA without new terms being clarified. It is understandable that the interim specialist and AID would bring in the TA team, especially in the face of a construction delay, since they were meant to "supervise construction", put it back on schedule and "approve the final designs for the research and extension facilities prior to the initiation of construction work on these structures." (Project Paper p 14). As they were a separate contractor, MOA reportedly instructed them to not become involved in A & E. Recommendations they did make to MOA went unheeded.

\* There appears to have been some confusion between the PP concept of a single contractor providing both A&E and TA under separate contracts (Project Paper, page 17) and the implementation of the project which was divided between two contractors. The project paper does not seem to have been amended to reflect this division. Such an amendment might have clarified the role of the TA contractor vis-a-vis construction so that either AID or the MOA could have provided the construction monitoring function that was removed from the TA Team. The central responsibility of the TA contractor was to advise the MOA on the development of the NAC and its programs for extension and training (MOA JMM/KNBS contract scope of work p. 4). After being excluded from construction supervision they

were left with the training aspect of the project until construction could be completed. Rather than wait for Abassa to be completed, the contractor sprinkled technical assistance around to several hatcheries and fish farms. Although this advice was useful, the TA team was Cairo based and hence their assistance was thinly spread to several fish farms and hatcheries. This independence and lack of focus was seen by some as a lack of commitment.

- 7.2.5 The (General Authority for Fish Resources Development (GAFRD), is presently negative about long term technical assistance. Some staff feel they have been patronized by US contractor technical assistance, whose loyalties were felt to be to the contractor rather than to the project or the client (MOA). The GAFRD Chairman does not recognize any need for further long term TA when the Abassa facility becomes operative, preferring to use its own people and request short term technical assistance as required. The short term specialists would work under the direction of Egyptian staff on specific problems. This appears to be a reaction against a perceived impression of an independent, and perhaps patronizing attitude that may have been left by the previous TA team.

### 7.3 Training

- 7.3.1 The first six long term trainees went to the US for graduate education in September 1980, several months before the technical assistance team arrived in Egypt. The project plan was to train 45 graduate aquaculturists to the Masters (35) and PhD (10) level. The English language requirement established a significant barrier to potential long term trainees and only a further three were able to go to the US before time constraints imposed by the PACD limited the opportunity to complete a graduate degree. AID has left the MOA with the impression of extreme inflexibility and indifference due to its opening, then design the to long term training.
- 7.3.2 The technical assistance team training specialist was ineffective in assisting trainees to either improve their English capability or to find an alternative third country university where training could be conducted in Arabic or to assist AID in providing language training in the US and extending the training commitment.



- 7.3.3 Time required for training was underestimated due perhaps to deficiencies in English language capability. Whereas 2 years was provided for a Master Degree, and 4 years for a PhD, the actual time requirement for completion has been 3 years and 5 years for the five Masters and the one PhD expected to finish in June 1985.
- 7.3.4 The TA team provided an in-country 4 month short term training course in Aquaculture for 23 participants and two shorter, speciality courses (one week) for 16 and (two week) 13 participants. AID sent 37 people to the US and to Thailand for short term training and site visits.

#### 7.4 Commodities

Commodities purchases appear to be moving ahead on schedule and within budget. The construction delays require that Transcentury, the contractor, store the goods on site in sealed containers until the site is ready.

#### 7.5 Changes in inputs required to provide outputs.

- 7.5.1 The largest output expected from the project by the PACD is the National Aquaculture Center and Homesteads infrastructure of buildings, housing, roads, canals and fish ponds. The project paper conception of this Aquaculture Development Project envisaged outputs of research, extension, training and production to meet its proposed purpose of providing the capability for sustained development of the fish farming industry and the addition of 4000 tons of fish each year to the national supply of high quality protein. Only minimal output of these support functions appears to be possible within the time frame of the presently redesigned project.
- 7.5.2 The revised outputs expected from this program will be only the construction and some short and long term training for MOA staff. Provision of the technological and management tools required to establish the capability for supporting the sustained development of fish farming in Egypt must come from the Egyptians trained by the program, their own recent experience in fish farming, and later, technical assistance that may be provided from other sources than this project.

- 7.5.3 The MOA has left this evaluation team with the impression that it would prefer the grant of facilities only, without the "strings" of technical assistance, or their commitment to specific long range plans for the use of the facility.

We recognise that the MOA has not demonstrated either management capability or technical expertise to the international standard desired by AID. Nevertheless, we believe that the provision of a facility and training assistance will meet the MOA requirements for a focus of applied research and extension support to the aquaculture industry.

To provide this output will require further time to permit design modifications and give the construction contractor a chance to finish the facilities. The work is expected to be finished within budget.

## 7.6 Input Recommendations

- 7.6.1 The PACD should be extended to 31 December 1987

The Technical Evaluation of February 1983 proposed that the PACD be moved to December 1987. This is indeed a realistic completion date given the pace of construction implementation and the necessity for extensive training to prepare MOA staff for their roles in applied research and extension which is expected to support the Egyptian aquaculture industry.

- 7.6.2 Two Consultants, an Aquaculture Manager and an Aquaculture Engineer, should be provided to the chairman of the GAFRD upon request to help in the implementation of the Aquaculture Development Project. The GAFRD should provide the planning, coordination and management for implementation of the NAC and the homestead production complex to which they have indicated a strong commitment. They have not satisfactorily demonstrated their ability to plan, budget and implement the Aquaculture project to meet AID standards. The proposed technical specialists are expected to

- (1) guide the GAFRD through the required steps toward implementation of the National Aquaculture centre and the "software" (staff, programs, budget training etc) required to operate these facilities.
- (2) act as liaison with AID and help the MOA to provide the required letters, protocols, forms etc, to meet the obligations to AID for continued funding.

- (3) act of behalf of the MOA to provide appropriate design changes, act as liasion between the MOA and its construction supervision sub-contractor, P.B. Sabbour, and facilitate paperwork and information flow between MOA and AID. Annex V suggests the terms of Reference for these specialists.

7.6.3 Intensive short-term training should be continued until the project termination date.

The GAFRD appears to be extremely limited in the number of trained or experienced staff with the ability to assume the applied research, training, and extension functions of the National Aquaculture Center. As soon as staff selection has been completed and job descriptions written, short-term training should begin so that the NAC staff can be as effective as possible in their new roles. We recommend that aquaculture courses in Arabic would be most effective in transmitting information, either in-country or perhaps in Tunisia or Israel where native Arabic speakers are involved in aquaculture. In-country training could be provided by the already trained staff of the GAFRD, staff of the IOF, or an outside organization (such as the International Ocean Institute in Valletta, Malta) that can design courses and bring instructors to a selected in-country venue. Prospective homesteaders should be includes in short term training programs.

The cost of short-term training for 20 individuals would probably be about the same in-country or out. Only if a larger group of potential trainees were available, would the cost of in-country training be significantly less expensive. Estimated costs for a two-month training course in the US are \$7,800 per person, including air fares. We recommend a budget of \$300,000 for the continuation of in-country, US and third country short-term training. This budget could accomodate 30 trainees for two months each in the US, plus 40 trainees for a 2-3 month course in-country, or some other combination to include third country programs.

7.6.4 Construction designs for drainage and for production and research fish ponds, should be revised and implemented along with specific instructions to the construction contractor on the method of proceeding to completion.

This work can be a joint effort between the MOA engineering specialist (para 7.6.1) and the engineer from the Dept. of Irrigation presently assisting the GAFRD. They would cooperate with P.B. Sabbour. Annex VI is a description of some of the required design and procedural changes recommended.

7.6.5 A long-term commitment to commercial mullet hatchery development should be made as soon as possible with a grant to the IOF at a suitable site within existing IOF facilities.

Mullet is the most valuable fish species in the present polyculture practiced in Egypt; its production is crucial to private sector profitability.

