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# EVALUATION OF THE IRRIGATION IMPROVEMENT PROJECT COMPONENT OF THE IRRIGATION MANAGEMENT SYSTEMS PROJECT

**(Project No. 263-0132)**

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## LIST OF ACRONYMS

| | |
|---|---|
| AID/USAID | United Sates Agency for International Development |
| CAP | Commodity Procurement Plan |
| CAD | Consortium for International Development |
| CASU | Colorado State University |
| DSC | Downstream Control |
| EWUP | Egyptian Water Use and Management Project |
| FAO | Food and Agricultural Organization of the United Nations |
| GOE | Government Of Egypt |
| HCC | High Coordinating Committee |
| IAS | Irrigation Advisory Service |
| IID | Irrigation Improvement Department |
| IIP | Irrigation Improvement Project |
| ILD | Irrigation and Land Development (USAID Division) |
| IMS | Irrigation Management Systems Project |
| IRR | Internal Rate of Return |
| ISPAN | Irrigation Support Project for Asia and the Near East |
| LBII | Louis Berger International, Inc. |
| LOE | Level Of Effort |
| LOP | Life of Project |
| MALR | Ministry of Agriculture and Land Reclamation |
| MKE | Morrison-Knudsen Engineers, Inc. |
| MMP | Sir M. Macdonald and Partners |
| M & E | Monitoring and Evaluation |
| MPWWR | Ministry of Public Works and Water Resources |
| NIIP | National Irrigation Improvement Project |
| NPV | Net Present Value |
| O & M | Operation and Maintenance |
| PACD | Project Activity Completion Date |
| PBDAC | Principal Bank for Development and Agriculture Credit |
| PIL | Project Implementation Letter |

| | |
|---|---|
| PM | Person Months |
| PP | Project Paper |
| RIIP | Regional Irrigation Improvement Project |
| TA | Technical Assistance |
| TDY | Temporary Duty Assignment |
| UCA | Unit Command Area |
| UNDP | United Nations Development Program |
| WRC | Water Research Center |
| WUA | Water Users Association |

## TEAM COMPOSITION

This evaluation of the Irrigation Improvement Project was carried out from September 8 to November 5, 1993. It was conducted for USAID/Egypt by a team including:

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* Donald Haslem as Irrigation Engineer;
* Parvis Hekmat as Water Resources Planner;
* James Layton as Sociologist;
* Kenneth Swanberg as Economist; and
* Thomas Weaver as Water Management Specialist.
* Farouk Shahin as Egyptian Institutional Analyst.

Members of the team visited various project sites and interviewed officials of USAID, MPWWR, WUA's, contractors, and beneficiary farmers. The lists of places visited and key persons met are presented in Annex 1.

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# EXECUTIVE SUMMARY

## A. Introduction

The Irrigation Management Systems (IMS) Project was started in 1981 and has now a Project Activities Completion Date (PACD) of September 1995. The Irrigation Improvement Project (IIP), which began in 1987, was one of ten sub-projects of IMS. The purpose of this evaluation is to :

- Assess progress within the IIP towards meeting its goal, purpose, and objectives;
- Evaluate the effectiveness of U.S. and GOE funded activities in contributing to project objectives;
- Provide guidance to USAID and MPWWR for making decisions concerning more effective implementation of IIP activities through the PACD; and
- Provide guidance for the design of future improvement activities beyond the PACD.

## B. Goal, Purpose, and Objectives of IIP

The goal of IIP is to increase production and productivity in the agricultural sector. Current IIP goals include :

- The improvement of the water delivery and distribution systems to at least 1,200 identified mesqas commanding 92,000 feddans or more;
- The organization of at least 1,200 WUAs, completion of 17 feasibility studies for 394,000 feddans, finalization of contracts to permit construction of selected mesqas within the identified areas by the PACD, the monitoring and evaluation of improved mesqa operation and maintenance, and providing help to farmers in on-farm water management practices.

The purpose of IIP is to strengthen MWWPR's capacity to plan, design, implement and operate a rehabilitation/modernization program in eleven canal commands covering 337,000 feddans.

The objectives of IIP are to :

- o Strengthen the institutional capacity of MPWWR in equipment, staffing, managerial and administrative skills, and in operational policies and procedures to continue IIP with limited expatriate expertise;

- o Develop a rational interdisciplinary approach in planning, designing and implementing the renovation of specific canal commands identified in MPWWR's current five year plan;

- o Develop an Irrigation Advisory Service (IAS) to transfer water management technical information and technical assistance to WUAs;

- o Organize operational WUA's in all IIP areas, coordinate scheduling of water delivery on mesqas, perform maintenance and resolve disputes, increase communication links between farmers and government officials;

- o Establish policies and procedures for the recovery of an appropriate portion of operation and maintenance (O & M) costs, and 100 percent of the nominal costs of mesqas and on-farm improvements.

## C. General Project Assessment

**The IIP Project must be evaluated as a prototype. In the Project Paper (Annex Q, p 21) the overall objective is to move to *"an action program aimed at developing a replicable methodology on a national scale"*. Its origins can be traced to almost fifteen years of research and field trials. The Project is designed to give guidance in the development of a process of water control and application that can only be described as revolutionary in the Egyptian context. It includes construction, training, capacity building, institutional and *policy* changes. It field tests a shift from rotation to continuous flow at the branch canals, new application technologies at the mesqa level, and new WUAs formed across government and indigenous institutions in a cross section of Egyptian environments.**

**The Project demands legislative action at the national level in order to meet its objectives. It must accomplish this at a time when the Egyptian economy is in transition from a State-controlled to a private economy. Given this, the project is not to be evaluated in terms of the total acreage already brought under the new water control methods. Rather, it should be evaluated in terms of the extent to which various project outputs, i.e. training, institutional change, and the irrigation system improvements in selected Unit Command Areas have created a basis for expanding the Project activities across the entire Nile irrigation system. Viewed from this angle, the Project is satisfactorily continuing to the achieve its goal, purpose and objective, but has not yet reached its ambitious level of outputs planned.**

## D. Overall Findings

IIP's Agreement was signed in 1987 but mobilization of the TA team actually occurred in 1989. Its implementation suffered a lag phase because of key personnel replacement of the TA team during the first year. The first construction contract was signed near the end of 1990. Since 1991, the progress of work has gradually gained momentum and is now accelerating. Seven Directorates and two Inspectorates have been created throughout Egypt, fully equipped with modern computer and office equipment, laboratories for testing materials, transportation facilities; and staffed with trained personnel. The required construction equipment for completion of Project activities at a brisk pace are in place. However, IIP institutional building is not yet completed and needs more time.

IIP was designed to increase agricultural production and productivity through improvement of irrigation infrastructure and management practices that permit timely supply of water in sufficient quantities needed by the crops. The effort of IIP in the improvement of water delivery resulting in increased crop yields is not yet quantifiable, but it has created the water resource security to permit farmers to select more high yielding crops to grow.

There is evidence that suggests that not all the IIP activities (WUA formation, expected number of functional mesqas completed, training of IAS agents, etc.) will be completed within each command area by the PACD. A subsequent Project will ensure proper completion and functioning of the various components and maximize the benefits of the invested capital.

The question of sustainability is of particular importance to any USAID funded Project and this needs to be addressed. Since the inception of the program to provide continuous flow delivery canals and improved raised lined and PVC pipe mesqas, the Project has concentrated on establishing an organization that would have the capability of continuing on after the Project to other command areas and canal systems. The Project .pent a considerable level of effort to institutionalize the capacity to design new systems, to develop their specifications, to contract the public and private sector for construction, and to train staff for all of these activities. Significant progress has been made : Engineers have been trained by the TA staff at the command levels, the IAS has been developed to conduct feasibility studies of good quality, a network of construction firms has evolved, and the technique for developing, training and promoting WUAs has been tested and established. This considerable institutional capacity is now ready to be utilized for a national program, to expand the results of the Project prototype activities. On the dark side, the legalization of WUAs is still awaiting legislative approval and the cost recovery issue has not yet been resolved despite several attempts to do so.

## E. General Conclusions

The success of IIP depends on a cost recovery program that will promote sustainability. It also depends on proper adaptation and functioning of the changes introduced for operation of the main delivery system, and participation of farmers in operation and maintenance of the mesqas in every command area.

Although some shortcomings remain to be addressed by the Project as indicated in this evaluation report, nonetheless, the overall progress of the project has improved significantly during the past year (Annex 5, Figure 5 -1). This team is of the opinion that the mobilized personnel and equipment are capable of improving mesqas serving just under 80,000 feddans by the PACD, and able to complete the mesqa improvements in the respective command areas with an enhanced rate of progress in 1994.

Water is the most important single input in crop production and its timely availability in sufficient quantities is essential for yield improvement. However, there are other opportunities and potentials for additional increases in crop yields and actual returns to the beneficiary farmers through improvement of other inputs in combination with the improved water application.

Although the capacity the carry out on a sustained basis the functions required by this program has been developed within the MPWWR (IIP,IAS, and the WUAs), this program cannot be efficiently expanded and continue to perform adequately within a Government bureaucracy without the leadership of a donor agency and TA team. The incentives, the consistency, the steadfastness, and the task orientation of a TA team are required for more than four to five years to establish a program of this magnitude. The capacity for sustainability exists, the motivation must continue to be primed.

## F. Overall Recommendations

IIP should be supported to continue its activities through the PACD, as planned, and with due notice of the recommendations of this evaluation report. A subsequent project should be designed, developed and funded to support completion of the IIP activities within the selected command areas where the irrigation improvement activities have already started, but will not be completed by the PACD. The new project should overlap the completion of the present IIP activities to avoid interruption and demobilization of IIP resources. The new project should consider inclusion of agricultural and marketing components to be implemented in parallel with the irrigation improvement component.

## G. Major Specific Findings, Constraints and Conclusions

### 1. Organizational Structure

The present organizational structure of IIP to carry on identified work tasks is inappropriate. There is a lack of staff to accomplish IIP goals. A continuous shifting of IAS personnel prevents consistency in program development.

### 2. Technical Assistance

The productive Technical Assistance (TA) team has provided effective guidance to meet most project objectives. Operation and maintenance plans may have been developed, but their effectiveness is questionable. A shortage of TA staff for future work requirements still exists.

3. Training Program

The IIP Training Program has been quite successful except that planned targets have not been reached yet. This was due to a slow start caused by replacement of expatriate staff with personnel more suited to the work. Nevertheless, it has succeeded in improving the administrative, managerial, and technical skills of IIP staff and farmers. The organization of farmers is progressing, albeit at a slow pace, but it is now accelerating. A tripartite coordination between the farmer, the IAS, and agricultural extension for improvement of water conservation and yields is lacking. The constraints are the continuous replacement of IAS agents and an absence of synergism due to a slack interdisciplinary approach.

4. Commodity Procurement

Commodity Procurement started with a substantial plan that was not synchronized with a realistic projection of progress and staffing needs. Based on a revised plan and budget of $ 7.0 million, most of the commodities needed for the project has been procured for about $ 3.8 million. Although the commodity procurement plan has been revised and cut back considerably, some of the commodities procured are more than the current needs and are not being used effectively. Recent purchases have been based on a more realistic projection of the progress and have resulted in substantial savings.

5. Feasibility Studies

Multi-disciplinary approach has been employed to conduct seventeen complete or supplemental feasibility studies covering 394,000 feddans on eleven command areas. Final reports of fifteen studies (264,200 feddans) have been completed and two are in the final stages of preparation. The quality and presentation of the reports have improved after the initial studies and are appropriate.

6. Designs and Contract Documents

Engineering designs are prepared using conservative assumptions which permit more flexibility for farmer irrigation and are adequate for WUAs needs. Mesqas have been improved using mobile pumps which is not always up to good design standards. Contract documents are well prepared with adequate provisions to promote timely completion of contract works and to assure good quality construction.

7. Construction

Currently, 36 mesqa improvement contracts covering 52,000 feddans and 26 main delivery system improvement contracts are in progress. The construction program is behind schedule mainly due to late start and lack of experience of construction contractors and IIP supervisory staff in the new mesqa improvements, at the start of the program. Several steps have been taken to correct the problems. As a result, the quality and timing of construction contracts have improved, but there is potential for further improvements. Construction contract awards have been satisfactory, but more forceful supervision of individual contracts and more vigorous overall coordination of the construction activities are needed.

8. Mesqa/Delivery System Improvement

Continuous flow with downstream control structures is well suited and highly beneficial to Egyptian conditions. Water previously wasted to the drainage system will remain in the distribution system. Farmers will have the possibility to share their water over a longer period of time. Implementation of DSC structures designed for the introduction of continuous flow has been delayed. Many completed mesqas designed for continuous flow are now getting by on rotational delivery.

9. Financial Status

The Financial Status analysis shows that the Project is on target with respect to the area covered, given the decrease in the budget as dictated by various amendments. The current Project's budget is $ 63,389,000, reduced from the original budget of $ 105,900,000, of which $ 43,393,000 has been expended. In the last quarter, $ 960,000 was added for training and technical assistance. Fifty six percent of the commodities scheduled for procurement have been obtained. Training expenditures have now reached the point where additional funds are now required from now to the PACD. The key budget item is irrigation construction. In this category, contracts have been let totaling $ 24,304,000. Twenty-six million dollars were budgeted for construction, or 42 percent of the total project budget.

10. WUA Formation

WUA Formation is on a successful path. The farmers have given inputs into the planning, design, and construction of the improved mesqas. The project has established a "phase" program detailing seven steps to assist WUAs into the operational stage.
The legalization of WUAs is still awaiting decision at the legislature.

11. Cost Recovery

The Cost Recovery issue requires the passage of a new law to stipulate how the recoveries will be assessed. Several commissioned studies have outlined the rationale of a cost recovery program which is intricately linked to the future sustainability of the Project. Additional assessments of costs and benefits are presented in this evaluation (see Section V).

## H. Specific Recommendations

### 1. Organizational Structure

Conduct an organizational evaluation of IIP to improve its structure. Building the organizational components of the WUAs should be emphasized so that they will perform their Project defined functions. The realistic role of the IAS should focus on the organization of the WUAs and helping in water delivery scheduling.

### 2. Technical Assistance

Program utilization of unused TDY time, and additional TA assistance in various training components, especially for M & E will foster achievement goals. IIP needs to build its social science staff to develop a structured monitoring program to evaluate the process of organizing WUAs.

### 3. Training Program

Restructure the administration of the project to diffuse training opportunities to a more widespread audience by more training of trainers. Permanence of staff within IIP should be given high priority. Establish a training office in IIP and focus on the needs of the Project.

### 4. Commodity Procurement

Reduce commodity procurement under the revised plan and re-allocate the total savings, which is estimated at $ 2.75 million. Due to the problems assciated with the purchase of the initial pumps for the completed mesqa improvements, it is recommended that unused budget items for commodities be considered for switching to the purchase of demonstration pumps.

### 5. Feasibility Studies

Continue with the program for feasibility studies as scheduled.

### 6. Design and Contract Documents

Continue with design and contract documents for civil works as appropriate. The system of pre-qualification should be adopted for award of construction contracts.

### 7. Construction

Strengthen IIP headquarters should be strengthened to monitor, coordinate and control construction activities more vigorously. Directors, engineers and supervisory staff should be encouraged and supported to implement contract requirements more forcefully.

8. Mesqa/ Main Delivery System Improvements

Include pump with mesqa improvement and establish a user repayment plan. MPWWR should consider adoption of continuous flow and downstream control demand irrigation to the widest possible area. Improved cost effective designs for IIP civil works can be achieved in some areas. These measures should be implemented.

9. Financial Status

Implement the adjusted targets of 80,000 feddans of mesqa improvements and 150,000 feddans of delivery canal improvements on schedule. Projections of the costs required to reach this target are just over $ 28,000,000 for USAID funding, about $ 2 million short of the current construction component budget in the latest revision.

10. WUA Program

Pursue greater lobbying effort on the part of IIP for the legalization of WUAs.

11. Cost Recovery

Implement the collection of data on a statistically sound basis without delay to present a convincing case to the Cabinet and the People's Assembly.

## I. Lessons Learned

- Project outputs, although very important, are only one of the measures of a Project goal, purpose and objectives. In this Project, with the exception of the low number of mesqas installed and feddans improved that draws attention and concern, many of the outputs that have been achieved are not striking, such as improvement in water control, main delivery and canal systems, potential in environmental amelioration which will have consequential beneficial effects on human and animal health. It is only in considering the ensemble of this Project's outputs and achievements that the conclusion is reached that its goal, purpose and objective have indeed been successful.

- IIP is more than a construction project. The work involves a new perspective and working procedures to rehabilitate irrigation systems and increased crop yields. This new approach needs an organization that is capable of managing the effort. The creation of an authority might be an improvement, but its political and financial implications need further studies.

- o IIP was planned and prepared within universally acceptable principles. The major constraints that caused its early delays were related to the lack of common understanding between MPWWR, USAID and the TA Contractor. Anticipated disputes related to Project implementation and financial issues should be settled during the negotiation phase.

- o Interministerial coordination and cooperation are difficult to achieve. Policy decisions at the highest level that influence field actions needed to foster an interdisciplinary approach towards common achievement goals, are essential for successful undertakings. Grant awards should be conditional to positive policy decision-making in integrated projects' designs that require a multidisciplinary approach.

# I. INTRODUCTION

## A. Background of The IIP Project

The Egyptian Ministry of Public Works and Water Resources (MPWWR) is responsible for all aspects of the irrigation and drainage systems which include planning, construction, operation, maintenance and management. MPWWR has four Departments : Irrigation, Finance, Planning and Mechanical; and five Authorities: Drainage, High Dam, Coastal Protection, Survey and the Water Research Center (WRC). The Irrigation Department regulates water supplies to each of 50 canal commands covering over 6.0 million feddans of old lands and 1.0 million feddans of recently irrigated lands according to need estimates jointly prepared with the Ministry of Agriculture (MOA).

The Irrigation Management Systems Project (IMS) was initiated in 1981 to improve the operating efficiency of the total irrigation system and strengthen MPWWR's operation, maintenance and planning capabilities. The purpose of the IMS was to provide technical and capital assistance for the planning, design, construction/rehabilitation, and management of Egypt's irrigation system. The IMS Project was amended in 1984 to increase its potential impact and take advantage of six years of USAID funded research at the Egyptian Water Use and Management (EWUP) Project (# 263-0017). EWUP merged into the Regional Irrigation Improvement Project (RIIP) jointly funded by MPWWR and USAID, and RIIP was implemented with technical assistance from the Consortium for International Development (CID) and Colorado State University (CSU). With a further expansion in 1987, IMS has now ten components of which IIP is one of them.

The IIP component, budgeted at $ 105.9 million in 1987, is a successor of EWUP and RIIP. Under the RIIP project only 3,400 feddans were being improved in December 1987. IIP was designed to remove specific constraints to agricultural production by improving the effectiveness of the irrigation and drainage systems over 337,000 feddans to be completed in 1991. The Project became more complex with requirements for feasibility studies prior to construction, the development of a cost recovery program, and the formation and legalization of WUAs. Throughout the IIP Project, technical assistance (TA) has been provided by Morrison-Knudsen Engineers (MKE) and Louis Berger International Inc. (LBII).

B. IIP Project Goal, Purpose and Objective.

1. Project Goal and Purpose

The Irrigation Improvement Project was designed to contribute to the overall IMS Project goal of increasing production and productivity in the agricultural sector and the IMS purpose of improving the system-wide water use efficiency for irrigation.

2. Project Objective

The objective of IIP is to strengthen MWWPR's capacity to plan, design, implement and operate a program of irrigation system rehabilitation and modernization by :

- o Strengthening the institutional capacity of MPWWR in equipment, staffing, managerial and administrative skills, and in operational policies and procedures to continue IIP with limited expatriate expertise.
- o Developing a rational interdisciplinary approach in planning, designing and implementing the renovation of specific canal commands identified in MPWWR's current five year plan.
- o Developing an Irrigation Advisory Service (IAS) to effect transfer of water management technical information and technical assistance to WUAs.
- o Organizing operational WUAs in all IIP areas. coordinate scheduling of water on mesqas, perform maintenance and resolve disputes; and increase communication links between farmers and government officials.
- o Establishing policies and procedures for the recovery of an appropriate portion of operation and maintenance costs, and 100 percent of the nominal costs of mesqas and on-farm improvements.

C. Purpose of the Evaluation

The purpose of this interim evaluation of the IIP is to :

- o Assess progress towards meeting the objectives of the IIP component and evaluate the effectiveness of U.S. and GOE funded activities in contributing to project objectives.

- o Identify constraints to effective implementation, and provide recommendations on how to address those constraints.
- o Evaluate efforts aimed at improving sustainability of project activities and make recommendations for further improvement.
- o Assess Project cost effectiveness and implementation efficiencies.
- o Assess planned versus actual accomplishments, review the Project design and implementation technology, and determine if specific irrigation improvement activities could be carried out more effectively.

The ultimate purpose of the evaluation is to provide guidance to USAID and MPWWR for making decisions concerning more effective implementation of IIP activities through the PACD, and provide guidance for the design of future improvement activities beyond the PACD.

## D. Methodology of the Evaluation

The team spent three days in Washington D.C. for briefing, studying documents supplied by the TA team and USAID, and initial planning of the evaluation. Upon arrival in Cairo, the team was briefed by the USAID Project Officer, gathered further documents and obtained information for planning site visits and interviews.

The team studied in detail the Project Paper, the PIL's, the 1990 IMS Project evaluation report, the 1992 IAS/WUA evaluation report, feasibility studies, TA team reports, the IAS strategy, training documents, annual work plans, quarterly progress reports and applicable AID evaluation guidance. Further documents studied are detailed in Annex 1 "List of References".

Several site visits by the whole team, in sub-groups or individually, were made in the Delta region, El Minia and in the Luxor area. Details of places visited and people contacted are in Annex 2. In addition, over 100 farmers were interviewed.

## E. Overview

The IIP Project must be evaluated as a prototype. In the PP (Annex Q, p 21) the overall objective is to move to "an action program aimed at developing a replicable methodology on a national scale". Its origins can be traced to almost fifteen years of research and field trials. The Project is designed to give guidance in the development of a process of water control and application that can only be described as revolutionary in the Egyptian context. It includes construction, training, capacity building, institutional and *policy* changes. It field tests a shift from rotation to continuous flow at the branch canals, new application technologies at the mesqa level, and new WUAs formed across government and indigenous institutions in a cross section of Egyptian environments.

The Project demands legislative action at the national level in order to meet its objectives. It must accomplish this at a time when the Egyptian economy is in transition from a State-controlled to a private economy. Given this, the project is not to be evaluated in terms of the total acreage already brought under the new water control methods, but rather the extent to which various project outputs, i.e. training, institutional change, and the irrigation system improvements in selected UCAs have and are creating a basis for expanding the project activities across the entire Nile irrigation system. Viewed from this angle, the project has satisfactorily achieved its purpose and objectives, but not necessarily its ambitious level of outputs as planned.

## II. PLANNED PROJECT OUTPUTS AND ACHIEVEMENTS

### A. Feasibility Studies

In 1987, the second IMS Project Paper Amendment identified eleven canal command areas to be improved under IIP. Technical and economic feasibility studies were an integral part of the rationalized approach introduced by the PP Amendment to investigate the opportunities and potential solutions for improvement of irrigation command areas and the bases for support of the USAID funding for construction.

Since 1989, seventeen separate or supplemental feasibility studies have been conducted on these command areas covering 394,000 feddans. Final reports of fifteen studies covering a total area of 264,200 feddans have been completed. The draft final reports of the remaining two studies are in the final stages of preparation. The proposed improvements for fourteen command areas (255,300 feddans) have been approved, while those for one command area (8,900 feddans) have not been feasible. Table 5-1 in annex 5 depicts the current status of feasibility studies.

### B. Designs and Contract Documents

The revised expectations of the IIP (Annual Report 7/93 to 7/94) are to complete planned main delivery system works benefiting about 175,000 feddans and the construction of improved mesqas in about one quarter of the combined project areas of nine Directorates or about 92,000 feddans. To achieve this revised goal, IIP plans to complete 104 sets of designs and contract ready documents for main delivery (42 sets) and mesqa systems (62 sets) by the end of calendar year 1993. Through the third quarter of 1993, a total of 83 sets had been completed. IIP officials expect that the remaining 21 sets will be completed prior to the end of the fourth quarter of 1993, thus anticipating no delay in the award of planned contracts. At the close of the third quarter of 1993, 48 of the 62 design sets for mesqas had been completed.

### C. Delivery System Improvement

IIP provides for improvement of the main delivery system to increase conveyance efficiency and to secure equitable distribution of water to the mesqas. The planned target was for improvement of the main delivery system of all the eleven command areas under the project, consistent with mesqa improvement target. IIP is to introduce continuous flow combined with downstream water level control as a part of the main delivery system improvement program.

Since December 1990, 25 construction contracts for improvement of the main delivery systems covering 81,970 feddans have been signed at a total cost of LE 22,131,616. To date, about 50 percent of the works, based on USAID disbursements (80% of total expenditures), have been completed. In addition, installation of 12 of the 32 gates procured for continuous flow is underway.

Prior main delivery system improvement activities have included rehabilitation of 12 km and 6 regulators of Serry canal and improvement of Herz-Numania (4,000 feddans) and Balaqtar (12,000 feddans) command areas. As a result, continuous flow is now operational in Herz-Numania and Balaqtar command areas covering 16,000 feddans (Annex 5, Tables 5 - 2A & 5 - 2B).

## D. Construction/Rehabilitation of Mesqas

IIP estimates that completion of approximately 1200 improved mesqas by the PACD will be required to reach their objective for construction of new mesqas. The IIP goal for this time period was to have completed 400 operational mesqas. A total of 36 contracts have been awarded to date at a total cost of L.E. 58,436,677.

Table 1: Planned v/s Achievements - Construction of Improved Mesqas

(Through September 30, 1993)

| | Planned (IIP) | | Achieved | |
|---|---|---|---|---|
| Mesqas | No. | Feddans | No. | Feddans |
| Completed (with pumps) | - | | 107 | - |
| Completed (without pumps) | - | - | 65 | - |
| Total Completed | 400 | 28,000 | 172 | 10,400 |
| Under Construction | 800 | 64,000 | 399 | 41,332 |
| TOTAL - Completed and Under Contract | 1200 | 92,000 | 571 | 51,732 |
| No. of Contract Awards | 62 | - | 36 | - |

The 571 improved mesqas (and sumps), either completed or under construction, are comprised of 381 low pressure PVC pipelines, 176 raised lined channels, and 14 low improved earth mesqas. Many of these improved mesqas are without pump sets. There are also 179 improved direct sumps completed covering only 1,735 feddans.

## E. Formation of WUAs

The process of forming WUAs includes seven phases: entry, leadership election, preparation for mesqa improvements, participation in improvements, operation (on-going), federation, and monitoring and evaluation. The planned numbers of WUAs and feddans were 2004 and 173,528 respectively (IIP Annual Work Plan July 1, 1992 to June 30, 1993). Table 2 depicts the present status of the organization effort.

Table 2: Present Status of WUAs

| | Phase I | Phase II | Phase III | Phase IV | Phase V |
|---|---|---|---|---|---|
| No. of WUAs | 1,526 | 1,209 | 1,016 | 355 | 107 |
| No. of Feddans | 92,950 | 86,821 | 80,089 | 26,087 | 4,782 |

## F. Training

The IIP Training Program really began in mid 1989, about one year before the critical ISPAN evaluation of September 1990 on the training component was conducted. This criticism, aimed at the low percentage of training expenditure funds, led to a funding reduction of $ 1 million. There has been substantial improvement since, nonetheless planned targets have not been reached where they are most needed at the WUA level (24.2 percent achievement), and also for the IIP on-shore training (81 percent), highlighting the slow process of a training program. However, off-shore trainees reached 150 percent (Table 3).

Table 3: Planned Outputs v/s Achievements of the Training Program

| Planned Project Outputs | Achievements by September 1993 |
|---|---|
| Train 6,300 WUA members | Only 1,526 WUA members were trained |
| IIP on-shore participants to reach 2,010 | On-shore training of IIP participants numbered 1,623 |
| 81 off-shore trainees | 121 off-shore trainees |

A revised training plan from July 1993 through September 1995 has been presented to the team and this will be discussed in Section I.C.1.

## G. Commodity Procurement

The Project provides commodities and equipment for project works and for strengthening MPWWR. Since 1989, MKE/LBII team has been providing technical assistance for procurement of commodities needed by the Project with an approved budget of $ 7.0 million.

At the end of September 1993, most of the commodities needed for the project had been procured at a total cost of $ 3,383,456. Purchase of ten remaining automatic control gates, computers and training equipment with an approved budget of $ 2,286,887 are in progress. The present status of IIP commodity procurement is summarized in Annex 5, Table 5.3.

## H. Financial Status

The original IIP project, as presented in the Project Paper (PP), was based on a budget of $ 105,900,000 and scheduled to cover an estimated area of 337,000 feddans in 12 irrigation commands. Due to various reasons which delayed the implementation of the construction of delivery canal and mesqa improvements, the scale of the project was reduced through several amendments, to a total budget of $ 63,389,000. With this revised budget, the gross area to be covered by the Project by the end of the PACD is 150,625 feddans, according to information derived from the USAID ILD contract's officer's current records, excluding the Serry Canal improvements which were originally included in the PP coverage area. Within this gross area, delivery canal improvements are scheduled to cover the entire area, with continuous flow systems reaching 115,055 feddans and mesqa improvements serving 78,559 feddans. For this reduced amount of coverage the budget has been adjusted to $ 63 million, 60% of the original budget of $ 105.9 million.