The availability of mullet fry (seed) will be an important limitation to the expansion of aquaculture. Present fry collection practices are wasteful of seed and result in high mortalities. Extension programs for mullet fry collection, fry handling, and nursery rearing must be a top priority for the NAC but cannot replace the ultimate need for a reliable source of large quantities of mullet seed. Since mullet spawn at sea and the Abbasa NAC facility is far removed from the sea, we recommend that the Alexandria IOF laboratory develop a grant proposal to establish a holding facility for a brood stock of mullet and to coordinate its efforts with other mullet hatchery work supported by the GAFRD. We estimate that a ceiling of \$50,000 would permit the establishment of the required holding facilities broodstock, and the initiation of applied practical research toward the development of commercial mullet hatchery technology in Egypt.

7.6.6 A financial/economic analysis of the proposed fish farming technique should be done to provide a realistic assessment of the viability of fishfarm homesteads.

The establishment of 80 homestead fish farms was conceived to provide encouragement to recent agriculture graduates to enter private sector fish farming as entrepreneurs. The project was designed to provide them with little more than the basic salary of a starting government official while binding them to a 15 year mortgage and subjecting them to all the risks associated with pioneering agriculture. This plan may not be attractive to graduate homesteaders, since:

- o government wages are not necessarily the entire source of family income of professionals employed by the GOE.
- o An entrepreneur would require an incentive of profitability commensurate with the risk and a return on investment at least equivalent to other private sector opportunities.
- o It is not within the usual Egyptian tradition for a university graduate to do the type of manual work required for fish pond management and maintenance of the homestead.
- o The single unit homestead design and low unit market value of the fish produced (see Annex VII), tends to reduce the independence and flexibility of the homestead fish farmer and would therefore necessitate a strong financial argument to provide incentive to the private sector.

The calculated present cost of the homestead development appears too large to be an acceptable mortgage burden for a homesteader under calculated cost-benefits in the Project Paper. One solution would be for the project to absorb all common costs of roads, canals, drains, and pumping stations, and to only charge the 15 feddans fish pond development and house to the homesteader. This would reduce the mortgage and consequent annual payments perhaps to within the expected capability of the potential homesteader. An assessment of this capability would require at least three steps.

- (1) analysis of construction costs to extract the "pond and house only" costs;
- (2) determination of the range of annual operating costs and expected harvests to provide, with some confidence, the range of potential gross profits;
- (3) assessment of the range of net profits that would be sufficiently attractive to encourage a graduate to take the risk and break tradition.

Production cost figures and a confident range of production revenue and mortgage requirements should be established by an AID economist with input from MOA. If the investment is potentially attractive to a private sector homesteader, the structure of a credit facility can be revived.

## 8. Outputs

### 8.1 Table 1: Progress Toward Outputs Proposed in the Project Paper (Section II-D)

#### Outputs

#### Progress

##### a) Support Institutions

- |  |   |
|--|---|
| (1) Nat'l Committee for the Aquaculture Develop. | Committee did not provide engaged project coordination and planning. It has recently been replaced by an advisory body to the Chairman, GAFRD               |
| (2) Nat'l Fish Farming Center at Abassa          | The Center is still under construction, approximately 40% complete. Research, extension, and fish seed improvement programs await completion of the Center. |
| (3) Serow Fish Hatchery                          | Deleted. Other Government hatcheries have been built and operated subsequent to the Project Paper.  |
| (4) Mullet Fry Collecting Stations               | Deleted   |
| (5) Zagazig fish market                          | Deleted   |

##### b) Participant Training

- (1) Long term: 429 man-months of long term training committed (per computerized PIO/P Report), five Master degrees have been completed and three of the eight trainees have returned to Egypt. The first PhD is expected to finish during 1985.
- (2) Short term: 110 man-months short term training abroad, completed or in progress to 30 Jan. 1985. 100 man months of participant training was provided by the Technical Assistance Team. Many of these trainees are now working in Government fish farms and hatcheries.

##### c) Production

- (1) Homestead Farm Develop. Homestead production awaits completion of the model complex

- (2) Small Farmer Develop. Deleted
- (3) Revolving Credit Prog. Deleted.

## 8.2 Significant USAID and Host Country Management Experiences.

8.2.1 A number of difficulties in the implementation of the Aquaculture Project may point up a generic problem in the Host Country Contract mode of operation. AID appears to require final authority on a wide range of obligations in a Host Country Contract to which it is not a signatory. If AID needs to assume the authority it must also accept greater contractual responsibility. The present mode has:

- o led to MOA confusion about who makes the final management decisions
- o permitted AID to hold authority as a sponsor without accepting the responsibilities required from a party to the contract
- o fostered delays due to lack of expertise, unclear lines of authority, and broken lines of communication
- o encouraged AID to use financial "pressure" to force changes on a contract to which it was not a party.

These unsatisfactory procedures have been at least partially responsible for the establishment of an adversary relationship between USAID and the host country which has generated mistrust and difficult working relationships. Audit Report No. 84-38 (Host Country Contracting 28 September 1984, Regional Inspector General for Audit, Washington, D.C.) made a strong indictment of the HCC mode, in a study of five countries including Egypt. HCC were vulnerable to delays and significantly increased the cost of doing business. They contributed very little to host country capability to function in a manner acceptable to AID, and were often in conflict with US laws and AID regulations for procurement of goods and services.

Recommendations: Consider deficiencies of the Host Country Contract mode when preparing the purchase of goods and services.

8.2.2 It is not good management to monitor a large specialized technical project without any access to qualified technical specialists. USAID responsibility for overseeing the contractors work generally precludes the use of outside assistance. If AID cannot provide in-house specialist expertise necessary to monitor specialized technical development projects, it should arrange for regular input of technical monitoring in areas outside of its limits of expertise.

Recommendation: AID should establish in-house technical capabilities where appropriate, to responsibly monitor and supervise its specialized technical projects, or assure that project management has access to technical expertise with authority to provide for AID oversight responsibility.

8.2.3 There appears to be a basic cultural difference between AID and the MOA. Whereas MOA does not appear to be involved in forward planning, punctilious record keeping or budget analyses for public record, AID requires all these things to implement its grant assistance. It is not that MOA refuses to cooperate with AID's need to justify expenses to its Washington constituency; the MOA is very well aware of constituency relationships. They are not aware of the importance AID okaces ib long term forward planning, specific budgets, or its bureaucratic procedures required for grant implementation. The MOA has in the past appeared perfectly willing to accept the form (if not the substance) of AID regulations. What may appear as intransigence to AID may merely be a cultural perspective that does not share American values. We have recommended that some assistance be provided to the MOA to help in the preparation of budgets, operation and maintenance schedules, organograms, protocols, staffing patterns, and long range plans for operation of NAC to meet AID requirements. This may not change the Egyptian attitudes toward planning, nor provide the standard of trained expertise for the NAC expected in an equivalent facility in the USA, but it should permit both AID and MOA to successfully fulfill their commitments to their beneficieries and to complete the bureaucratic processes required for a development project.

8.2.4 A further cultural misunderstanding by AID led to the imposition of the American management technique of decisions by an informed committee onto the Egyptian political process. The transfer did not appear to be an effective one and did not provide the planning and coordination envisaged in the Project Paper (see paragraph 5.4). That the Project Grant Agreement established the formation of the National Committee for Aquaculture Development as a condition precedent for the dispersal of funds, indicates both a lacunae in AID's understanding of the Egyptian political process and an insensitivity to the Egyptian institutional techniques for decision making.



Recommendation    Remove the requirement for a coordinating body from the project and establish a more acceptable managerial mechanism that incorporates the more usual procedure of informal dialog and negotiation resulting in decision by single authority.