Table 4: Adjustments to Coverage Area and Budget Revisions

| # Feddans Covered | | Current Status w/Contract Amendments | | |
|---|---|---|---|---|
| Feasibility Studies | Project Paper | Main Delivery | Continuous Flow | Mesqas |
| 394,000 | 337,000 | 150,625 | 115,055 | 78,559 |
| Corresponding Budgets | | | | |
| $ 105.9 million | | | $ 63.4 million | |

With the latest budget revision, $ 63,389,000 is reserved to cover costs up to the PACD. Of this amount, $ 43,393,000 have been expended, 68 percent of the current budget. In the last quarter, an additional $ 960,000 was added for training and TA to the Contractors' budget component. With respect to the individual budget items, 80 percent of the TA component has been expended and the team has been reduced in size for the remaining two years of the contract. Fifty six percent of the commodities scheduled for procurement has been obtained. The major outstanding items yet to be purchased are automatic gates ($ 1,819,000), computers ($ 883,000), and pickups ($ 443,500). Some of these items have been ordered and are awaiting delivery. Training expenditures have now reached the current budget level to the point where additional funds were required for the last quarter's budget.

The critical budget item at this point is funds for irrigation contracts. In this category, contracts have been let to public and private firms (29 private, 32 publics) totaling $ 24,304,160. (USAID covers 80% of this funding, or $19,443,328). Thirty-three per cent of the contracted amount has been recorded as completed. The contracted amount to date covers 58,603 feddans with mesqa improvements and 81,970 feddans of delivery canal improvements plus the Serry

Canal, covering another 91,000 feddans. The IIP projections are for about 93,000 feddans of mesqa improvements to be made by the PACD, whereas the evaluation team's estimates drawn from USAID documents are for 78,559 feddans of mesqa improvements, based on actual contracts awarded or under bidding at this time. Twenty-six million dollars were budgeted for construction, or 42 percent of the total project budget. The estimated costs to complete the proposed construction to reach the revised targets of the Project is slightly over $ 28,000,000.

The original budget was for $ 105,900,000 to cover the proposed 337,000 feddans. The current budget of $ 63,389,000, which is 60 percent of the original, and covers a reduced amount of feddans, roughly 150,000 without the Serry Canal and 240,000 feddans when the Serry Canal coverage area is added in. A listing of each budget item by category and expenditure status appears below.

Table 5: Original and Current Project Budget with Expenditures

| Category | Project Paper | Current budgeted Amount | Amount | Percent of Current Budget Spent |
|---|---|---|---|---|
| | | (U.S. Dollars, '000's) | | |
| TA | 10,628 | 20,326 | 16,200 | 32 % |
| Training | 2,460 | 1,730 | 1,624 | 3 % |
| Commodity Procurement | 11,199 | 9,661 | 5,443 | 15 % |
| Local Oper. Budget | 2,970 | 1,237 | 683 | 2 % |
| Construction | 78,179 | 26,403 | 19,443[1] | 42 % |
| Misc. and Contingencies | 464 | 4,032 | 309 | 6 % |
| TOTAL Budget | 105,900 | 63,389 | 43,393 | 100 % |

[1] Includes construction costs under contract for both mesqa improvements and delivery canal rehabilitations.

# III. TASKS OF THE SCOPE OF WORK

The team was asked to evaluate the IIP Project using a framework of eight specific tasks as described below.

## A. Institutional Capacity of IIP Within MPWWR

TASK 1 Assess progress in the development of the institutional capacity of MPWWR to continue irrigation improvement activities as envisioned under the Irrigation Improvement Project with limited technical assistance.

### 1. Staffing

Despite the progress made to-date, the institutional capacity of IIP is at present incapable to continue its activities if the technical assistance remains limited to its present level. Without additional technical assistance, the progress made so far will not materialize in tangible benefits.

The present staffing is approximately one-third of the anticipated staffing for the projected rehabilitation of 337,000 feddans. Present staffing patterns have not been the principal reason for the delays in construction thus far, but there are problems regarding the number of staff and the constant shifting of personnel. For projected activities, only 61.5 percent of the staff positions needed for 1993-1994 are filled. The largest deficiency is in the feasibility studies function where only 44.8 percent of the needed staff are on board. Although feasibility studies for the existing areas are complete, the duties of the feasibility studies staff will shift to updating of completed studies and monitoring implementation of improvements. By contrast, the IAS function has 74.6 percent of its positions filled. The Delta has the greatest *staffing* deficiency.

#### a. Findings

The IIP has practically forsaken an interdisciplinary approach to their work. Over seventy percent of the IAS field agents are technicians. There are no social scientists even identified as being needed despite the major work involved in organizing WUAs, the recognized work load of conducting socio-economic studies, and the very urgent need to monitor the farmers' organization work. Staffing to undertake the intensive monitoring program needed to properly evaluate the effects of the Project is inadequate. An interdisciplinary approach between MPWWR and MOA is seriously lacking, and agronomic and marketing benefits that could result from an improvement in crop water-use management are relegated to the back burner.

b. Constraints

There is an erroneous assumption that somehow an organization will evolve that will encapsulate the spirit of managing new technologies in an old bureaucratic environment. Serious organizational impediments to implementing the Project objectives exist. Major organizational constraints are the number of staff available, the inability to keep agricultural engineers from the MOA on the Project, the constant shift of personnel, the highly centralized authority pattern of managing the project from Cairo, the lack of financial incentives for field personnel, the shortage of operating funds for field equipment and vehicles, and the non-project work demands of IIP personnel in the Directorates. The general conjecture is that if IIP attains the status of an authority, many of these problems will be solved.

c. Conclusions

There is a continual shifting and replacing of individuals within the IIP. Since January 1989, the IIP has had six directors and a total of 17 different project site General Directors. For the IAS specifically, 22 field engineers have transferred from the project and complete staff turnover has occurred at three sites. One critical problem in this staff turnover pertains to agricultural engineers recruited from the MOA and who must return to the MOA after four years with IIP. The team has recently learned that 40 permanent positions of agricultural engineers have been included in the next MPWWR budget. This is certainly a step in the right direction.

There is no evidence that becoming an authority will solve the above-mentioned problems because many of them are endemic to the organizational structure and management of the Ministry as a whole. The focus for improving IIP organizationally needs to begin internally. Because an IIP authority status is politically stalemated at this time, other efforts should be initiated to improve the management of the organization. A more in-depth study should be able to determine whether or not an authority can be effectively implemented, or if there is some intermediate organizational form that can be implemented and still provide the legal and resource base needed to carry on IIP activities. Because of the great reduction in the number of feddans, one would have concluded that the present staff would be adequate. However, the present staff are stretched at this time. Once more feddans are improved, even with the reduced projections, the work will be more labor intensive as the tasks will demand more work with the WUAs, more on-farm efforts, and more monitoring of scheduling. Additional staff will be needed to execute the increased work load.

d. Recommendations

Staffing should be upgraded to meet the needs. Social scientists are notoriously lacking. A training office should be established within IIP to provide necessary training of trainers to properly diffuse new skills to Directorates. A detailed and comprehensive organizational evaluation of IIP needs to be conducted. A TA team of both American and

Egyptian institutional development experts should be hired to do an organizational development analysis of IIP (see Annex 6). This evaluation would be strictly limited to the management of IIP and would focus on the following as a minimum :

- o the organizational environment of IIP;
- o the organizational culture of IIP; and
- o the organizational structure of IIP.

2. Operational Policies and Procedures

Operational policies and procedures require some modifications. Changes are recommended for contractor selection procedures as discussed in Section B. Changes are also recommended for provision of pumps for mesqas, (see Section E). The established procedures for planning, design and construction currently are being followed.

3. Training Programs

a. Findings

The training program was an integral part of IIP. It has emphasized the necessary skills to perform the tasks of the Project. The training programs should be enhanced as discussed in Section III and VI.

Nineteen overseas courses have been provided for 121 IIP engineers and senior officials. About 1,600 engineers have been trained in 52 special on-shore courses related to IIP needs. An estimated 1,400 WUA leaders and council members have attended different types of courses covering irrigation scheduling, O & M, WUA finances and record keeping. Critical future training efforts have been planned.

Training programs for the Project up to the PACD will be as intensive. For off-shore training, 103 short-term programs are scheduled. Three M.S. degree programs are to be started and two others are already in progress. There is a proposal to fund a tour to Indonesia to study their cost-sharing program. On-shore training for the staff will be scheduled for about 397 participants covering several areas (see Annex 7). Training of WUA leaders is scheduled to be extended to an additional 2,302 farmers before the PACD.

b. Constraints

The main constraints have been the continuing loss to the project of trained but frustrated engineers, and an insufficient number of trained trainers.

c. Conclusions

Training has been given extensive support in the project and has addressed key activities which IIP has been conducting. Training has been and will be in the future extremely important to the progress of IIP. On-farm and M & E training are required in future training plans. Given the fact that training is of extreme importance, the Project should institutionalize the process in the organization.

d. Recommendations

Institutionalizing the process means that there should be a training office in the Project that can facilitate and administer a truly large scale effort. The Project has made contact with the Ministry's training and support center, but meaningful outputs have not been forthcoming. This relationship should be pursued and it can be one of the items for the suggested organizational evaluation mentioned in Section I.A.4.

The training office should develop a policy and procedure to train trainers systematically and diffuse them to the field sites on a continuing cycle of activity. The project staff needs will augment and the small Cairo staff doing the training will be unable to keep up with the increased demand.

4. Commodity Procurement

In 1987, under the Second IMS project Agreement Amendment, the procurement needs of IIP were estimated at $ 11.2 million, exclusive of automatic gates that were not a part of the Commodity Procurement Plan (CPP) at the time. CIS/CSU technical assistance team provided the required services for procurement of commodities valued at $ 2.66 million, for both IIP and WRC, from 1985 until the end of their contract in 1991.

In July 1989, the new TA contractor, MKE/LBII, proposed a CPP based on projected implementation and staffing level presented in their March 1989 Inception Report. The Plan called for a three-phase procurement of on-shore and off-shore commodities valued at $ 8.86 million. Phase I was approved, but the approval of proposed phases II and III was postponed pending a future reassessment of the Project needs. As the IIP progressed, the proposed time frame for completing all of its designed activities was determined overambitious. The area proposed for construction of irrigation improvement was reduced and the project completion date was extended to September 1995. These changes had a major effect on the quantity and timing of IIP's required commodities. In September 1992, a revised CPP was adopted, whereby phase II, phase III and the on-shore CPP were deleted, and a new time table for procurement of the remaining phase I commodities was approved. The revised CPP also included an additional $ 2.8 million for procurement of automatic gates needed for continuous flow. The net result of all these changes was a reduction of $ 1.86 million to a revised budget of $ 7.0 million for the remaining life of the project.

a. Findings

The CPP included purchase of 246 motorcycles for IAS field agents. These motorcycles were procured and delivered according to the plan in January 1992. In some areas, the number of procured motorcycles exceeded the current number of IAS agents, and some of these agents do not know how to ride. Consequently, a large number of motorcycles are still unused and kept in their original shipping boxes at various Directorates.

In some Directorates, sophisticated surveying equipment procured in 1992 are still unused, although theodolite, levels and other conventional surveying equipment are being used. Computer Aided Drafting equipment at IIP headquarters is underutilized as the number of qualified users are too few.

Under the revised CPP, a total budget of $ 4.15 million is available for procurement of 31 pick-up trucks for construction supervisory staff, 70 automatic gates for continuous flow, and computer equipment. (see Annex 5, Table 5-3). At present, however, the construction contractors are providing transportation for supervisory staff according to their contracts; fewer automatic gates (42) will be needed on the basis of revised projection of achievable continuous flow coverage by the PACD; and fewer computer equipment with lower unit prices are being procured due to the recent reassessment of needs and the reduced prices of computer goods in the US market during the last three years.

b. Constraints.

The present training programs for use of the new equipment are provided for a limited number of potential users. Once the trained personnel transfer to other locations, the replacements are unfamiliar with the proper use of equipment.

c. Conclusions

The original procurement plan and the actual need of the commodities and equipment were not synchronized. Although the plan was revised and reduced considerably, it was not sufficiently flexible to be adjusted periodically to a more realistic workload and staffing needs.

The present arrangement for transportation of construction supervisory staff is satisfactory and there is no need for procurement of pick-up trucks. Significant savings in the budget of IIP revised CPP are anticipated. These savings stem from timely reduction in procurement of the projected quantities of commodities to match the actual demands of the improved areas.

d. Recommendations

Procurement plans should be based on projections of demands for a shorter planning horizon, users' applications and a project-wide demand assessment criteria to be developed by IIP. Preparation of annual plans with sufficient lead time for procurement of imported commodities is recommended.

Training for use of the new equipment should be on-the-job with periodic refresher courses for all potential users in each IIP office.

Procurement of pick-up trucks should be canceled and its budgeted amount, along with other savings totaling about $ 2.75 million, should be re-allocated to the other project needs (e.g. construction, procurement of pump).

## B. Progress in Planning, Design and Construction

TASK 2 Assess progress in developing the rational interdisciplinary approach for planning, designing and implementing irrigation improvements called for in the project design.

### 1. Planning

The planning process through the feasibility studies has employed socio-economic surveys, incorporated the results of earlier surveys and studies, utilized TA in the socio-economic and engineering dimensions, and repeatedly recognized the value of the interaction between and the need for an interdisciplinary approach to planning. Documentary evidence indicates an interdisciplinary approach to planning, however there is a need to increase inputs of agronomists and sociologists in future efforts. Such planning should include more evaluation of indigenous existing organizations and how the new WUAs will interface and interact with these institutions.

With regards to the quality and effectiveness of feasibility studies, ten out of thirteen of the completed and accepted feasibility studies over the seventeen Project UCAs were carefully reviewed, including costing procedures and the estimation of project benefits. The quality of the analysis improved after the initial studies with a more complete presentation of data and a better presentation format. The analytical framework for computing the benefit cost streams is appropriate. The analysts claim to have taken a conservative approach attempting to show not what the best possible outcomes might be, but that the projects were feasible under conservative estimates.

The Feasibility Studies provide a plan of action to begin the construction and organizational activities that are required to provide the new water management system. They have shown that there is considerable variation in the projected discounted net benefits across the project areas as a function of the alternative mesqa designs (Annex 8, Tables 8-1 through 8-4), and the physical parameters that define the Project activities.

In the selection of priority areas for improvement, there are no indications that a process has been developed which can use the experience gained from the selected UCAs to provide guidance for future sites selection.

a. Findings

The data presented in the feasibility studies show a complex set of benefit streams which vary across UCAs. The constant is the decreased pumping costs which is a function of the crop grown and seasonal water requirements.

The UCAs were selected for inclusion in the project on the basis of the existence of known problems associated with irrigation. As such they must be seen as a set of unique sites to be analyzed and carefully monitored in order to provide the type of guidance that is inherent to the prototype project concept.

b. Constraints

There is a lack of inputs from agronomists and sociologists. in the planning process. The yield benefits claimed for the various crops in different areas are less than the between year variability that is suggested by the multiple years yield data given for all of the UCAs. This alone raises questions regarding estimates of yield increases and minimally suggests that careful monitoring will be required to verify the impacts of project activities. In addition,the sources of benefit and the constraints to yield increases are quite different across the selected command areas. (Annex 11, Table 11-3).

c. Conclusions

The feasibility studies have been a useful tool to MWWPR. These studies strongly suggest that the benefits from yield increases due to improved water distribution and on-farm water management are in the order of ten per cent to twenty per cent for all of the command areas. The baseline data, which is derived from the surveys for the area currently under production with the water served from the individual pumps, is drawn through an acceptable survey format. Yield estimates for the entire mesqa area are then estimated by attributing continuous water flow to all areas served by the mesqa. The difference of the weighted yield for the mesqa area is then used as the derived benefit from the project's improvements. Although these benefits are based on yield increase estimates and then compared to field survey data, this has been determined to be sufficient for making before and after project comparisons. The monitoring system will determine the degree to which these projections were accurate, once sufficient operating time has elapsed for the new mesqas and several seasons of yield data have been collected.

On the other hand, the estimated benefits which are claimed by way of reductions for pumping costs, based on an analysis of the relative cost efficiency of larger pump sets, is well established by empirical studies, and accepted with a high level of confidence. The project has now moved to a position where it can accomplish its primary mission.

d. Recommendations

Future mesqa improvement projects should be initiated with due regards to a thorough appraisal of the benefit streams of those already underway. This is totally consistent with the formulation of this IIP as a prototype project to give guidance to possible similar projects across the Nile irrigation system. Projects already started should be completed, and a careful monitoring program of output increases should be initiated immediately (see Section D). The feasibility studies must be viewed as a set of data from which, in combination with a well directed monitoring program, can give guidance for planning for future irrigation improvement activities.

It is recommended that selection of new project areas be based on a project identification process that :

- Establishes those project characteristics that are most likely to contribute to a higher internal rate of return;
- focuses on any new projects in areas where water quality prohibits the re-use of drain water, or areas where drain water flows out of the Nile system;
- avoids areas where decreased percolation and drainage, claimed for project activities, could allow increased salt water intrusion or have other environmental consequences;
- Recognizes the role of water re-use, both drain and ground-water, as part of the total water management system.

A new system of priorities for selecting new project areas should be developed based on findings of the proposed M&E activities.

2. Appropriateness of Engineering Designs

a. Findings

From its initial stages the IIP has employed design criteria derived from the concept of sound water management practices through WUAs for effective delivery of water to the farm in accordance with expected crop and water user needs. The improvements to the main and delivery canal systems for transmission of continuous flow with downstream control to the mesqa provides the flexibility needed for farmers to irrigate according to crop water needs. Elevated and pipeline mesqas provide water users with efficient water conveyance, low maintenance costs and convenience of water delivery.

Mesqa flow and pumping capacities are designed by IIP engineers using criteria that will provide sufficient water during periods of critical water demand. Overnight storage in the canals allows estimated daily crop water requirements to be delivered to the mesqas for 16 hours.

Engineering designs are prepared using conservative assumptions for crop water use and are adequate for the needs of the WUAs. Increased mesqa capacities, permitting more flexibility for farmer irrigation, will allow periods when withdrawals higher than planned amounts can be made from the delivery system.

b. Constraints

Conservative design assumptions allows periods of excessive water use by the mesqa and some increases in mesqa costs may occur.

Constraints with regards to continuous flow with Down Stream Control (DSC) are : (1) farmers will have to share their water over a longer period of time, (2) DSC gates can be tampered with and protection will be required, (3) these measures are new to Egypt and reluctance to implementation may be encountered, and (3) regular specialized maintenance will be required.

c. Conclusions

Improved mesqas are designed with flow capacities derived from conservative crop water use assumptions. With timely irrigation afforded by the introduction of continuous flow, these designs will provide a system capable of meeting crop water requirements and providing farmers with the flexibility to irrigate at the time, rate and duration needed by their crops.

d. Recommendations

IIP should reevaluate conservative design assumptions which increase mesqa capacity requirements, using realistic estimates. Provide farmers with a planned, broader range of water use in a planned design flexibility factor.

3. Cost Effectiveness of Designs

a. Findings

The introduction of continuous flow in the delivery system is made possible and enhanced by the installation of automatic downstream control gates and regulators at an average cost of about LE 100 per feddan . In addition to providing scheduling flexibility, downstream control measures are designed to allow farmers to irrigate during the daylight hours, reduce waste water flow at the tail-end and provide storage in the canals during periods of non or low water use. Downstream control is well suited to Egyptian conditions where irrigation water is conveyed in canals with gentle slopes and water levels below the ground surface. These conditions provide natural storage capacity upstream of the automatic gates. Fairly flat canal reaches allow for widely spaced downstream control structures.

Single point pumping, when adopted and managed by WUAs, eliminates many of the inefficiencies of the existing individual pumping units and can reduce pumping costs by 50 percent or more. The performance of these pumping units can be further improved by better design of an effectively placed permanent installation. However the mobile pumps, with a few exceptions (capacity and a pumping pad), are not designed as an integral part of the improved mesqa.

Downstream control (DSC) structures and appurtenances are well suited to Egyptian conditions. Main delivery system costs associated with the installation of automatic DSC structures and required appurtenances for continuous flow indicate that the unit cost will range from LE 50 to 200 per feddan.

b. Constraints

Constraints regarding the installation of improved pumping units are: (1) Commonly used mobile pump units are regarded as an equally efficient and effective method of lifting water from the canal, (2) the notion that the pumping unit is a separate entity and can be removed from the design without impairing complete improvement package, and (3) acceptable methods of providing the pumps are still pending.

c. Conclusions

Properly designed and permanently installed well planned pumping stations will further reduce pumping costs.

Automatic gates, distributors and tail escapes, as designed by IIP, are considered to be appropriate and cost effective for providing continuous flow in the improved areas. They are appropriate for Egyptian conditions and will eliminate much of the water wastage that normally flows to the drains.

d. Recommendations

IIP should adopt a policy that engineering designs for mesqa improvements include all necessary details for the efficient placement of permanently installed pumping units and be included in the construction contract for improved elevated mesqas.

MPWWR should consider the adoption of continuous flow and DSC demand irrigation to as wide an area as possible to achieve the water saving benefits provided by these measures.

4. Contract Documents and Procedures

a. Findings

IIP contract documents including detailed design drawings and specifications are prepared and assembled at the directorates, and reviewed and approved by the Cairo Central Office. Contract units are selected which provide an amount of work large enough to attract the necessary interest by competent contractors and to receive competitive bidding for the construction of either main delivery system or mesqa improvements. They contain adequate requirements for prompt and good quality construction if their provisions are made applicable and enforced.

The contract documents were well prepared with adequate provisions and specifications to promote timely completion of contract works and to assure good quality construction. Enforcement of these conditions modified for IIP contracts is needed. Contracting procedures were reviewed and also found to be appropriate.

b. Constraints

Reluctance of some officials to award contracts to anyone other than the lowest bidder.

c. Conclusions

Contracting procedures were adequate. The contract documents were complete, with provisions and specifications for more conditions than are necessary for IIP civil works. However, methods are not prescribed for prequalification or screening of contractors for small works. Elimination of unacceptable contractors (which may sometimes be the lowest bidder) will improve performance and reduce delays in contract completion.

d. Recommendations

Contracting procedures should be modified to require a system of prequalification and improved screening of contractors with assured support and responsibility provided by the Cairo office. Prequalification requirements should have flexibility to encourage participation of qualified contractors entering into this new field.

5. Usefulness of Standard Designs

a. Findings

Structural designs prepared by IIP for both main system and mesqa improvements are normally equivalent or comparable to other structures used and can be standardized. The design of improved mesqas by the IIP is a repetitive process involving hundreds of either identical or similar small-raised channel and pipeline appurtenances. Standard designs have been prepared by IIP and are being used in the Directorates. These designs were found to be appropriate and being used for mesqa construction by most Directorates for some irrigation improvement structures.

Standard designs were well prepared by IIP and appropriate for use in the field for many irrigation improvement structures. These standards are not being used to the extent that they could be.

b. Constraints

Standard design constraints are : (1) design engineers do not always accept work prepared by others, and (2) standard drawings do not always reflect the latest innovations in design improvements.

c. Conclusions

The use of standard drawings is very appropriate for the types of repetitive designs and should be used in IIP.

d. Recommendations

Regularly scheduled meetings of design engineers should be held for the purpose of review and revision of standard designs and for the exchange of information in regard to updating the design of irrigation improvement structures.

6. Construction

a. Findings

Construction contractors have produced substandard works in the past. However, the quality of on-going construction at the sites visited have improved and are acceptable. Well equipped material testing laboratories are now operational in all Directorates. Standard sampling and testing procedures are being employed for monitoring and quality control of the on-going construction.

There has been a recent surge of tendering and award of contracts as IIP is coming to an end and the time is running short for construction works to be completed and funded by the PACD. Since July 1993, ten new contracts have been awarded and another 16 are being tendered, while only six have been completed. The rapid rate of tendering and award of new construction contracts is expected to continue for the next few months.

The trained and qualified engineering staff are gradually leaving IIP as they are promoted to higher positions at MPWWR. The Construction Directorate at IIP Headquarters has had two Directors during the last three months and this position is now vacant. The monitoring unit is under-staffed. The quarterly progress report produced by the unit although statistically attractive, does neither flag the problems of individual contracts nor the lack of coordination between construction activities that permit correctional measures by the management.

Recently, contractors are required to submit a detailed construction schedule along with their bid. These schedules are only submitted for compliance with a bid requirement and are usually ill prepared and not adhered to, although are however revised from time to time after the award of contract. The supervisory staff has a difficult time enforcing the approved construction schedules.

IIP has taken several steps to mitigate construction delays including : (a) disqualifying contractors of delayed on-going IIP contracts from participating in new tenders; (b) eliminating contractors whose bid is more than ten percent below the engineers' estimate; (c) establishing a construction monitoring unit at IIP Headquarters to follow up the progress of work; and (d) providing training for construction supervisory staff. These measures together with on-the-job experience gained by the contractors are expected to prevent delays in the future.

b. Constraints

Construction contracts are relatively small, the majority fall between LE 1.5 to 2.5 million. At present, the number of supervisory staff assigned to each contract is adequate and the ones interviewed at random were knowledgeable of contract procedures and specifications.

There are considerable delays in the execution of construction contracts as the result of three broad categories of causes that have existed in the past:

- Delays that are due to lack of qualification of contractors who had no prior experience in similar construction works, and mostly include contracts signed at the start of IIP construction program in 1990 and 1991;

- Delays that are attributable to lack of direction or experience of the supervisory staff; and

- Delays that are due to the act of other private and public agencies such as permits, delivery of pipes by factory and others.

### c. Conclusions

The recent surge of tendering and award of contracts will place a heavier burden on the construction supervisors in some Directorates. There is a growing concern that future shortages of staff and deficiencies in training will contribute to poor quality and delay of construction. Unless additional staff are mobilized and trained in time, the quality of construction may deteriorate and completion dates may be delayed further.

There is a lack of overall coordination and management of construction activities. Uncontrolled delays have contributed to the existing lack of coordination between construction activities and the procurement of gates. In the next two years there will be a significant increase in construction activities on which the project success will heavily depend. A properly coordinated and well managed construction monitoring, coordination and control program is a prerequisite for such success.

The quality and timing of construction have improved, but there is potential for even further improvements. All policies, procedures, material testing equipment and facilities are in place and the contract documents provide a wide range of latitudes for reasonable and proper supervision and control, however enforcement of provisions of contract requirements, particularly for maintaining construction schedule, is weak.

### d. Recommendations

An assessment of the needs and availability of qualified construction supervisory staff and a project-wide plan for mobilization and training of construction inspectors, to be assigned to each contract, should be made and implemented. The appointment of a qualified Construction Director at IIP and strengthening of construction monitoring unit should be made soon. The Construction Directorate, at the IIP Headquarters, should initiate a more comprehensive and vigorous program and play a more active role in monitoring and coordinating project-wide construction program to ensure completion on time and within budget.

Directors, engineers and technicians should be encouraged and supported to use their authorities to implement contract requirements properly and forcefully.

## 7. Operation & Maintenance

### a. Findings

IIP has introduced continuous flow combined with downstream water level control to Egypt for the first time. Continuous flow is for increasing the flexibility of the irrigation system to allow farmers to irrigate in a timely manner, at the rate and duration required by the crops, replacing the existing rotation of water delivery. Continuous flow is achieved through installation of new water control structures on the main delivery system, equipped with new automatic gates that are different from the existing ones in Egypt.

IIP has also introduced new innovations in water distribution at the mesqa level, through installation of low pressure pipeline and pre-cast concrete linings, and introduction of WUAs, a new organizational arrangements for operation and maintenance and management of the mesqas. Operation and maintenance manuals have been prepared for the new mesqas. Demonstration mesqas are currently being used by IIP for providing the required training to the farmers and the IAS staff.

b. Constraints

Training for both the farmers and the irrigation staff to ensure successful utilization of the new system is poor.

c. Conclusions

Significant changes are being introduced at the main delivery and at the mesqa levels. Such changes require proper operation and maintenance plans, policies, guidelines and procedures.

d. Recommendations

The operation and maintenance manuals for the mesqas should be translated into Arabic, simplified and tested on demonstration mesqas. New operation and maintenance manuals for the main delivery system and supply of continuous flow to the mesqas should be prepared with the assistance of the TA team. For O&M of the main delivery system, intensive on-the-job and short-term training courses should be provided for the irrigation and IAS staff. For mesqa O&M, separate training programs at the demonstration mesqas should be arranged for the IAS staff and the farmers.

## C. Effectiveness of IAS

TASK 3 Assess the effectiveness of the Irrigation Advisory Service in organizing operational water user associations, providing water management technical assistance to farmers and water user associations.

### 1. Assessment of IAS and WUAs' Evaluation

Despite underlying constraints, IAS has been quite effective in mobilizing WUAs and in providing water management technical assistance to WUA farmers. The comprehensive organization of operational WUAs is just beginning and it needs extensive efforts and time for its continuance. This partial success is attributable to an excellent training program which has nonetheless suffered from reduced funding.

a. Findings

The June 1992 evaluation of the IAS and WUAs was useful in systematically focusing on areas of improvement to make both the IAS and WUA more sustainable. This 1992 evaluation came up with fifty-five recommendations which are being addressed to some extent by IIP. These recommendations can be grouped into the following three key categories :

On The permanence of IAS within the MPWWR, Issues of resource commitment, staffing patterns and budget control, were just symptoms of an overall problem of the IAS not being a viable, identified entity in the MPWWR. That evaluation viewed the IAS as functionally independent from IIP and ignored the possibility of IIP becoming an authority.

Regarding The present and future status of IAS, the report stated that there must be a clear and mutually shared perception that IAS be an enabling and facilitating entity rather than an implementing entity. The IAS purports to facilitate change among WUAs, by assisting farmers to organize among themselves, helping them to implement new technical procedures, and providing a direct linkage between the farmers and government organizations to solve problems.