### 8.3 Recommended Changes in Outputs Required to Achieve Project Purpose.

Presently all construction work has stopped and AID must now consider which of the contracted facilities should be completed. Many of the supporting facilities have long ago been deleted (Carp hatchery, mullet hatchery, two mullet collecting stations, and a fish market) before construction began. To permit the project to reach a successful conclusion within the revised terms of reference we recommend:

#### 8.3.1    The National Aquaculture Center should be completed, incorporating revisions in Annex VI to ponds, drains and buildings.

The GOE and the Consultant are convinced that this facility will provide crucial support for national aquaculture production and may lead to the growing importance of Egypt as the aquaculture center of the Middle East. The Center is to provide the focus of a national support system for aquaculture, including applied research, extension and training, improved fish seed varieties and improvement in production methods.

The best estimate of the construction supervisor is that the NAC facility and research ponds can be completed by mid 1986. The present constraint to completion of this facility is the contract disagreement between MOA and Modern Contractors the construction prime contractor. In January 1985 negotiations at senior management levels have resumed at the request of the Minister of Agriculture, and all parties are optimistic that construction work will resume by March 1985. An exchange of letters between the Chairman of the GAFRD and Modern Contractors will be the benchmark of progress in this case.

Remaining construction costs to complete the NAC buildings, road, staff housing, and research ponds is estimated to be \$3.23 million by P.B. Sabbour, the construction supervision subcontractor and is within the total of committed funds (Table 2). This does not include the cost of a pumping station or A&E costs for design revisions. It is expected that the construction contractor will present a higher estimate for completion.

8.3.2 The homestead farms complex should be completed to include design modifications.

The GOE is committed to the production facility as part of its food security and protein production program. Although the Technical Evaluation of February 1983 recommended cancellation, and the technical assistance team recommended delay due to the unknown production capability of the proposed homesteads, present fish production on large government fish farms suggests that 300-500 kg per feddan can be expected from the Abbasa site within a few years and without a long program of training and extension.

The construction supervision subcontractor to the MOA estimated in January 1985 that the homestead ponds could be completed for an additional \$3.1 million which is within the total of committed funds (Table 2). This price incorporates design modifications to improve drainage. But does not include pond construction changes nor pond access road relocation. The construction contractor is expected to provide a higher estimate for the cost of completion. We have recommended that work on the homestead production ponds not begin until after the NAC facility has been completed. The consultant's latest estimate for a completion date of all construction activities is 33 months from the resumption of work by the construction contractor, now estimated to be about March 1985.

The economic analysis recommended in paragraph 7.6.5 would determine whether or not the homestead facility should be offered to the private sector as an investment. In the event this production facility is not attractive to the private sector it will be assumed to remain under government operation as a subsidized production facility to provide low cost fish to local consumers.

8.3.3 The support facilities deleted from the project should remain out of the project.

The Serow carp hatchery was to be given money for expansion and research on other fish species. The MOA has ten carp hatcheries planned; four have already been established with a total capacity of 100 million fingerlings per annum. Expansion of carp production at any hatchery is neither expensive nor difficult. Research and development work on fish seed improvement would best be concentrated at the NAC facility to maintain a critical mass of expertise and to make most efficient use of scarce resources.

The Zagazig fish market is indeed inadequate for the hygienic distribution of even the present supply of fish, but the construction of a new fish market at Zagazig is not crucial to the project.

Mullet collecting stations for the acclimation of fry to fresh water are not considered to be critical aspects of support required to meet the purpose of the project. Mullet fry are collected where fresh and sea waters meet; thus acclimation may be largely completed when the fry are captured. Projected mortalities due to double handling, double acclimation, and feeding limitations suggest that a more useful investment would be in extension, production nurseries, and better transportation facilities capable of handling mullet fry in oxygen-filled plastic bags.

8.3.4 Permit present long term trainees to study for higher degrees as appropriate.

There are still five long term trainees in the US, three of whom have completed masters degree and are hoping to be permitted to go on for PhDs in fields related to aquaculture. Completion of advanced degrees useful to the NAC's proposed training, applied research, extension and fish seed improvement programs would be useful in meeting the project purpose to provide sustained fish farming capability to Egypt.

8.4 Budget

8.4.1 The recommended additions to present inputs and the recommended continuation of outputs should permit the project to be completed within the \$27.5 million allocated for the project. Construction cost overruns (from P.B. Sabbour's estimates) could be made available from obligated but yet uncommitted money (MACS Report 6B; Dec. 31 1984).

8.4.2 The estimated costs of bringing this project to a successful completion by implementing the above recommendations are \$10.4 million. Details are shown in Table 2 following.

Table 2: Aquaculture Project Financial Summary (\$'000)

	..	Fund Category			E	Total
		B	C	D		
1. Funding (1)	8,090	11,220	4,100	3,500	550	27,500
2. Committed (2)	7,978	9,990	3,500	1,099	0	22,567
3. Disbursed & accrued (2)	4,722	5,208	1,054	875	0	11,859
4. Unexpended Commitments (2)	3,256	4,782	2,446	224	0	10,708
5. Estimate to finish project	828 <sup>(3)</sup>	6,500 <sup>(4)</sup>	2,246 <sup>(5)</sup>	520 <sup>(6)</sup>	400 <sup>(7)</sup>	10,494
6. Surplus/(deficit) from committed funds	2,428	(1,718)	200	(296)	-	734
7. Additional uncom- mitted funds	112	1,230	600	2,401	150	4,493

Fund Categories:

- A. Technical assistance and A & E services
- B. Construction
- C. Procurement
- D. Training
- E. Credit funds for private sector production ponds

Notes:

- (1) MACS Report 6B as of December 31, 1984
- (2) MACS-PO7C Commitment Detail as of December 31, 1984
- (3) Construction supervision \$538,000  
TA for project implementation 240,000  
Mullet hatchery grant 50,000
- (4) Abbasa land, site, drainage, NAC housing 434,000  
NAC Center and research ponds 2,801,865  
Homestead ponds 3,078,800  
Homestead housing 184,723  
\$6,499,388  
Estimated by P.B. Sabbor, construction superintendent.  
Some of this total will be MOA contribution.
- (5) Estimated by Transcentury, commodities procurement contractor.
- (6) Trainees still in US 220,000  
Short-term training programs 300,000
- (7) 80 homesteaders @ \$5,000 400,000

## 9. Project Purpose

The Aquaculture Project has two stated purposes as presented in the Logical Framework

- 9.1 "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."

Achievement in improved institutions for planning and coordination must wait until after the MOA develops a planning and coordination management system that fit into its administrative patterns.

Achievements in applied research and extension await completion of the NAC and completion of training programmes now being realized.

- 9.2 "To increase fish production by 4,000 tons per year by 1986." This will not be realized under revised project outputs of only 1200 feddans of production ponds.

- 9.3 End of Project Status depends heavily on the AID approval of MOA-Contractor negotiations now underway for project restart and revision. Negotiation results are not available at the time of this evaluation.

It is anticipated that the project will provide a National Aquaculture center (NAC) that will function with lowered expectations than envisaged in the 1978 Project Paper. The NAC is expected to meet MOA needs for a focus of applied research and extension support to the aquaculture industry. It would operate with its own trained staff and is expected to draw on local and international scientific expertise where required for specialized research and production improvement programs. Although it was envisaged that the project would also operate mullet fry collecting stations and hatcheries, the deletion of these ancillary facilities is expected to permit the concentration of trained staff in a single facility which can be more realistically managed than several satellite facilities. The revised focus of the Aquaculture Development Project is on the support center rather than being shared with the production facilities. Private sector participation in the project homestead production ponds is currently under consideration but will certainly be less than the 5,000 feddans envisaged in the Project Paper.

- 9.4 Several short-falls exist in the linkage between project outputs and project purpose.

- o the idea of a coordinating committee to provide project planning and management has never been realized.
- o the Center, still unfinished, is in no position to stimulate pond production nor to provide services throughout the Delta.
- o The production ponds have not been completed and it is not yet certain whether fish farming as designed is even theoretically attractive to the private sector.

10. Goal

The project is expected to "Increase availability of high quality protein foods."

- 10.1 The availability of fish, as a source of protein has increased from 3.7 kg per capita in 1977 to 5.4 kg per capita in 1982 and an estimated 8.1 kg per capita in 1984. Fish remain available to all economic levels within the country. The largest increase in the statistical per capita increase is due to re-estimation of the inland fishery catch. The private sector has indeed provided an increase in fish availability from 50,000 feddans of fish farms operated in part with the government support of inputs and favorable marketing policies. No progress toward the goal of increased availability of fish can be attributed to project achievement.
- 10.2 As explained in Section 5.1, domestic farmed fish production may not be the best avenue for reaching the goal of increased availability of high quality low cost protein. Distant water industrial fishing may offer an alternative worth investigating in the present economic environment.

11. Beneficiaries

11.1 All potential benefits of this project targeted toward the low income level population remain a matter of conjecture since project outputs have not been realized because project inputs are not in place. The Project can still reasonably be expected to provide some increase in the number of small farms engaged in fish production and an appreciable increase in small farm fish productivity when the extension service of the NAC begins operation.

11.2 Summary of Expected Benefits with Projects current goals

<u>Nature of Benefits</u>	<u>Identity and number of Beneficiaries</u>
Employment, MHC	Homestead Farmers Laborers 500
Employment, NAC	Researchers and laborers 128
4,000 tons of fish	Consumers 1,080,000
Education	Government workers 69
Training	Homesteaders and government workers 200

11.3 Private sector homesteaders may not be beneficiaries of the project if the proposed economic analysis shows that the envisaged homestead farms would not be attractive to private sector investment.



## 12. Lessons Learned

- o The host country contract mode does not necessarily reduce administrative work.

Legal conflicts, inadequate management, delays, and unmet obligations often result in more difficult administrative problems (8.2.1)

- o The amount of time, money and expertise required to implement these aquaculture project were grossly underestimated.
- o Transfer of management procedures, like technology transfer needs adaptation to host country traditions.
- o Where technical assistance expertise is ignored by the design/construction activities of a project, design errors are likely to persist. The ultimate user's knowledge and requirements are essential to building a functional facility.

13. List of Recommendations for the Aquaculture Development Project  
(263-0064)

1. Extended PACD to 31 December 1987. (see paragraph 7.6.1)
2. Provide two technical consultants for one year each to assist the General Authority for Fish Resources Development with project implementation. Cost: \$240,000 (7.6.2)
3. Continue short term training to PACD cost: \$300,000 (7.6.3)
4. Support revised construction design as appropriate. Cost : A&E may be included in one of the positions shown in 2 above (7.6.4)
5. Commit funds for mullet broodstock development. Cost: \$50,000 (7.6.5)
6. prepare cost/benefit analysis to determine viability of the present homestead plan. If attractive to private sector, incorporate supporting credit program. Cost: AID in-house (7.6.6)
7. Consider deficiencies in the Host Country Contract mode when seeking to purchase of goods and services. No cost (8.2.1)
8. Establish AID technical capability to appropriately monitor its specialist technical contracts. (8.2.2)
9. Cancel project requirement for a National Committee for Aquaculture Development and replace its assigned coordination and project management functions with an individual authority. (8.2.4)
10. Complete National Aquaculture Center incorporating proposed design changes. Cost: \$3,350,000 (8.4.1)
11. Complete homestead production farms complex incorporating proposed design changes. Cost \$3,230,000 (8.4.2)
12. Do not revive other support facilities previously deleted from the project. No cost (8.3.3)
13. Continue long term training support for degree candidates currently in the USA. Cost: \$220,000 (8.3.4)

## Annex I: Project Background

- Dec. 1976      An AID team concluded that fish farming offered the best potential for increasing fish production and achieving the goal of increasing consumption of high quality protein in Egypt.
- Aug. 1977      Project Identification Document for fish farm development.
- Dec. 1977      Egyptian Aquaculture Feasibility Report noted that the Government of Egypt (GOE) was prepared to give enthusiastic support to aquaculture but lacked organization, trained manpower, or an institutional base for its development. The study team recommended that AID provide support to aquaculture development and identified sectors of the industry most in need of strengthening. An outline of the present project was prepared and a suitable site selected for fish production within the Delta region and central to the aquaculture industry.

This document was reviewed by the World Bank and it was informally decided that the Bank would concentrate their development efforts on fish production and AID would concentrate on the institutional support required for national planning, research, and extension. AID would also support the development of private sector production facilities as part of its overall objective of promoting the development of a productive economic base in Egypt.

- July 1978      The Project Paper designed a five year, \$27.5 million project to establish:
1.    A National Aquaculture Center at Abbasa to provide training, applied research, and extension services to aquaculture.
  2.    A 1200 feddan production area consisting of 80 homesteads adjacent to the Center to serve as a model for fish farming.
  3.    Credit facilities for the homesteads to rollover and support an additional 3800 feddans of fish farms in a second phase to include village fish ponds and cooperatives. Inputs were not provided for the second phase.

4. Support facilities outside the proposed National Center including two carp hatcheries, a mullet hatchery (provisional) and two mullet fry collecting stations.
5. Long and short term training for Egyptian aquaculturalists abroad and support for national planning activities through a National Committee for Aquaculture Development that would fund marketing and production activities throughout Egypt, including a market at Zagazig.

Sep. 1978 Grant agreement signed between AID and GOE for Aquaculture Development Project in Egypt No. 263-0064.

Oct. 1978 Minister of Agriculture appoints as First Undersecretary for Aquatic Resources. Nineteen firms asked to prequalify for project services contract.

Nov. 1978 Ministry of Agriculture (MOA) decree 2147 formed a 12 man executive committee (In Feb. 1979 the AID mission director accepted that this was the National Committee for Aquaculture Development) "with full administrative authority to coordinate and implement the project as specified in Art. 4... sec. 4.1(c) of the Project Grant Agreement No. 263-0064. This committee apparently only met seldom; a new committee was formed 1984 and apparently serves as an advisory board to the Chairman of the General Authority for Fish Resources Development (GAFRD).

Dec. 1978 MOA requested a PSC aquaculture specialist to maintain continuity and to assist the MOA with contract arrangements and negotiations. The specialist arrived 25 July 1979.

Jan. 1979 MOA sent requests for proposals to short-listed A&E firms for a 15 March response. A separate contract for Technical Assistance (TA) was to be advertised in early 1979. Both to be Host Country Contracts.

Apr. to  
Sep. 1979 Kramer Chin and Mayo International Inc. (KCOMI) was selected to submit cost estimates to MOA. KCOMI's cost estimate for services was reduced to about half after negotiations and approved in September. By November their outlined concept for development of facilities was prepared. In September P.B. Sabbour signed as subcontractor.

- Feb. 1980 KCMI submitted design concepts for a \$39 million facility (Feb. 5); revised designs for a \$15 million facility were submitted on 26 Feb. after a request to stay within the original budget of \$3.8 million. This rapid slashing of \$24 million was most likely the source of present design inadequacies.
- April 1980 MOA selected JMM/KNBS to submit cost estimates for Technical Assistance. The contract was signed on 24 August and approved by AID on 29 September 1980. The team leader arrived in Dec. 1980.
- May 1980 Grant Agreement with MOA amended to extend Project Completion Date (PACD) from 31 August 1983 to 31 August 1984.
- Sep. 1980 First six MOA trainees went to the USA for graduate education. As of Jan. 1985 two have returned with masters degrees, one returned without a degree, and three are still working for PhD degrees.
- Dec. 1980 AID became aware of (and involved in) a JMM conflict with K. of KNBS; his financial irregularities were treated by AID as a management issue. This conflict continued to fester until K. was jailed in Jan. 1983, implicating several high MOA officials. By May 1983 this became a full blown political incident.
- Jan. 1981 KCMI submitted a contract amendment proposal to cover cost overruns of \$1.25 million.
- Feb. 1981  
o AID Project Officer transferred. New Project Officer designated in July 1981.  
o KCMI submitted a letter of explanation for cost overruns which blamed AID for delays in approval of drawings, for misunderstanding the complexities involved and for its insistence on custom built housing. The contract was amended to cover cost overruns.
- Mar. 1981 PIL 16 changed the financial plan to include the \$8 million inflation and contingency inputs to bring the US total contribution to \$27.5 million. MOA increased its contribution of the project by \$6 million for the credit fund and \$2 million for construction.
- MOA invited bids for the construction of NAC housing, project access and site drainage (schedules A, B, & C).