On the issue relating The IAS vis-à-vis WUAs, the study identified the "haphazard" and the highly varied status of WUAs in the project. There is a continued need for IAS's support to strengthen the WUAs. Many of the comments were couched in the environment of the still gnawing pump problem and the uncertain cost sharing issue which are still not being adequately addressed by the Project.

b. Constraints

A coherent understanding about the fundamental mission of IAS still does not exist. The confusion as to the exact role of IAS, which extends to engineers and field agents, is a very critical issue which needs to be addressed. The "vision" of IAS is being discussed, but more efforts to clarify the purpose of the organization is required. The work with the mesqa WUAs is now focused on immediate issues of pump acquisition and financial stability. Trained personnel to tackle scheduling management and other organizational issues is lacking.

c. Conclusions

IAS should not be treated as an independent entity from the rehabilitation effort. However, the issue of an IIP authority is beyond the power of IIP. Mesqa leadership for the most part is not fully developed as needed to perform the specified tasks of the WUAs.

d. Recommendations

There is a need to re-emphasize the purpose of the IAS when discussing operational issues. The hiring of Egyptian social scientists in the Project to monitor the process of WUA formation is imperative.

2. Farmers' Inputs in Mesqa Improvements

a. Findings

Throughout the phase process, farmers have been an integral part of the operations.

b. Constraints

Farmers were not allowed a choice of alternative improvements in all of the areas and in Edfu, the farmers were swayed to accept the pipeline. But after the choices were made, farmers were involved to differing degrees in the planning, design, and construction of mesqa improvements.

c. Conclusions

Farmers are not allowed to make a choice between buried pipeline mesqas and elevated mesqas. The designs and the type of mesqas are imposed upon them.

d. Recommendations

More information should be made available to farmers so that they become knowledgeable on the pros and cons of each type of mesqa being proposed. They would then be able to participate more fully during the conception phase.

3. Effectiveness of IIP in Assisting WUAs to Move into Operation.

The effort that has been conducted should be described as farmer mobilization. The organization of farmers in decision-making, coordination of effort, establishment of communication lines and authority structures have not been achieved to an effectual standard. The WUAs are only beginning to understand their responsibilities.

a. Findings

Given the circumstances surrounding the physical improvements, IIP has been effective in assisting WUAs to move into the operational stage in terms of plans, activities, and internal cooperation among farmers. However, concern is warranted regarding the "on-going" nature of developing Phase V associations into truly functioning organizations. Efforts are now being focused on establishing bank accounts and financing the pumps. But the discipline of irrigating among the water users has not significantly changed with the introduction of the new improved mesqas to the extent that it will be when they receive continuous flow.

Mesqa plans are established, but for most of them the operational plans seem to be the same as before the improvement. Training in resolving disputes has been conducted by the TA for the Project. However, there is no indication that the principles have been diffused and implemented in the field.

The realistic role of the IAS should focus on the organization of the WUAs and helping in water delivery scheduling. Without further training, the IAS personnel do not have the knowledge and expertise to teach farmers on-farm water management techniques. The IAS can be trained in on-farm water management. However, on-farm improvements include much more than water management. Although critical, this component is not sufficient for achieving yield potentials, and therefore it is preferable to have agricultural extension workers with expertise in crop husbandry advise on on-farm water management. The agricultural extension service needs to be included in on-farm improvement.

b. Constraints

There is no clear definition of the IAS role. The incentives which USAID Project managers have developed with PBDAC are appropriate but apparently ineffective in facilitating loans as these procedures are being implemented across the different Directorates. PBDAC has failed to develop procedures which facilitate the granting of loans to the WUAs because they do not have legal status.

c. Conclusions

The present organizational structure of IIP is not conducive to the training of IAS agents in integrated farming technology. For the time being, and until an authority is created within MPWWR, it should be easier to train also the extension service officers from the MOA to take a total crop management perspective than to create a competing extension service through the IAS. Furthermore, this approach would tend not to exacerbate the perceived impasse between MPWWR and MOA personnel at the higher échelons where "turf" protection is demarcated by existing laws.

If there is to be an established delivery schedule that is more stringent than the farmers' existing scheduling patterns in order to better use continuous flow, additional actions by the Project need to be set up with the farmers to ensure that the associations meet one of their central responsibilities. This prototype project should establish a monitoring mechanism to evaluate what is the most effective way to develop a functioning farmer organization and the consequences of such an organization in the rural sector. Based on present conditions, numerous WUAs will evolve haphazardly on a trial-and-error basis without patterns being identified so as to guide future efforts. With the above reservations, the work with the IAS has progressed very well. The WUAs are still in an embryonic form and there is still much to be done to call them organizations in an effectual sense.

The Project policy of requiring the purchase of pump for the collective use may be necessary if cost reductions inherent to the use of a larger pump are to be achieved. However, the issue of financing the group pump has not been resolved in a manner which allows the project to move ahead effectively. Improved mesqas are being completed faster than group pumps can be put in place. The alternative, more feasible means of providing group pumps for the improved mesqas is to include the pumps with the mesqa improvements and work out an arrangement with farmers to begin repayment for the pumps and mesqas. (see Section G for a detailed discussion on the pump issue).

d. Recommendations

Proper administrative steps to define the proper role of the IAS are needed. A systematic approach to look at the process of organizing WUAs in order to prepare for further application throughout the nation is warranted. This includes the steps needed to expedite legalization of the WUAs. The rapid appraisal approach performs only a limited monitoring function, but does not deal with the operational process or political aspects concerning the WUAs.

In the absence of an IIP authority with a proper organizational structure that would integrate all aspects of crop husbandry from seed planting to the table of the consumer, the agricultural extension service should be trained in on-farm water management, because field where drainage water sometimes accounts for almost 50 percent of the water losses from the field. Training in *crop water-use efficiency* is evidently beyond the scope of the IIP Project. However, this restricted scope in the original conception of the Project, perhaps governed by interministerial rivalries, constrains the increased benefits that could have accrued to the farmers. Such training would have included, among others, variety selection, crop type, age, evapotranspiration ratios, improved technologies in water delivery systems beyond flood and furrow-surface irrigation techniques for row crops, and the philosophy of soil-plant-water continuum.

Since it is universally agreed that water management, although critical, is not sufficient for achieving yield potentials, it is preferable to have agricultural extension workers who have expertise in many dimensions of crop husbandry to advise on on-farm crop water management after undergoing further training, until and if an authority is established within MPWWR. If an authority is created, transference of trained staff from MOA to the newly formed organization could be given consideration for the greater benefit of the country.

## D. Adequacy of IIP'S Monitoring and Evaluation (M & E) System

TASK 4 Assess the adequacy of the IIP Component monitoring and evaluation system (M & E).

### 1. M & E System of IIP

The M & E program has two separate components, a socio-economic and a water management. The program is critical for two reasons : (i) to establish the absolute benefits received by the farmers as a basis for expanding the program into new regions, and (ii) to provide a basis for a cost sharing program that may be associated with this project (see Section E).

#### a. Findings

The planned M & E program shows considerable insight and creativity. However, for extracting the lessons learned from IIP to provide guidance for future projects, the program is minimal. The monitoring program for irrigation system performance is operated independently of the socio-economic monitoring except that measurements are taken along the same mesqas and farmer fields that are included in the socio-economic survey. There appears to be a strong training program for creating the capacity among the IAS engineers to carry out the monitoring tasks for program objectives and training. The M & E is not claimed to be sufficient for determining water savings as in a scientific experiment. Instead it is designed to document if water delivery and timeliness will improve as a result of the Project and to create an awareness of water management among IAS staff.

The current plans for M & E concentrate on average yield increases for head and tail enders and on changes in water use efficiency on the same farms. These are necessary but not sufficient M & E activities for capturing all of the lessons to be learned from the Project. The procedures must capture yield increases with greater sensitivity to differences between Project regions, climatic effects, changes in input quantities other than water, price changes, and in identifying other sources of Project benefits as seen by farmers, i.e. environmental effects, organizational constraints and the benefits that can be attributed to the various Project components, namely continuous flow, land leveling and improved mesqas.

The socio-economic surveys that have been carried out appear to have been effectively administered and conducted. However, the M & E program does not provide enough information required by IIP, MPWWR and USAID to evaluate the effectiveness of the Project. There is general acceptance and belief among the Project staff that the Project is indeed successful and that it will most certainly result in increased yields, decreased water application costs and water savings. The basis for this optimistic view seems to be early experiment station results and the belief that if water use efficiency is increased, benefits will certainly follow. This view, if it does not include a complete understanding of the existing system, fails to recognize that many of the farmers have identified the same problems and have developed methods, not always conventional, for overcoming them. It also fails to recognize the existence of and the benefits that are derived from water re-use.

b. Constraints

Constraints associated with the timely collection and analysis of data appear to be associated with an inadequate number of staff, the personnel transfer and training problems, and to the relatively low priority which has thus far been assigned to monitoring and evaluation.

c. Conclusions

There is no evaluation program to determine benefits or costs identified by the farmers but not recognized by the Project managers. Based on informal focus group meetings with farmers at the sites visited, there is considerable enthusiasm for the IIP project. There are clear expectations that there will be cost savings and by some, that there will be yield increases. These expectations have been created by IIP staff, farmers in other project areas, and especially, for cost reduction from pumping through farmers' experience. These potential benefits, and perhaps others should be identified as they are relevant for project expansion and for cost sharing considerations.

The evidence that is available on yield differences and other benefits strongly suggests that the evaluation and monitoring program should not be based on preconceived notions but rather on systematic documentation.

d. Recommendations

A systematic M & E of the process of WUA formation and its interaction with the WUAs of other areas should be continually evaluated for improving the WUA formation process. An environmental M & E program needs to be included because of their implications for project expansion and cost sharing. The socio-economic section is competent and displays a high level of professionalism. This group should continue to be a part of the M & E program.

2. M & E Information Process

a. Findings

The M & E program is not sufficiently fine tuned to evaluate the effectiveness of the IIP program with sufficient sensitivity to guide future policy decisions related to IIP type activities. These include investment decisions in similar projects by other donors and increased involvement of the private sector in mesqa improvement activities (see Annex, Table 8-1). The differences in the IRR calculations, as well as for benefit cost, between the different Project command areas (see Annex 8, Tables 8-2 through 8-5) suggests very clearly that there will be differences in the profitability of the Project dependent on the physical and environmental circumstances of the Project command area. Likewise, the sensitivity analyses, which tests how much prices and costs can change and the Project remain viable, indicate considerable difference between Project command areas (see Annex 8, Table 8-6). This means that the M & E should account for project differences between command areas as a guide for recommending the Project activities to new areas. Minimally, this means a careful monitoring of any increases in yields.

Regarding the field data collection activities as providing the required information in a timely manner, the socio-economic surveys that have been carried out appear to have been effectively administered and conducted.

There is no environmental monitoring program. Continuous flow has the potential to reduce the incidence of bilharzia, increase mosquito borne diseases and increase problems with weed growth in the branch canals and distributories. These effects should be monitored and evaluated because of their implications for Project expansion and cost sharing.

b. Conclusions

There is no systematic monitoring of the process of WUA formation nor of the interaction of the WUAs with other rural institutions. These experiences should be continually evaluated for improving the WUA formation process.

c. Recommendations

The IIP program should initiate short-term technical assistance (agricultural economist, agronomist, on-farm water management specialist, pedologist, and environmental experts) for approximately a two to three-month period to develop a M & E evaluation that will determine :

- Project benefits by project and command area characteristics including absence or presence of drainage, major soil differences, land leveling and type of mesqa. The methodology will need to account for multiple production inputs in the production process.

- The effects of the new water control practices on downstream water users, and the effects of continuous flow on unimproved mesqas including the environmental effects.

- The benefit streams as seen by farmers at different locations along the mesqa and by type of farmers including tenants, owner operators and absentee owners.

- The evolution of pump ownership patterns on the improved mesqas, particularly for the emergence of single owners who have gained monopoly pricing power because they control the pump and thus water availability for all the farmers along the improved mesqas.

- Other relevant activities and outputs, viz. introduction of new and improved crop varieties, cost effective fertilization practices, scientific collection of yield data for meaningful and accurate comparisons. The specialists should investigate possibilities for involving the Egyptian University community in the M & E program including graduate students for specialized studies. The M & E system should be structured in a way that includes significant participation by persons not directly associated with the IIP, or with the early research which laid the framework for the project. This is a generally accepted principle for maintaining objectivity in any system of M & E. At the same time, it is important that the IIP staff should continue to be directly involved in M & E. This activity must be a process that allows the Project to benefit from lessons learned in a continuous and constructive manner. It must not be cast as a policing operation or create opportunities for inter-agency conflict.

E. Progress in Cost Sharing Program

TASK 5 Assess progress to date in developing a cost sharing program at the mesqa level.

1. Sustainability of IIP activities

a. Findings

Pump purchasing for single point lifting has been calculated to effect a decrease in pumping costs by about 50 percent, substantiated in the field. Thus, a case could be made whereby collections by WUAs would be raised by 10 to 20 percent with the understanding that at the end of a five-year period the WUAs would have to pay off a "no" interest loan (supplied by the Project) for the first pump as well as the necessary funds for the replacement. The replacement could be contingent on repaying the first pump. Farmers could be given the option between the current procedure and with bank involvement plus lower irrigation charges for the first five years. The "no" interest provision would in fact be a subsidy. The collection of funds would be more stringent than it is now except for the requirement of protecting the farmers from possible embezzlement on the part of some WUA leaders. However, the situation in the field is not so simple.

*Several different scenarios exist.*

1) Cases where farmers own their pumps :

- On the one hand, some of these pumps may be old and ready for the junkyard. In this case, those farmers/owners of such pumps may be willing to participate in a new pump purchasing program for single pump lift unit.

- On the other hand, some farmers have recently purchased their pumps and have either vested interest or have just started making payments to the bank on their purchase. Obviously, they would not be willing to forego their investment and increase their debt burden just to satisfy USAID exigencies.

2) Cases where farmers rent pumps from other farmers or from entrepreneurs who are not farmers:

- Some farmers are at the mercy of pump owners. They know what they are paying now, and the uncertainty of how much their share in a new pump purchase will cost to them is overwhelming. For the short term, paying more for the *statu quo* may be preferable to the unknown future and higher cost of the single pump unit with possible long-term benefits that are however not yet tangible.

- There are pump owners who are "pump-lords" and can influence poorer farmers in decision-making, especially if these pump owners' rental operations are lucrative.

3) Location of owners' land along the mesqas :

- Farmers at the head of the mesqas have been satisfied in the past with water delivery to their land. Why would they spend money to "improve" a situation, which from their perspective, is totally satisfactory ?

- Farmers at the tail end of the mesqas, especially in the Delta region, are enthusiastic because they are rightly convinced of improvement in water delivery and water quality. They would be willing to invest in a single pump lift system, but are unable to do so without the approval of the entire WUA.

4) The non-legal status of WUAs makes it difficult for them to obtain a loan from PBDAC, even if the WUAs want to do so, because PBDAC is unwilling to deal with a non-legal entity.

Regarding the mesqa cost recovery program, although there are some proven and assumed financial rewards in the adoption of single pump lifting in water delivery alone, the total benefits which would include increases in crop yields through better husbandry that can be derived therefrom have not been quantified yet. Some attempts have been made to quantify these future benefits which are discussed in the next paragraph.

The IIP Project has undertaken an impressive array of activities associated with the possible adoption of a cost sharing policy. The commissioned studies (ISPAN, Ref.[57 & 76], MKE/LBII, [2], PACER [51]) have outlined the rationale for cost sharing in public works expenditure not only theoretically, but they assemble cost and benefit data pertinent to the current situation regarding public costs for irrigating from the extensive Nile irrigation network. These analyses and the feasibility studies for each Directorate were updated to 1993 prices and benefits and cash flows were recalculated in order to present a clear picture of the feasibility of cost sharing in the irrigation improvement program.

The first analysis was to identify the costs associated with the mesqa improvement program. Costs per feddan were determined by dividing total costs for the system's contracts in each directorate by the number of feddans serviced. The average value for the construction contracts awarded to date is LE 997 ($ 301). Projections for the total number of contracts to be awarded in this first phase of the IIP program yield a per feddan rate of LE 1,034 ($ 312). When delivery canal system costs are added to the total expenditures the total construction costs per feddan receiving mesqa improvements becomes LE 1,495 ($ 450). Estimates for operating costs of the new mesqa technologies have been derived to be LE 8/feddan, and mesqa cleaning amounts to LE 13. According to the feasibility studies, the weighted average savings for on-farm pumping costs is LE 200/feddan for two seasons a year. The studies referenced above also maintain that an administrative charge should be made, amounting to approximately LE 128/feddan. However, the rationale for this charge has not been substantiated. The costs of the pumps for the continuous flow system average LE 890/per feddan. Combining all of these values yields the following:

Table 6 : Mesqa and Pump Costs Per Feddans, Capital and Operations

| Capital Costs | (LE/feddan) |
|---|---|
| Construction, Mesqas | 1,034 |
| Construction, Total | 1,476 |
| Cost for Pumps | 186 |
| **Operating Costs** | |
| Operations | 8/yr |
| Maintenance | 13/yr |
| Administration Costs | 178/yr (20% of LE 890) |

On the other hand, the improved mesqas generate savings and increased yields. Savings from pumping costs are estimated at LE 200/feddan, drawn from the crop budget analyses for before and after mesqa improvements and developing a weighted average for the cropping patterns presented in the feasibility studies. Estimated crop yield increases generate income increments of LE 440 per feddan for the project area. In addition, there will be some shift in cropping patterns to more profitable crops, but this has not been calculated at this time because it is unknown how this shift will occur given the recent freeing up of commodity markets in Egypt. Water and land savings are also suggested in the afore-mentioned studies but estimates as to their values are rather dubious at best, and are not presented here. Some benefits to those feddans receiving continuous flow and other delivery canal improvements but not receiving improved mesqas will be calculated for the benefit/cost analysis but will not be used in the cost recovery analysis.

b. Constraints

The reference studies suggest that farmers would only be willing to pay a portion of their incremental savings or earnings for a cost recovery program. Since savings and earnings combined are only estimated at LE 640 (savings of pumping costs of LE 200 and income increments of LE 440) and annual operating costs are LE 20 (not including administrative costs), forty percent of this combined total would be LE 248. This means that some adjustment to the terms of the recommended cost recovery schedules would be required. If the recovery cost were to be determined to cover 75 percent of the mesqa construction costs, i.e. LE 791, payments would have to be LE 200/year starting in year four at 15.5 percent discount rate. LE 200 is 32 percent of their incremental income plus pumping cost savings less operating costs.

c. Conclusions

The implementation of a cost recovery program in the IIP Project areas is still being debated, and it has been for some time. The task at hand is to decide how much the charges should be relative to the costs incurred. The referenced studies have suggested a three-year loan from PBDAC at 17 percent interest for the pump costs. This amounts to payments of LE 91, 81, and 70 respectively over three years. For the mesqa construction costs, the studies have recommended an interest free loan with five years grace over twenty years, with annual payments of LE 53.7. Discounting this value over this time span at the cost of capital discount rate in Egypt of 15.5 percent (PBDAC charges 17 percent) yields a net present value (NPV) of LE 161, only 15 percent of the original construction cost. An annual repayment figure of LE 350 would be required to generate a NPV equivalent to LE 1,034, the costs of construction and rehabilitation of the mesqas. An annual payment rate of LE 500 would be necessary, under the same terms of five years' grace, to cover the total project construction costs per feddan of LE 1,476. If the grace period is reduced to one year, a NPV equivalent to costs per feddan is reached with annual payments of LE 195 for twenty years, and with payments of LE 270 if payments start in year four, the year after the last payment for the proposed PBDAC loan for the pump.

One of the criteria analyzed in the referenced studies is the farmers' cash earnings in order to determine their capacity to make cost recovery and loan payments. On the average farmers earn the following cash returns, as depicted in Table 7.

Table 7: Farmers' Cash Earnings Per Feddan, IIP Project Area

| | (LE/feddan/year) |
|---|---|
| Gross Income | 2,780 (baseline, without IIP improvements) |
| Total Input Costs | 1,472 |
| Net Returns | 1,296 |
| Labor Returns | 616 (1/2 family labor; 1/2 hired) |
| Incremental Value | 440 (with IIP improvements) |
| Savings on Pumping Costs | 200 |
| Total Cash Earnings | 2,552 (including all labor returns) |

The table above clearly demonstrates that the farmers will have the cash earnings to allow them to comfortably make some level of cost recovery payments, near the LE 200 per feddan rate. With proper crop husbandry and a shift to more profitable cropping patterns, a farmer's incremental income could increase two-fold to LE 880 per feddan, raising total cash earnings to roughly LE 3,000.

d. Recommendations

The information presented above clearly lays out the cost and income parameters that need to be considered for the design of the cost recovery program. Determinations as to how much farmers should contribute do not always follow strict economic guidelines. Although farmers may have the "ability" to pay, the culture surrounding payments for water may dictate some other form of cost recovery, through land taxation, a marketing tax, or an export tax. The final decision as to how cost recovery will be implemented must ultimately rest with the GOE, based on their perception of how to distribute the costs according to the benefits derived throughout society and on what is culturally acceptable in Egypt. One must remember that the benefits to increased production from improved mesqas and delivery canals are shared by more than just the farmers. The benefit streams to the individual farmer and the public at large are not sufficiently documented to develop a detailed cost sharing formula. Consumers receive a "consumer's surplus", middlemen have more product on which to earn a commission, and transporters have more product to move about. Although the cost sharing program as recommended in the special studies charges only a portion (75 percent) to the farmers, the others who benefit do not pay directly with fees or taxes. Needless to say, the cost recovery program is a controversial issue, and one which defies simple solutions.

Moreover, the cost recovery condition requires the passage of a new law to stipulate how the recoveries will be assessed. The process was only initiated in 1991 when the agreement in principle was signed. However, since the demonstration mesqa and delivery canal improvements first had to be constructed, and then the benefits to the improvements had to be witnessed and statistically verified, there has hardly been enough time to make a convincing case for the Cabinet and the People's Assembly. Although progress is being made, it would be erroneous to believe that the Cost Recovery Law will be in place in the near future.

## 2. Financial Viability of WUAs

### a. Findings

There is some evidence that the WUAs on improved mesqas are financially able and willing to continue working as a viable group in the future. A review of documents on the financial status of the WUAs that are in operation shows that collections are beginning to be established. However, in situations where continuous flow is interrupted and farmers have to "borrow" or "rent" water from other sources, their willingness to pay fees to the WUAs is reduced.

### b. Constraints

There are strong indications that maintenance services may not be readily accessible from the private sector, and hence maintenance costs may escalate. The key issue is developing a reserve of LE 1,500 to rebore and/or rehabilitate the pumps after two to three years. Not all of the WUAs operating at this time have been able to generate these kinds of funds. If on top of these requirements, under somewhat unstable conditions, the requirement of the initial purchase of the pump is levied, the likelihood of further delays in making the mesqas operational is imminent. Regardless of the income increments recorded by the farmers for each feddan of improved mesqas, the formation, management and fee collection system for each WUA will take some time to become operational. Experience in other countries does not support the feasibility of WUAs to be strong in fee collections for more than their direct operational costs. Mesqa improvements and pump purchases may be beyond their current capacity to mobilize funds.

### c. Conclusions

From the point of view of the financial viability of the member farmers of each mesqa, all indications from the feasibility studies and many other field surveys and interviews, shows that the farmers will increase their cash and net earnings as shown in Table 7 above. Nonetheless, collections of fees for capital purchases of common goods (the mesqa pumps) will be difficult to maintain. They may even need a loan to cover their first pump repair. Improving water supply and maintenance alone does not seem to be a sufficient incentive to ensure group behavior for mesqa maintenance and rehabilitation. If the WUAs play only a regulatory role, their long-run viability may be questionable. The evaluation team recommends that the WUAs consider activities in production management, crop selection, irrigation system design, contract growing schemes and product marketing, in order to be in a position to be more in demand by the member farmers.

Discussions have evolved regarding the possibility of including the cost of the pumps in the mesqa improvements costs. The mesqa improvement cost is LE 1,034 (see above, Table 7) and the pump costs per feddan are LE 186. Taking a recovery cost rate of 50 percent of the investment, or LE 610, a repayment rate of LE 155 would be required for payback, starting in year four for 20 years with a 15.5 percent discount rate. (see Annex 9 for further analyses.)

#### d. Recommendations

From a financial point of view the WUAs are not as solid as was originally projected. The incentives to pay water user fees, in any form that they are designed, have to come from significant and readily perceivable increases in returns to more efficient water delivery ***and use*** for better crop husbandry. The increments that have been demonstrated to date are not so robust as to make it obvious that farmers will willingly contribute their assessed fees to their WUAs. Moreover, the rehabilitation concept is one which is designed to recapture water use efficiencies that once were available and have since been lost to over-use and deterioration of the canal and mesqa systems that were originally provided by the State for decades past. Although the improvements supported by the Project are in fact new technologies, the farmers view this as recovering productivity rates of the past rather than introducing significant new technologies that will bring more than fifty percent increases in crop yields. Technology adoption usually requires such levels of improvements in returns to gain farmers' acceptance. High adoption rates of new technologies in small scale farming situations when the farmers accrue the entire benefits for their own private use are difficult to generate even when benefits are over 50 percent, and this situation will be even more difficult if a portion of these increased benefits will have to be paid out in water delivery fees.

The recommendation from the evaluation team's economist and agronomist is that the WUAs need to find additional services which they can impart to members and for which they can charge fees, given their ready demand from farmers. Another alternative was suggested above whereby the cost of the pump be added to mesqa improvement costs, and repaid over twenty years. (The repayment rate would be LE 155/year at 15.5 percent, twenty years, four years' grace). Several ideas along these lines will be presented in Annex 12, but are not considered to be a direct responsibility of this section of the evaluation. It needs to be stressed that the WUAs as currently designed and operating may not remain financially viable over the long run and may have severe difficulties generating their initial capital for maintenance and rehabilitation of the pumps and mesqas.

## F. Effectiveness of Technical Assistance (TA)

TASK 6 Assess the effectiveness of technical assistance provided to the project since its inception.

The TA was provided to the IIP Project by MKE/LBII since its inception, under a contract signed in November 1988, with actual implementation starting in late 1989. The originally contracted level of effort (LOE) of the permanent TA field staff was increased from 394.5 person-months (PM) to 691 PM when the Project PACD was extended. TDY specialists and Home Office personnel, excluding administration/secretarial services, were increased from 110 to 154 PM.

The TA team has had an excellent and positive impact towards achieving IIP objectives. Such progress could not have been achieved without the foundation built by the EWUP program and the RIIP under the CID/CSU TA which ended in 1984 and 1988 respectively. Whereas the CID/CSU TA was more concerned with the building up of expertise on a more academic level, the MKE/LBII program was rightfully geared to and directed at the grass root level, despite a slow start due to staff replacement in the initial phase and a delay to reach a mutual understanding with USAID regarding guidelines for feasibility studies.

1. Findings

By September 1993, LOE of resident staff already utilized was 606 PM with 85 PM remaining : 14 PM for the position of on-farm Water Management Specialist which the Team Leader is filling, 24 PM for a Senior Sociologist, and 15 PM for an expatriate sociologist. The position of a new Sociologist for 18 PM and of an on-farm Water Management Specialist for Upper Egypt will soon be filled. Of the 77 person-moths of TDY, 61.1 has been utilized to date. (Annex 10, Appendix 1, Tables 1 & 2).

The accomplishments of the TA team covered a wide range of activities, from feasibility studies, designs, training of IAS agents, formation of WUAs, construction supervision, to the preparation of guides and reports (see Annex 10 for details).

The training materials and technical papers developed by the TA team are of excellent quality and are being used effectively but not to the fullest extent.

2. Constraints

The reasons for several delays are the non-legal status of WUAs which is still waiting for action at GOE legislature, PBDAC's apathy showing a lack of enthusiasm to deal with non-legal entities, and USAID insistence on the principle that pumps should be purchased by WUAs despite the fact that the only unarguable benefits shown so far is a reduction in pumping costs and a more efficient irrigation application system.

3. Conclusions

Institutional building is a long term process with tangible outcomes measurable after a decade or more. In this particular instance, concrete results are substantial within four years, especially in the training program (see Section H), the main and distribution water delivery systems, the mobilization of WUAs, and the completion of many feasibility studies among other achievements. The actual formation of functional WUAs and operational mesqas were partially successful.

### 4. Recommendations

Necessary actions that need to be taken to remove the above constraints may be beyond IIP except for some lobbying efforts to expedite the legalization of WUAs. USAID should revise its policy on pump financing as a separate entity from mesqa improvement and include the cost of the pump for recovery as discussed in Section VII.

The TA team should train at least a dozen local sociologists (which include replacements), one to be assigned to the Main IIP Office and one to each of the seven Directorates. They should prepare themselves to take over the responsibilities of the expatriates at the end of the PACD.

The remaining TDYs (15.9 PM) should be utilized to evaluate computer programming, support the M & E program, help in the preparation of O & M manuals, update and assess the IAS and WUA evolution and evaluate water delivery system control.

The training materials should be translated into Arabic to reach a wider audience both within IIP and at the WUA level where leaders are usually literate.

## G. Cost Effectiveness of IIP Activities

TASK 7 Assess the cost effectiveness of project activities funded by both USAID and the GOE.

### 1. Use of Project Funds for Technical Assistance

#### a. Findings

The original project dedicated $17,108,000 to TA through the CID/CSU contract, of which $ 9,610,000 was used for the Water Research Center. The CID/CSU contractors were replaced by MKE/LBII in 1989 with a budget of $ 15,902,000. Both of these contracts were for personnel to staff and to manage the forerunner to the IIP and the current IIP Project. On the average, seven long-term personnel were in place in Egypt during the implementation phase, prior to the latest contract extension. The TA budget also included several short-term TA consultants.

At the beginning of the project, the TA had difficulty getting established and personnel adjustments were required. Thus, the first year of operations was not fully effective. However, once the appropriate team was in place, implementation has been very productive. The TA component accounted for 32 percent of the total budget of the project.