June 1981 KCOMI contract extended to April 1982 after AID approval of drawings.

July 1981 Modern Contractors (MC) awarded contract for schedules A, B, & C.

Sep. 1981 MOA invited bids for the construction of the NAC facility, homestead ponds and housing (schedules D, E, & G).

Dec. 1981 KCOMI contract again extended to Feb. 1983.

Feb. 1982 Modern Contractor (MC) awarded construction contract for Schedules D, E, & G.

June 1982 AID Audit Report concluded that delays in project implementation were a result of "poor contractor performance" from both KCOMI and JMM/KNBS. The auditors recommended:  
\* not approving the release of additional funding for contractors.  
\* termination of TA contract unless staff assignments were met.  
\* a total of 15 recommendations primarily dealing with improvements of reporting and control procedures and the settlements of unjustified expenses of \$77,000 and LE 110,000.

June 1982 Transcentury contracted with MOA for provision of \$600,000 of commodities for NAC and housing.

July 1982 KCOMI contract terminated for convenience. The PB Sabbour subcontract was assigned to MOA acting as prime contractor.

Sep. 1982 Project Officer aired "mismanagement" problem of TA contractor.

Oct. 1982 First (in house) evaluation of project reported that the project was 30 months behind schedule and construction not expected to be completed before Autumn 1983. The project officer reported that although the NAC facility was not yet available, the technical assistance had not diminished.

Jan. 1983 K. of KNBS arrested along with government officials.

Feb. 1983 Project Officer removed since the project was thought to be no longer technical but "a visible political issue". The GOE felt that it had been pushed too hard on an issue that did not involve US funds.

A technical evaluation of the project by the USAID/Cairo Systems Management Group (SMG); the Kingery report, recommended that the support facilities (hatcheries, market, and collecting stations) be deleted and that the construction of homestead ponds and the associated production credit programme be cancelled. The NAC facility should be completed and TA extended to overlap the returning trainees. They recommended that the PACD be extended to Dec. 1987.

Mar. 1983 Aquaculture Development Project goes on AID "Alert" list. Noted problems included: construction behind schedule, technical assistance slow to start, and ongoing legal issues.

Mar. 1983 AID recommended that the MOA:

1. Cancel the Technical Assistance contract with JMM/KNBS due to poor management and lack of synchronization with completion of the NAC facility.
2. Cancel the construction of homestead ponds due to cost overruns and apparent inability of the contractor to finish. The TA team reportedly felt that there was a small chance of success until after the NAC could demonstrate fish farming methods at its research facility.
3. Cancel the two mullet collecting stations since they were not vital to the success of the project.

THE MOA finally concurred with these recommendations under some pressure from AID but were insistent about completing the production facility and contemplated continuing its construction with GOE funds.

May 1983 Egyptian officials declared innocent in newspaper articles that accused Americans of "defaming the reputation of Egyptian officials" by wrongly accusing them of embezzlement.

- Aug. 1983 P.B. Sabbour subcontract to MOA for construction supervision extended to Aug. 1984 after having been extended in March to Aug. 1983.
- Nov. 1983 MOA terminated technical assistance contract with JMM/KNBS.
- May 1984
- o Amendment to Transcentury increased purchase of commodities to \$3.5 million for lab furnishings, etc.
  - o MOA stopped payments to Modern Contractors.
- July 1984 PACD extended from Aug. 1984 to Feb. 1986.
- Aug. 1984 Modern Contractors stopped working and no work has been done on site to Feb. 1985.
- Sep. 1984 P.B. Sabbour contract for construction supervisor extended to Feb. 1986. Transcentury PIO/C extended to Feb. 1986.
- Dec. 1984 P.B. Sabbour estimated that:
- \* NAC staff housing and the site drainage were almost finished. The access road was only 38% done with a cost overrun estimated to be \$36,000.
  - \* The NAC facility and its research ponds were about 38% finished and could be completed with a cost overrun of about \$700,000 by Feb. 1986.
  - \* The homestead housing and 1,200 feddans of production ponds were about 45% finished and could be completed at a cost overrun of about \$860,000.
  - \* Minister appointed a supreme council to reconcile differences between MOA and construction contractor.
- Jan. 1985 MOA overtures to renew the Aquaculture project led to a meeting of all principals concerned. Agreements were reached to begin steps toward resolution of constraints to construction completion and all appeared eager to successfully complete the project on an optimistic note. Both MOA and AID raised responsibility for the project to a higher managerial level.



## ANNEX II

### Fish Farming Projects in Egypt

Fish farming has a great potential in Egypt not only for the favorable physical, biological and year round climate conditions, but also it is a financially attractive activity among private fish farmers. The area utilized in fish-pond culture activities by the private fish farmers increased from about 1000 feddans in 1971 to about 50,000 feddans in 1984. Moreover, due to the increased demand for fish and the support of the Egyptian Government for the development of aquaculture as a major issue of the national "Food Security Program", it is expected that fish farming will continue to expand and cover an area of additional 60,000 feddans in the few coming years.

#### Existing Fish Farming Projects:

##### A - Fish farms managed by GAFRD

###### \* El Zaweya Fish Farm (Kafr El Sheik Governorate)

Area 1000 fd ; fresh water  
Construction completed : Jan 1980  
Production area : 840 fd  
Operated area : 450 fd  
Production (1983): 193.6 tons

###### \* Reswa Fish Farm (Port Said Governorate)

Area 1000 fd; brackish water  
Construction completed : Nov 1982  
Production area : 789 fd  
Operated area : 440 fd  
Production (1983): 54.4 tons

###### \* Barsik Fish Farm (Beheira Governorate)

Area 2000 fd; fresh water  
Construction completed : Dec. 1982  
Production area : 1768 fd  
Operated area : 800 fd  
Production(1983): 178.8 tons (first harvest)

###### \* Manzala Fish farm (Dakahlia Governorate)

Area 1000 fd; brackish water  
Under construction and expected to be completed  
by July 1985. Previously was a 300 fd farm in  
operation since 1963.

B - Fish farms affiliated to local governorates

\* Abbasa Fish Farm (Sharkia Governorate)

Area 200 fd; fresh water  
Construction completed : Jan. 1985  
Starting operation : March 1985

\* El Kashaa Fish Farm (Kafr El Sheik Governorate)

Area 1000 fd; fresh water  
Under construction and expected to be completed  
by Dec. 1985.

\* Damietta Governorate Fish Farm (Damietta Governorate)

Conversion of a 2000 fd area of the northwest  
section of Lake Manzala into 80 ponds of 20 fd  
each to be sold or leased to private fish farmers.  
The project is facing some construction problems.

\* Alexandria Governorate Fish Farm (Alexandria Governorate)

The project fits into the Alexandria Governorate  
Food Security Programme. The total area is 350  
fd of Lake Maryut. The target to develop integrated  
duck and fish farming. The present activities  
are trials to rear fish in cages or enclosures  
enhancing productivity by duck rearing, artificial  
manuring and feeding with condemned food materials.  
The site of this project is presently the training  
center for the Maryut, World Bank Fish Farming  
Project.

\* Other small fish farms

Minya Governorate

Sohag Governorate

Quena Governorate

C - Private fish farms

\* The Ismailia Fish Farming Company

Area about 1100 fd; fresh water. The target  
is to produce a yearly production of 6000 tons  
of fish and of 250,000 ducks.

\* Private farms

Total area of about 50,000 fd located in the Delta Governorates, either owned or leased and operated by private fish farmers. The area of each farm varies. These include fresh water or brackish water shallow and deep ponds. Some of these farms are poorly managed while some are properly managed and produce 1.5 to 2 tons of fish/fd/year.

D - Aquaculture Foreign Aid Projects

\* Abbasa National Aquaculture Centre

USAID project. Includes Research Centre, Extension, Training and 1200 fd of fish ponds (homestead).

\* Maryut Fish Farming Project

Prepared by UNDP, financed with a World Bank Loan. Total cost 24 mln LE. Total area 3500 fd. Construction of about 450 ponds of 5.5 fd to be operated by private fish farmers. The complex is to be organized into six producer-cooperatives with the support facilities supervised by a central company that takes care of training, extension, supplies, purchases and marketing of fish. The project is under construction and it is expected to be completed by June 1986. It should be taken into consideration that this project is a brackish water fish farming system.

\* Lake Nasser Fisheries Development Project

A project of the General Authority for the High Dam Lake Development (Ministry of Reconstruction) in Cooperation with the Japan International Cooperation Agency (JICA). The project involves the establishment of a Fisheries Management Centre. The duration of the project five years from 1981 to be extended.

\* Carp Hatcheries

- Saft Khaled Hatchery (Beheira Governorate)  
Hungarian Loan. Construction completed to produce 30 mln fry of carps per year.
- San El Hagar Hatchery (Sharkia Governorate)  
Hungarian Loan. Under construction.  
Produce 30 mln fry of carps per year.

E - Hatcheries Run by GAFRD (General Authority for Fish Resources Development).

- Fowa Hatchery (Kafr El Sheik Governorate)  
Production 15 mln common carp fry per year.  
Constructed by German aid and put into operation by Chinese assistance.
- Abbasa Hatchery (Sharkia Governorate)  
Identical to Fowa Hatchery.  
Production 15 mln common carp fry per year.

F- Delta Barrage Hatchery & Suez Canal University Hatchery

These are grass carp hatcheries affiliated to the Ministry of Irrigation, set up in cooperation with the Dutch Aid for a weed control project. Production 0.5 mln fingerling grass carp per year.

Research Activities in Aquaculture

The Inland Water and Fish Culture Division of the Institute of Oceanography and Fisheries (Academy of Scientific Research and Technology) is currently engaged in several aquaculture research projects that include:

- Fish feed formulations from relatively cheap sources and agriculture by-products.
- Artificial propagation of some economically important Nile fishes and possible introduction into the existing polyculture system.
- Production of monosex Tilapia.
- Fish farming in brackish waters, species composition, stock manipulation and ecological aspects.
- Intensive fish farming.
- Development of cage culture and pen enclosure culture in fresh and brackish waters.
- Production of natural fish food.
- Effects of pollutants on the aquatic ecosystem.
- Transplantation of fish in natural water bodies for increased production (Lake Qarun studies)
- Nutrition of the seabream Sparus auratus.
- Controlled reproduction of mullets (Mugil cephalus and Mugil capito)

## Annex III

### Aquaculture (263-0064) - Evaluation Scope of Work

1. Briefly summarize the original design of the project and subsequent changes in that design. Compare and discuss the differences and the implications of the changes made for potential project impact.
2. Discuss the achievement of the originally anticipated and subsequently revised outputs. (To what extent have the outputs been achieved? How well have they been achieved? What effects did project redesign have on the successful attainment of outputs, both original and revised?) Assess the production/institution building mix of project components over time and how this may have affected potential project impacts.
3. Assess the impact of this project on an improved institutional ability for sustained development of fish farming on an economic basis. (Have Egyptians gained improved capabilities to plan and coordinate applied research, training and extension in aquaculture?) Discuss how project modifications (as discussed in 1 and 2 above) may have affected attainment of this institution building purpose.
4. Assess the project's impact on fish production in Egypt. (Are more fish now available on the market as a result of this project? How do production figures compare with the expectations for increased production in the original design? If there are differences between actual and expected production, to what can they be attributed?)
5. Assess the project's impact on anticipated project beneficiaries, particularly in the private sector, and if/where appropriate, the effects of design changes on those beneficiaries.
6. Document and analyze significant "external factors" that have influenced project progress and potential success.
7. Analyze the appropriateness of this project, both as originally designed and as modified, (1) in addressing Government of Egypt interests and concerns in expanding Egypt's fish production capabilities and (2) in addressing the aquaculture needs, resources and potential in Egypt as perceived from an outside perspective. If/where appropriate, note alternative approaches that may have larger and/or more permanent impact on aquaculture and general fisheries development in Egypt.

8. Recommend future actions for USAID/Cairo and the GOE to consider in advancing Egypt's aquaculture development. Include both short-term recommendations (i.e., what realistically can/should be done in the remainder of the project's life?) as well as longer range options (i.e., What project follow up should the GOE ensure? If AID were to continue its involvement in Egyptian aquaculture, what actions should it take, what priorities should it establish?) Consider the activities of other donors in Egyptian aquaculture development in this regard.

*clb*

EVALUATION SUMMARY - CAPITAL PROJECTS

Original Plan

1. Narrative Summary of Original Planned Objectives	2. Objectively Verifiable Indicators		3. Planning Assumptions
	a. Indicators of Progress Toward Planned Targets	b. Indicators of Benefit Incidence- Employment, Income Distrib., Social Equity, etc.	
<p><u>A. Sectoral or Program Goal</u></p> <p>Increase availability of high quality protein food.</p>	<p><u>Measures of Goal Achievement</u></p> <p>Total supply of fish increases at greater rate than population rate increase through fish farming An increasing percentage is supplied by pond culture rather than imports</p>	<p><u>Measures of Benefit Incidence at Goal Level</u></p> <p>Per capital increase in fish consumption</p>	<p><u>Original Assumptions Affecting Linkage betw., Proj. Purpose and Sector-Program Goal</u></p> <p>Increased domestic fish production leads to increased fish availability. Land and other inputs used for fish culture not useable for other agricultural production. Market remains strong for fish.</p>
<p><u>B. Project Purpose</u></p> <p>Sustain development of fish farming on an economic basis through improved institutions (Applied research, extension, planning &amp; training) Increase production by 4,000 tons per year by 1986</p>	<p><u>Conditions Expected at End of Project</u></p> <p>5,000 feddans of profitable private sector farms with farmers supported by research, extension and training. Mean production of 1,000kg per feddan (80% of homesteaders still operational)</p>	<p><u>Indicators of Benefit Incidence Expected at End of Project</u></p> <p>80 families earning L.E. 1,288 each per annum plus 500 full time jobs in fish industry. Additional supplies of fish to 1,080,000 consumers.</p>	<p><u>Original Assumptions Affecting Linkage between Project Outputs and Project Purpose</u></p> <p>National Working Group is an effective coordination mechanism. Center stimulates pond construction and provides services throughout Delta/ Fayoum region that improves fish production. Only Minor adaptive research needed for successful fish farming. A high level of interest can be generated in fish farming among Egyptian farmers Sufficient suitable candidates available for training and most trainees remain active in Egyptian aquaculture. Fish farming is sufficiently attractive to encourage private investment Availability of credit, extension services, and seed will stimulate fish farm development Subsidized inputs and government control on a portion of marketing will not affect investment.</p>
<p><u>C. Project Outputs</u></p> <p>Estab. Nat'l Aquaculture Working Group Estab. Nat'l Aquaculture Center and 1 200 feddan homestead farms. Estab. two hatcheries and two mullet collecting stations. Promote fish production on 3,800 feddans by 1983 Train 45 aquaculturists at university level, 30 on short courses. Credit fund to finance private sector fish farm development.</p>	<p><u>Magnitudes of Outputs</u></p> <p>Viable ongoing aquaculture planning An internationally recognized center for research and training 1,200 feddans of homesteads 50-70 million Mullet fry distributed to 14-20,000 feddans 10-17 million carp and mullet fry produced and distributed. 3,800 feddans of village cooperates and private farms estab. in Sherkia &amp; Ismailia by 1986</p>	<p><u>Indicators of Benefit Incidence Expected at Output Level</u></p> <p>Center has 128 jobs in research extension, and training programs. 1,000 indirect and spinoff jobs in marketing, distribution, etc. 260 farmers profitably raising fish for sale.</p>	