However, what appears to be an anomaly is that when the overall budget for the IIP Project was reduced, due to the slow uptake in letting construction contracts, the TA component was increased while the construction component was depleted (see Table 6). Nevertheless, the need for TA was apparent in the development of the command level construction designs, for supervision and assistance to IIP and IAS work at the Directorate level, and in stimulating the formation of the WUAs for each mesqa improvement. The presence of expatriate TA in the field and at the IIP and IAS headquarters was important to the efficient implementation of the Project for several reasons, including :

- o Within the GOE system, Government officials are continuously transferred from one post to another. As a result, staff training is required on a repetitive basis and continuity is lacking. Competent TA is required to provide this continuity and consistency.

- o Staff are sent off for training, leaving a vacuum in the position vacated. TA is required to fill the void created.

- o Training is also required for the on-shore staff and this is usually conducted by the Contractor, through short-term TDY's and by the long-term staff on-the-job training and with short courses, and

- o Because of the delays in the development and approvals of the Feasibility Studies, construction contracting was delayed. This led to reduced overall budgets.

However, the pace of construction has now increased considerably and over 50 percent of the planned construction is expected to be completed. Nevertheless, the work on Feasibility Studies, the work schedule for the IAS, and the promotion of the WUAs continue at the planned rate, and hence, the scheduled amount of TA is required to assist and train in these tasks. As a result the expenditure rate for TA has progressed according to the original budget and timetable, and the major share of this budget has been expended. An additional budget was requested for the Project's extension period.

b. Constraints

Given the unstable situation with regard to host-country staff continuity and presence during the execution of the Project, there would have been little continuity and drive towards the ultimate goals without the consistent presence of the USAID TA Contractors, especially in the area of WUA development.

The design of this project was one of tremendous size, area coverage, and total budget along with the introduction of innovative new technologies. This was a large and complex Project in USAID experience. These types of projects are usually reserved for development banks, but because of the uniqueness of the USAID program in Egypt, and the capacity of the Egyptians to implement large projects, this project was developed by USAID. In order to ensure appropriate implementation, the TA component was designed to play a major role. For this reason, it was one of the major components of the total Project and was executed on schedule in terms of personnel in country in spite of the delays in the other components.

c. Conclusions

One criticism that can be leveled at the TA component is that it was designed for a program which was to cover 337,000 feddans but ended up covering only 150,000 feddans. However, as pointed out above, the IAS and IIP services continued to apply to the larger area originally planned because of the nature of the IIP mandate. The impact of this was that the major portion of the TA was utilized in the first few years of the contract with long and short-term personnel.

Nevertheless, the very nature of this Project's design must be considered. The IIP was intended to be, in principle, an Institution Building Project, whereby the IIP of the MPWWR would be strengthened to the point where they could service the major needs of the country's irrigation sector with respect to delivery canal rehabilitation and mesqa improvements, reaching all the way down to farmers owned landholdings. To this extent, the coverage area of the Project extends well beyond the specific construction contracts funded by the construction component of this Project. The TA, training and equipment procured under the auspices of this Project have been used to service many other irrigation programs in addition to those cited in the Project plans and schedules. Hence, the area to be considered for calculating benefits and returns, and the effectiveness of the TA area coverage, extends far beyond the number of feddans for which this Project has awarded construction contracts. A case in point has been the Serry Canal covering a gross area of 100,000 feddans which was originally included in the 337,000 feddans listed in the PP. The cost of construction for the delivery canal to this area has been reassigned to the Structural Replacement Division using resources other than USAID funds from the IIP Project. However, the IIP assisted in the design, training and development of this rehabilitation work, and the Project's TA and local staff were heavily involved in stimulating this effort. Similarly, from the point of view that the IIP took the leadership in the development of Herz Noumania, whose construction costs came from sources outside the USAID portion of the Project, and an activity now underway at the World Bank for which IIP is taking leadership in developing the plans and training schedules. This shows that the cost effectiveness of the TA and USAID's investment in this Project's activities goes further than measuring the impact to the number of feddans in the command areas where Project funded construction is taking place.

However, the most critical issue with regard to TA is its primary role. The USAID Project's mandate is to develop delivery canal rehabilitation and mesqa improvements from a physical construction viewpoint, and to establish WUAs throughout the system. Therefore, the question arises as to whether the work with the WUAs should include work with on-farm agronomics for new irrigation techniques, the introduction of new technologies for irrigating high valued crops and tackling marketing and financing issues for the WUAs as well. The MPWWR's position is for the irrigation engineers to deal with the technical aspects of water management and delivery and leave the rest up to the farmers themselves or the Agricultural Ministry's extension service. Should the TA team lend assistance to the farmers in these new areas (through training courses or other mechanisms) and/or should the TA team get involved with the Ministry of Agriculture's extension service which attends to the mesqa improvement areas ? (see Annex

12 for more details). If this aspect were to be added to the TA team's responsibilities in the two-year extension period (for which additional funding would be required) the overall impact of the Project would be increased and the effectiveness of the TA enhanced.

d. Recommendations

TA from a Project Contractor is essential for the efficient management of the Project. The presence of the Contractor provides incentives, consistency and rigorous task orientation throughout the IIP institutional structure that would be absent without the expatriate professionals. Moreover, the role of the TA in promoting the development of the WUAs, their formation, their training, their financing and their legal status, is critical to the Project's success. These developments would not proceed as scheduled without the prodding and professionalism of the TA team. It is recommended that the TA team be retained until the PACD.

Because about 40 agricultural extension officers will be added to IIP staff (already included in the next MPWWR budget) and in order to maximize the cost effectiveness of the TA effort and the IIP institutional achievements, additional emphasis could be placed on the agronomics of irrigation at the farm level, the introduction of drip/subsurface and mini-sprinkler techniques for a much needed higher water conservation and increased yields of cash crops in selected areas, and on marketing analysis to determine what crops will fare well under the new free market system in the improved continuous flow delivery canals and mesqas.

The current effort to assist in the formation of the WUAs is right on target, and this assistance should be extended, as mentioned above, and perhaps expanded as suggested here.

This can be in the form of training or direct technical assistance at the Directorate and mesqa levels through short or long-term TA. It must be noted that this kind of TA at the WUA and mesqa level is not available locally and cannot be provided under the current structure of the MPWWR's IIP organization. Although there is some evidence that the farmers are already shifting to higher-yielding cropping patterns in the new mesqas, assistance in this area would enhance the cost effectiveness of the TA (and the Project), in terms of increasing its total economic potential. Although the current efforts meet the accepted standards for USAID project return rates (i.e. with an IRR greater than 12 percent), significantly greater impacts could be realized in this manner.

2. Cost Effectiveness for Commodities

a. Findings

Earlier mention has been made in this report regarding the status of commodity procurements. A significant amount of money has been spent on vehicles, especially motorcycles that are not fully used. There are also potential savings from the reduction in the purchase of automatic gates and the lower costs for computer equipment. Approximately $ 2,750,000 will be available to assign to other components.

b. Constraints

The main item to be considered in this section is construction. The original project has been reduced due to the delays in producing the feasibility studies and subsequently, delays in letting the construction contracts. A series of amendments have been implemented accordingly, the Fourth Amendment maintains the original $ 105.9 million, the Fifth reduced the budget to $ 77.1 million, the Seventh added $ 10 million from the Special Accounts fund, the Eighth reduced it back to $ 77 million, and the proposed Ninth brings it down to $ 73 million. A Tenth Amendment is scheduled to reduce the budget even further to $ 63 million. With all of these reductions, the construction portion is affected. Currently, with the last proposed budget of $ 63 million, construction will account for forty-two percent of the budget or $ 26 million.

c. Conclusions

There is a great deal of discussion regarding the coverage of the intended original project which was to spread benefits over an area of 337,000 or 394,000 feddans, depending upon which document is used as a source. The base reference number for this evaluation has been 337,000 feddans, drawn from the 1987 PP Amendment. Several documents identify the costs to improve each feddan, ranging from $ 231/feddan to $ 330/feddan. Using the actual cost figures from the contracts awarded and scheduled, the cost per feddan receiving mesqa improvements is LE 1,034 ($ 312). Using total construction costs, including delivery canal improvements, gives a per feddan cost of LE 1,495 ($ 451). If just the mesqa improvement feddans are included the cost is LE 780 ($ 235). However, the figures above ($ 231/feddan) which are drawn from the project preparation documents divide total USAID project costs by total feddans receiving improvements. With the reduced Project budget these figures would produce per feddan costs of LE 780 ($ 235), which is derived by dividing Project costs, $63,389,000 by gross Project area, 150,625 feddans (gross area with delivery canal and mesqa improvements excluding Serry Canal).

The number of families or farmers receiving benefits is calculated by dividing total improved area by the average farm size. Project documents, on the other hand, use a modular system of 21,000 feddans for each of eleven command areas, and assume the number of beneficiaries per command to be 1,120 farm families. This determination was based on a mesqa improvement program that only rehabilitated a small number of mesqas per command area. Taking the average farm size in the areas served by the actual contracts let or under bid by the Project, the total number of farmers is 26,000 (78,559/3) and those receiving mesqa and delivery canal improvements is 50,000. This yields a per farmer cost of $ 1,268 ($63,389,000/50,000). From the crop budget analyses it shows that one feddan requires 88 work days per year (2 crops), which is equivalent to 264 work days for three feddans or one yearly full-time equivalent (which is calculated at 260 days per year). Hence, this cost to produce one employment equivalent or

one job could be compared with the costs (to USAID) for generating one employment equivalent in micro-enterprise ($ 900 to $ 7,000) or agribusiness ($ 200 to $ 3,000). It should be noted that as the Project expands coverage area, the costs cost per feddan and per farmer will fall significantly, because the overhead costs of TA, training and vehicles will be spread over a larger number of feddans. Increasing the area of coverage by 100,000 feddans lowers the per farmer cost to $ 972.

d. Recommendations

Since the per feddan costs are within acceptable standards for irrigation development world-wide (i.e. less than $ 1,000) and the number of beneficiaries is high relative to the coverage area, it is recommended that the construction portion of the project continue and be expanded. This is where the real impact is generated under the current design. The next section will consider the benefits that these improvements stimulate.

3. Justification for Capital and Recurrent Costs

Information from the feasibility studies were analyzed by updating the crop budgets to 1993 prices for all inputs and outputs. Calculations were made for weighted average gross outputs and all inputs for each directorate. Values with and without the IIP improvements were also derived. These values were then compared with costs to give the following results.

a. Findings

The analysis was conducted by calculating the benefits generated for the costs saved in pumping (Benefits 1) with the new mesqas and the value product increment generated by yield increases due to improved water efficiency with the new mesqas and the improved delivery canals, including continuous flow systems. These increments were drawn from the feasibility studies (Benefits 2) and from assessments made by the evaluation team's agronomist (Benefits 3). His estimates were that tail-enders in the delta would have 30 percent yield increases and tail-enders in upper Egypt would have 15 percent increases. In addition, there would be a 10 percent increase overall in the Delta and 5 percent overall in upper Egypt. Also, those feddans receiving improved delivery canals, including continuous flow, would increase their yields over two-thirds of their area by 8 percent in the Delta and 4 percent in upper Egypt. A fourth benefit stream is calculated by multiplying the value product increments by two, which would be the incremental income earned from shifting the current cropping pattern to higher-valued crops in each directorate (Benefits 4). All of these benefits streams were calculated from the weighted average values of the cropping patterns for each Directorate and multiplied by the acreage (in feddans) covered by the improved mesqas and delivery canals respectively.

The costs for the project were calculated four ways. The cost for the pumps was added to the mesqa improvement costs (Cost 1) for the first cost cash flow. Total costs for delivery system improvements and mesqa rehabilitation costs plus pump costs made up the second (Cost 2) cash flow for costs. The third cash flow for costs was USAID costs for the project, which was $63,000,000 (Cost 3), and the last cost estimate included GOE costs at a rate equal to USAID costs (Costs 4). Given these benefits and costs estimated over thirty years, which is the expected useful life of the Project's benefits, the following Internal Rates of Return were derived. These results appear in Table 8.

Table 8 : IRR Analysis on Project Benefits and Costs

| | Benefit/Cost Comparisons | Internal Rate of Return | |
|---|---|---|---|
| 1. | Savings in Pumping Costs/ Mesqa Improvements + Pump Costs | 20 % | (Benefit 2/ Cost11) |
| 2. | Savings in Pumping Costs/ Del. Canal + Mesqa Imp. + Pumps | 14 % | (Benefit 2/ Cost 12) |
| 3. | Savings in PC + Value Prod Incr./ Mesqa Improvements + Pump Costs | 50 % | (Benefit 1/ Cost 11) |
| 4. | Savings in PC + Value Prod Incr./ Del. Canal + Mesqa Imp. + Pumps | 36 % | (Benefit 1/ Cost 12) |
| 5. | Savings in PC + Value Prod Est./ Mesqa Improvements + Pump Costs | 50 % | (Benefit 44/ Cost 11) |
| 6. | Savings in PC + Value Prod Est./ Del. Canal + Mesqa Imp. + Pumps | 36 % | (Benefit 44/ Cost 12) |
| 7. | Savings-PC + Value Prod Est-M&DC/ Mesqa Improvements + Pump Costs | 56 % | (Benefit 41/ Cost11) |
| 8. | Savings-PC+Value Prod Est-M&DC/ Del. Canal + Mesqa Imp. + Pumps | 41 % | (Benefit 41/ Cost 12) |
| 9. | Savings in PC + Value Prod Incr./ USAID Costs | 22 % | (Benefit 1/ Cost $63M) |
| 10. | Savings in PC + Value Prod Incr./ USAID + GOE Costs | 11 % | (Benefit 1/ Cost=$126M) |
| 11. | Sav. in PC + 2xValue Prod Incr./ USAID + GOE Costs | 18 % | (Benefit 37/ Cost=$126M) |
| 12. | Sav. in PC + 2xValue Prod Est-M&DC/ USAID + GOE Costs | 21 % | (Benefit 39/ Cost=$126M) |

b. Constraints

From a close analysis of the crop budgets in each of the feasibility studies, a comparison was made of the net returns using financial prices and using economic prices. In all cases, net returns for the increments due to before and after Project implementation are higher when economic prices are used. Although prices for imported inputs such as fertilizers, chemicals and in some cases seeds are higher, these costs are offset by the fact that product prices are higher in economic terms compared to financial terms, due to the lid on domestic prices paid to farmers which are generally lower than international parity prices. Based on this analysis, only the financial benefit/cost calculations have been made to demonstrate the impact from the farmer's perspective knowing that the economic returns would be even higher in this particular case in Egypt.

c. Conclusions

The analysis shows that the project is justified in financial terms when only the savings in pumping costs are considered, with an IRR of 20 percent for mesqa improvements only and 14 percent for total delivery system and mesqa improvements. When yield increments are added, the IRRs jump up to 50 percent and 36 percent respectively (no. 3 & 4 in Table 8) for the cost calculations (1) and (2). The team agronomist's estimates of yield increases derived independently and multiplied against the weighted average cropping systems of each Directorate almost exactly equal the same value derived from the feasibility studies. However, the two field surveys of Beni Ebeid and Herz Noumania give larger increments, and so it is felt that the two estimates used in this analysis are somewhat conservative. When the benefit streams described above are compared to USAID and GOE costs, the IRR falls to 22 percent for USAID only and 11 percent for USAID and GOE cost estimates (no. 9 & 10 in Table 8). When cropping pattern shifts and market opportunities are considered in this last analysis, the IRR increases to 18 percent (no. 11). For future projections, this last value should be taken as the most likely scenario, especially if on-farm management and marketing are added to the Project mix of services.