4. Changes in Assumptions and Circumstances	5. Actual Progress in Terms of Objectively Variable Indicators	
	A. Indicators of Progress Towards Planned Targets	B. Indicators of Benefit Incidence Employment, Incomes distrib., Social Equity, etc.
<p><u>Changes Affecting the Linkage betw. Project Purpose and Sector-Program Goal</u></p> <p>Linkages remain the same. Fish farmed are not exported and are available to all economic levels.</p>	<p><u>Contribution of Project to Sector-Program Goal</u></p> <p>Total fish consumption has increased to 5.4kg per capita (1982) from 3.7(1977) Percentage supplied by pond culture has remained constant. No contribution by the project.</p>	<p><u>Benefit Incidence at Goal Level</u></p> <p>Low value fish are more available to poor families. Fish Consumption has increased 47% per capita (1982) 50,000feddans of fish ponds are now in production, but little contribution from this project</p>
<p><u>Changes Affecting the Linkage betw. Proj. Outputs and Proj. Purpose</u></p> <p>Construction of National Center and Model Homestead farms stopped. Revolving credit funds deleted. Mullet collecting stations and carp and mullet hatcheries deleted from project. Technical assistance contract terminated. A&amp;E price contract terminated</p>	<p><u>Progress Toward Project Purpose</u></p> <p>Government initiative outside project context has increased fish pond production, Project incomplete, no project related progress toward fulfillment of the purpose, but Government has initiated dialog to resume construction of National Aquaculture Center.</p>	<p><u>Benefit Incidence at Project Purpose Level</u></p> <p>Proposed National Center still believed to play an important supporting role in aquaculture. National Center and model fish farms expected to be completed by Feb. 1986.</p>
<p>MOA may not have sufficient depth of trained staff with capability to implement project. MOA's apparent disinterest in forward planning does not provide confidence in availability of budget, or O &amp; M funds for project continuity</p>	<p><u>Progress Toward Output Targets</u></p> <p>National Aquaculture Working Committee, ineffective in planning, coordinating and synchronizing project implementation.</p> <p>National Aquaculture Center is 65% completed. 3 university graduates returned to project. 7 still in training. 22 have received short term training. Most commodity procurement completed or in transit.</p>	<p><u>Benefit Incidence at Output Level</u></p> <p>Short term trainees are working in fish production at government fish production centers. Three long term trainees are working with the General Authority for Fish resources Development.</p>



## **Annex V**

### **Terms of Reference for Future MOA Aquaculture Specialists**

1. Assist a Director of the National Aquaculture Centre (NAC) to:
  - 1.1 Organize divisions of the NAC
  - 1.2 Prepare an operating budget
  - 1.3 Provide job descriptions (and recruit staff)
  - 1.4 Establish research, training and extension priorities and plans
  - 1.5 Apply for special status as an Agricultural Research Institute
  - 1.6 Contact international specialists and short term technical assistance
  - 1.7 Fill gaps in equipment and training
  - 1.8 Determine the needs of client fishfarms in Egypt
2. Synchronize AID funds to meet Ministry of Agriculture (MOA) schedules, and MOA reporting schedules to meet AID funding requirements.
3. Coordinate between MOA and AID to smooth the flow of paper work.
4. Establish a long term planning process for aquaculture development in Egypt; begin the process of identification and preparation of future grants.
5. Assist PB Sabbour and Modern Contractors to finish the facilities within the budget and to guide them on behalf of the MOA.
  - 5.1 Read and interpret technical engineering correspondence and compose MOA responses.
  - 5.2 Analyze and interpret technical specifications and drawings on behalf of MOA, the prime contractor.
  - 5.3 Suggest additional design modifications and make additional measurements to insure the best possible completion of the NAC.

## ANNEX VI

### Recommended Design Changes for Completion of the National Aquaculture Center and Homestead Fish Production Pond System.

1. The contractor should be instructed to complete the facility in stages. Provisional acceptance of the first stage would be a precondition for the start of the second stage. Completion of stage two a precondition for the start of stage three etc. The Fixed Amount Reimbursable (FAR) contract mode may be appropriate. For each stage, minor modifications, inclusions or deletions are expected as the staged process is elaborated.

Stage One Completion of the National Aquaculture Center, its utility hook-ups, well water supply and garage. The NAC should be ready for occupancy and the start of research and extension activities at the earliest possible date. The operation of the research and homestead production ponds would begin after the NAC is in operation, thereby eliminating the problems of having both operations start at the same time.

Stage Two Completion of the redesigned research ponds, primary intake system and the water supply to the existing governorate fish farm.

Stage Three Completion of utilities for the MHC housing, a portion of the production ponds and their auxiliary structures.

The Abbasa road may be included, otherwise delayed to a later stage. The pump drainage station must be coordinated with the Ministry.

Subsequent Stages Completion of final portions of the MHC ponds.

2. The design drawings have to be revised. Implementation of the present fishpond design is expected to cause problems with fish harvests, vehicular access to harvest fish, pond drainage, and trash fish instructions. If implemented in its present form, the design oversights and errors would result in many management inconveniences and would require post-construction innovations and increased maintenance costs. A drawing-by-drawing review of pond systems is recommended to assure systematic and coordinated revision of the design consistent with accepted fish production management techniques. An A&E firm, such as the construction supervision subcontractor is capable of doing the review with access to knowledgeable aquacultural expertise.

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3. The following design changes, discussed with the construction supervision subcontractor are expected to be included in the estimate of construction costs to complete construction (with the possible exception of the drain pumping station):

3.1 Deepened drains will require a pump drainage outlet to the El Wadi Drain. Design suggestions have been made by the Ministry of Irrigation and should be reviewed. Completion and approval for construction has a high priority since the drainage pump/motor units require procurement orders. Pond construction cannot begin until at least temporary drainage of the site is completed.

3.2 Removal of the organic soil surface material should be only from the base area of berms and an adjacent strip needed to provide suitable fill for the berm construction.

After excavation of the berm fill, the borrow area will be refilled with the stockpiled organic soil surface material. Compaction is unnecessary. Roots will be mechanically raked from the pond surface and burned or removed from the pond. The surface material, rich in organic matter, will serve for pond fertilization. Regrowth will be controlled primarily by grass carp (*C. idella*), assisted as needed by mechanical water weed cutters.

3.3 Berm width on the outlet side of the ponds will be increased to accommodate vehicular traffic. Berm width along the inlet side of the ponds will be correspondingly decreased since vehicular traffic is not necessary.

3.4 Concrete harvest pads at the inlet will be deleted.

3.5 Ponds will be sloped from inlet to outlet end, between 0.2% and 0.5%. This can be accomplished along with earthmoving operations that refill the borrow areas after root removal.

3.6 Drainage ditches will be deepened so that pond outlet pipes are at least 30 cm. above the drain bottom and preferably 15-30cm. above the mean water level of the drain. This

applies to the NAC ponds as well as the MHC ponds. The feasibility of reducing drain canal side slopes from 3:1 to 2.5:1 should be seriously considered. Local irrigation drains may serve as examples.

3.7 Pond sealing should be removed from the construction contract and provided as needed after pond construction is completed; for two reasons:

- \* The extent of permeable material is not known.

- \* With more surface material remaining in place, and pond drainage procedures untried, pondsealing may not be necessary.

3.8 A harvest sump is needed along the outlet side of the pond to provide a location for harvesting fish. The bottom of the sump will likely be below the intake of the outlet pipe and require a portable pump for complete drainage since the lack of natural land slope makes it infeasible to lower the outlet sufficiently to gravity drain the sump as well as the pond.

3.9 Inlet and outlet screens need to be redesigned. Screen stapled on a wooden frame is unsuitable. An integral metal two stage screen, coarse followed by fine, welded to a metal frame is recommended.

4. An enlarged vehicle maintenance shop and garage must be restored to the plan to insure proper care, storage and repair of NAC and MHC equipment. A prefabricated structure, purchased as commodity procurement would suit project needs.

## Annex VII

### Aquaculture Development for the Private Sector

1. Despite some relaxation during the past ten years, Egypt is still dominated by public sector control of primary production. This is reflected in subsidized agricultural inputs sold through the PBDAC, Government control over export crop production, and artificially maintained market prices for locally produced grains and cotton (too low) and meat products (too high) by government intervention.
2. Aquaculture production in Egypt has begun to flourish only within the past 5-10 years. In 1971 there were perhaps 1000 feddans of fish farms. In 1984 there are more than 50,000 feddans of private ponds and nearly 10,000 feddans of national and local government fishfarms.
3. Recent relaxation of central control over aquaculture has permitted some private sector marketing of fish. Farmers that accept subsidized inputs must sell a portion of their harvest to the Fish Marketing Company of the Ministry of Supply (FMC) at prices 30-40% below free market prices, though monitoring of this requirement is lax.
4. The Government controls the supply of seed to fish farms through Government carp hatcheries and mandated control over all the collection and distribution of all natural mullet fry by the General Authority for Fish Resources Development (GAFRD). Fertilizers and credit are subsidized.
5. AID's Aquaculture Development Project (263-0064) has, perhaps inadvertently, supported this public sector control of fish farming by:
  - 5.1 Designing a production system for low market value fish that is dependent on government subsidized seed and fertilizer and is dominated by government marketing policy, carp has no present private sector market, and government purchase of mullet puts constraints on the private sector market.
  - 5.2 Accepting the design of a highly capital intensive fish production unit; 80 homesteads, each with two ponds of 6.5 feddans costing \$96,000 each homestead at presently calculated costs to finish. Although the present cost is far over budget, the accepted design conceived homestead fish farms that were too sophisticated, too expensive, too small, and too tied together to permit independent

profitable operation by private sector investors, especially given the extensive site correction required (drainage and removal of unsuitable material).

- 5.3 Encouraging central planning for the industry through a national committee.
  - 5.4 Perpetuating Government control of fish seed distribution by planned funding for Ministry controlled carp hatcheries, mullet collecting stations and a mullet hatchery.
  - 5.5 Providing technical assistance and training only to the public sector GAFRD personnel.
  - 5.6 Establishing a national research, training, and extension facility to support and improve the production of low value government marketed fish species.
6. The single encouragement offered to the private sector development of aquaculture was the homestead farms and a later phase II credit plan for cooperative and small farmer fish pond development. From its inception this design had a low chance of success for the entrepreneur because:
- 6.1 The homesteads are on a single site and tied together for water and drainage, equipment use, input distribution and marketing. This would require a single management authority for any effective control of inputs and outputs; and a reduction of independence.
  - 6.2 The low unit value of fish produced, especially as sold to the FMC, and the large burden of capital cost repayment could never permit the homesteader to become independent; even at the optimistic production levels and low input costs proposed.
7. The private sector prefers to limit its risks by investing in project with low capital costs and high unit value outputs. This permits a rapid return on investment and a high continued income, commensurate with the risks involved. Private investment requires flexibility to change both inputs and outputs to maximize profitability and minimize risk and/or loss. This means minimum construction cost fishponds, even where this results in higher operations and maintenance costs and lower potential production per feddan, and a choice of high value species with strong private sector market demand.

7.1. Alternative construction methods include ditching and preparation of dikes with suitable material from the ditches rather than removal of the entire layer of unsuitable material from the site (c.f. Barsiq fishfarm). Despite the resultant operational problems (weed cutting, oxygen demand, insect removal) this alternative could be attractive to the private sector investor were the savings in capital costs and interest sufficient to compensate the production risks. Potential production losses may be perceived as less expensive than the continuous high interest and loan repayments. The investor can be flexible about operations and maintenance, weighing production losses against cash flow requirements.

7.2. Alternative fish species with higher market value are all carnivores and thus more expensive to feed than Tilapia, carp, and mullet. It is not certain where the use of Tilapia (*T. zilli*) to feed carnivores would be financially viable, but it is the question that would be asked by a private sector investor in fish farming.<sup>1</sup> It is not a question that is expected to be dealt with under the present project priorities. Fish species with strong markets at minimum seasonal prices greater than LE 1.50/kg (average perhaps LE 2-2.50) and with adequate sources of seed are:  
Seabass (*D. labrax*)  
Nile perch (Asian seed: *L. calcarifer*)  
Eel (*Anguilla anguilla*)

This is not to say that a polyculture of mullet, carp, and hybrid all male Tilapia could not be profitable; on the contrary low input costs may even provide higher return on investment for this polyculture than for carnivores.

<sup>1</sup>A first estimate is that to grow one kg of carnivore it will require about 7 kg of *T. zilli* costing about LE 0.10 per kg. This feed cost would be low enough to investigate further.

## Annex VIII

### List of Key Personnel Interviewed

Name	Title/Project Affiliation
Malcolm Johnson	Former JMM/KNBS consultant-fish production
Colin Nash	Former KCMi bio-engineer
William Madden	Former JMM/KNBS TA acting team leader
Donovan Moss	Auburn University/Fisheries Dept/Int'l Programs
John Grover	Former Feasibility Study Team, Auburn Univ./Fisheries
Gary Jensen	Former JMM/KNBS consultant-extension
Ali Abdel Khater	MOA/GAFRD on educational leave
John Grayzel	AID/Washington Middle East Bureau
Arnold Radi	AID/Cairo Former Project Officer/Aquaculture
Derek Anderson	PB Sabbour, President
Anis Aclimandos	Transcentury, Regional Representative
Yehia Hassan	MOA/GAFD Chairman
Hassan Amin Abdalla	MOA/GAFD Under-secretary for Fish Resources
Ali Ahmed Aziz	MOA/GAFD Fish Resources
Hussein El Hobashy	MOA/GAFD Fish Resources/Commodities
Mohamed El Shinnawi	MOA/GAFD Fish Resources/Training
Magdi Awad	MOA/GAFD Fish Resources
M. Cammoun	MOA/Barsiq Fish Farm, Director
Dr. Bardici	MOA/Lake Maryut Project, Director
Mounir Ishak	Nat'l Academy of Science/IOF, Director
Abdel Al Kholy	Nat'l Acad. Sc./IOF, former Director
Seoudi Elewa	P.B. Sabbour/Aquaculture Project Director
Phillip Serene	Aqua Service President
Christopher Mannier	Aqua Service/Lake Maryut Project, Resident Director
Ismail Abou Ghali	Cairo Commercial Fish Market, Chief Spokesman
J. Wynne Davies	Former JMM/KNBS consulting engineer
Belinda Barrington	AID/Cairo/LEG
Magdy Gheith	AID/Cairo/Agr
Allan Gordon	AID/Cairo/Con

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Jeffrey Lee

AID/Cairo/Agr, former Project  
Officer-Aquaculture

Roger Russell

AID/Cairo/Civil Engineer

David Schaer

AID/Cairo/Agr

John Swanson

AID/Cairo/Agr

Teresa Ware

AID/Cairo/Agr

A. Bjorlykke

AID/Cairo/Contracts Office

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