In addition, benefits to areas not included in the specific Directorates where the Project's delivery canal rehabilitation and the mesqa improvements have been scheduled (such as Serry Canal, Herz Noumania, and the proposed World Bank project area in the Delta), have not been estimated and not added to Project impact benefits. These additional but unquantifiable benefits significantly underestimate the total impact attributable to the IIP Project. These should be included due to the impact stimulated by the institutional building aspect of the Project. In the same vein, the multiplier effect attributed to the increased demand for inputs due to the rise in crop production and the increase in demand for consumer goods because of the higher crop incomes have not been estimated. Generally, multiplier effects add four times the income generated by the labor income produced by the Project's activities. In this case, labor work days are 50,000, multiplied by 260 workdays per year times LE 7/day by 4, equals $10,000,000 per year at full Project maturity within five years. Adding this value to the benefits stream in formula number raises the IRR to 46 percent.

With respect to calculations for each individual Directorate according to its own cropping pattern and mix of inputs and outputs, the analyses that have been derived show that for mesqa improvements along with pump costs, the IRRs range from 45 percent to 56 percent, and when delivery canal improvement costs are added the IRRs range from 21 percent to 26 percent. These return rates would increase significantly if cropping patterns were to shift to more of the local high-yielding crops within each Directorate.

d. Recommendations

In each of the Directorates analyzed, there were crops that produced higher return rates than others, either in rotation or as stand alone crops. Presumably, with more efficient water delivery and freer markets, farmers will edge towards these crops. Evidence has been received in this regard through informal discussions with Project staff, but no statistical information is available to attest to this occurrence. As cropping pattern shifts occur, crop returns will increase and the Project will be in a better position to recommend an expansion of the delivery system and mesqa improvements over a much larger area. However, without proper guidance into new cropping patterns and new on-farm irrigation techniques, the projected benefits may not materialize, and the project will not produce its maximum benefits. This could happen if all farmers opted to concentrate in one cash crop at the expense of a balanced approach, and they could easily inundate the local market and force a drastic fall in prices. This would undermine the projected benefits. As the project stands, with a well-balanced cropping pattern and expectations of roughly 10 percent yield increases, the project remains viable and should be recommended for expansion. However, caution should be taken unless a clear understanding of how to stimulate on-farm crop management and cropping pattern selection is introduced into the Project's overall management, either by arrangements with other ministries or by including such services from within the MPWWR.

## H. Project Design Implementation

TASK 8 Compare planned versus actual accomplishments and review the project design and implementation to determine whether or not irrigation improvement activities could be carried out more effectively in a different manner or by different entities.

### 1. Private Sector Involvement in Mesqa Improvement, in Planning and Feasibility Studies

The private sector is being included in the construction of the improved mesqas. In fact, they are doing a better job than the public sector companies at many of the sites. This difference in productivity and quality is noticed by the IIP. Private sector involvement is possible in practically all phases of this process, but must evolve in a purposeful manner. The role of the government is to bring on private sector involvement in a way that will not adversely affect the farmers.

Information is available to guide the private sector in identifying areas where the various mesqa improvement packages are financially viable. This is also required for the protection of the cultivators and landowners. This guidance is not yet available from IIP Project outputs, but may happen in the near future (see Section B).

a. Findings

Local consulting firms already provide limited planning and feasibility studies in irrigation works. There are still only a few experienced local firms capable of providing such services, although there are sufficient number of qualified engineers, agronomists, soil scientists, economists and sociologists in Egypt.

At present, while the feasibility studies for the present project area are nearly complete, there is no work available to sustain the multi-disciplinary study teams. The future volume of work, other than the preparation of the report needed for the World Bank by January 1994, is uncertain. The possibilities are that the multi-disciplinary teams will be dismantled and the non-engineering staff will return to their original ministries, although some would be needed for on-farm water management monitoring and evaluation and on-farm water management.

The private sector is being included in the construction of the improved mesqas. In fact, they are doing a better job than the public sector companies at many of the sites. This difference in productivity and quality is noticed by the IIP. Private sector involvement is possible in practically all phases of this process, but must evolve in a purposeful manner. The role of the GOE is to bring on private sector involvement in a way that will not adversely affect the farmers.

b. Constraints

Lack of steady volume of work and maintenance of a multi-disciplinary team composed of non-engineering staff from other ministries and government agencies are the main constraints for IIP conducting feasibility studies in-house. At the same time, lack of steady volume of work is also the main reason for the low number of active consulting firms.

c. Conclusions

More extensive use of private consultants would alleviate acute manpower shortages of IIP and would enhance multi-disciplinary planning capabilities within the country. The private consultants have the opportunity to work for a number of different private and public clients and sustain a reasonable volume of work while keeping abreast of the new technologies and developments in their specialized field of expertise. Private consultants need encouragement and support not only by IIP, but by MPWWR and the GOE. The most important support by IIP and the GOE, however, would be through regular assignment of a steady volume of work to the more competent local consulting firms.

Given the extensive training and experience gained by IIP personnel through active participation in preparation of sixteen supplementary feasibility studies, IIP personnel have the capability and potential to guide, control and manage multi-disciplinary planning endeavors by private consulting firms. For engaging the private sector in the future, IIP would need only a minimum number of qualified staff to oversee both the performance of private consultants and M & E activities.

d. Recommendations

IIP should maintain a core multi-disciplinary staff for its routine planning activities and make use of local private consulting firms to augment its capabilities for conducting major feasibility studies in the future. At the start of the program, the consultants should be required to conduct the studies in collaboration with reputable foreign consulting firms to ensure transfer of technology and high quality of services.

2. Potential Role for Private Companies and PBDAC

There is currently no system for monitoring expanded involvement of the private sector in the installation of improved mesqas. A competitive private sector could innovate with cost saving measures that may or may not be appropriate for either short or long term irrigation efficiencies. PBDAC may be more amenable to participation with private sector involvement.

3. Modification of IIP to Expedite Irrigation Improvement

Based on the capacity of the IIP to carry out its assigned tasks to date, notwithstanding the project delays which are frequently encountered in projects of this complexity, the structure could have been adequate although its organization needs to be remedied.

a. Findings.

There is a general expectation that, in order to have a creative and supportive work environment which provides incentives for career commitments and a concomitant successful continuation of the Project, it might prove necessary to create a National Irrigation Improvement Authority (NIIP). In fact, in the Seventh Amendment to the Grant Agreement between GOE and USAID dated July 3, 1991 (Section 5.17), the GOE had already agreed to take the steps necessary to establish an Authority to carry out the activities of NIIP prior to completion of improvements in the first 150,000 feddans.

b. Conclusions

Four conclusions flow from these findings:

- There are opportunities for increased private sector involvement provided a number of conditions are met. The accounting of benefit flows may suggest more public participation in financing the improvements.
- Turning the private sector loose under these circumstances could be costly to entrepreneurs and farmers alike.
- Substantial policing may be required if the nation is not willing to let the buyer beware.

- o Although the personnel changes and reassignments are disruptive, they are not viewed as fatal flaws that will cause the Project to fail to achieve its objectives by the PACD.

c. Recommendations

- o Additional studies for private sector involvement are necessary. All benefits emanating from the Project improvement, including crop yield increases should be factored in.

- o The IIP should identify more accurately the benefit streams or best mesqa alternative designs as a function of Project circumstances.

- o Regulate product quality by market experience. The opportunities for expanded private sector involvement should be explored through a series of special studies that identify the necessary and sufficient conditions for increased private sector involvement within the context of the current uncertainties regarding the appropriate circumstances for UCA duplication to be addressed by the monitoring program (see Section IV).

- o The IIP Project has not sufficiently demonstrated its applicability within the context of the NIIP to justify the creation of an Authority. Further studies are necessary because of its procedural, political, financial and virtually irreversible nature of its implications unless privatized in the future.

Therefore, the establishment of an Authority by the PACD depends on the timing of that study, subsequent decisions within MPWWR, and legislative actions by the GOE.

4. IIP Linkages with MPWWWR and MOA

These linkages and lack of collaboration were discussed above in Section A. The present structure of IIP, incorporating the changes recommended in this evaluation, and continued for the time being with closer associations with MOA, Egyptian Universities, the IMS PPD and the WRC, could be beneficial for achieving the Project objectives. If better coordination cannot be achieved in the near future, then the creation of an Authority could become imperative.

# ANNEX 1

## List of References

# ANNEX 1

## IRRIGATION IMPROVEMENT PROJECT
1993 Interim Evaluation Mission

**TEAM REFERENCE MATERIAL**

(Provided by USAID, TA Contractor and Others)

TITLE AND DATE OF REFERENCE

---

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ANNEX 2

List of People Contacted and Places Visited

# ANNEX II

## LIST OF PEOPLE AND PLACES VISITED

### A - Cairo

**MPWWR**

| | |
|---|---|
| Gamil Mahmoud El Sayed | First Under-Secretary |
| El Sayed Mohamed Hassan | Sector Head, Horizontal Expansion |

**Irrigation Management Systems Project (IMS)**

| | |
|---|---|
| Mahmoud Abbas | Assistant Chief, Monitoring Office |
| Adrian Hutchens | Consulting Economist, PPD |
| Jaleen M. Moroney | Economist, PPD |

**Irrigation Improvement Project (IIP)**

| | |
|---|---|
| Yehia Abdel Aziz | MPWWR Under-Secretary & Director General |
| Hassan Shuman | Consultant - (Former Director General of IIP) |
| Ramsis Bakhoum | Director General for Design |
| Adel Hashim Salem | Director General for Planning |
| Hassan Abbas Mahmoud | Director General for Construction |
| Nadia Welson Amin | Director of Mesqa Design |
| Abdel Fattah Metawie | IAS Acting Director |
| Abdalla Doma | IAS Director of Operations |
| Alaa Ismail | Field Coordinator, DG Construction |
| Abdei Atty Shenavy | Economist |
| Ali Kamal | Computer Specialist |
| Mohamed Abbas Ahmed | Store Keeper |
| Abdel Hamid Abdel Hadi Mostafa | Mechnical Engr., In Charge of Vehicles |

**IIP Technical Assistance Team, MKE/LBII**

| | |
|---|---|
| Caroll Hackbart | Team Leader |
| Max Lowdermilk | Senior Social Scientist |
| Ramchand Oad | Water Management Specialist |
| Edwin F. Shinn | Sociologist |
| Tony A. Gillman | Area Engineer |

**Water Distribution & Irrigation System Research Institute**

| | |
|---|---|
| Fouad Z. El Shibini | Director |
| Moheb R. Semaika | Head, Water Requirement Dept. |

**USAID**

| | |
|---|---|
| Christopher Crowly | Deputy Mission Director |
| Douglas J. Clark | Associate Mission Director, AGR |
| Clemence J. Weber | Office Director, AGR/ILD |
| David Smith | IIP Project Officer, AGR/ILD |
| Rollo Ehrich | Agriculture Economist, AGR |
| Randall Parks | Evaluation Officer,PDS/P |
| Richard Steelman | PDS/PS |
| Mahmoud Mabrouk | Irrigation Engineer, AGR/ILD |
| Tarek Bekhet | PDS/PS |
| Ingi Lutfi | EAP |
| Leo Pizarro | DIR/CS |
| Robert Jordan | AD/PDS |
| Rus Backus | AGR/ILD |
| Donnie Harrington | AGR/ILD |
| Frank Gillespie | AGR/ILD |
| Shawky Boctor | AGR/ILD |

**World Bank, Irrigation Improvement Project Identification/ Preparation Mission**

| | |
|---|---|
| Aizad Nawaz Khan | Mission Leader, Pr. Irrigation Engineer |
| Youssef Fuleihan | Senior Agricultural Economist |
| Mohamed N. Ben Ali | Agronomist |

**Others**

| | |
|---|---|
| Hassan Mohamed Ismail | Pacer Consultants |
| Mostafa Mahmoud El-Kady | Pacer Consultants |
| Mona El-Kady | Director, Egyptian Survey Authority |
| Nabil M. El-Mowelhi | Director, Soil & Water Institute |
| Mohamed Shafie Sallem | Director, Agricultural Extension and Rural Research Institute |
| Kamal T. Nasser | Sector Head for Credit, PBDEC |
| Emad Hamdy Imam | Associate Prof., American Univ., Cairo |

## B - Zagazig

**Irrigation Improvement Directorate**

| | |
|---|---|
| Taher Zeidan | Director General |
| El Shahet Abdel Latif Al Morsi | Deputy Director General |
| Ahmed Moressy | IAS Director |
| Farmers | Saidiya project site |

## C - Tanta

**Irrigation Improvement Directorate**

| | |
|---|---|
| Wadee Boutrous | Director General |
| Atef El Kashef | Director of Works |
| Abdel Fattah El Akhras | Director of Works |
| Nagwa Abu Hammar | Soils Laboratory |
| Iman Haddad | Acting Director, IAS |
| Samy Sharaf | Site Resident Engr., Dredging Co. |
| Abdel Fattah Anwar | Site Resident Engr., Agaria Co. |
| Abdel Aziz Ahmed | Site Resident Engr., Yonoco Co. |
| Farmers | Qahwagi and Bahr El Saidi project sites |

## D - Beni Sueif

**MPWWR**

| | |
|---|---|
| Abdel Latif Al Zohair | Under-Secretary for Beni Sueif |

**Irrigation Improvement Inspectorate**

| | |
|---|---|
| Sayed Mashady | Inspector General |
| Mohamad Kamel | IAS Coordinator |
| Ahmed Shaaban | Assistant Director of Works |
| Ali Abdul Karim | IAS Agric. Eng. |
| Said Abdou El-Samir | IAS Agric. Eng. |
| Al-Foly Ali Hassan | IAS Agric. Eng. |
| Farag Mahmoud | IAS Field Agent |
| Raied Abdul El-Atti | IAS Field Agent |
| Abdalla Nasr Hasssan | IAS Field Agent |
| Gamal Hassan | IAS Field Agent |
| Saad Farag Mohammed | IAS Field Agent |
| Hosni Abdalla | IAS Field Agent |
| Ragab Abdalla Hussein | IAS Field Agent |
| Farmers | Qiman El-Arous project site |



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## E - El Minya

**Irrigation Improvement Directorate**

| | |
|---|---|
| Abdel Hakim Mohamed Hassan | Director General |
| Mohamed Mahmoud | Director of Works |
| Ali Yahia | Director of Works |
| Abbas Mohamed Abdel Ghani | Assistant Director of Works |
| William Zaki Hanna | Assistant Director of Works |
| Mohamed Khaled Ahmed | Assistant Director of Works |
| Ali Mamdouh | IAS Director |
| Farouk Abu Bakre | Private Contractor |
| Kamal Fowzi | Soils Mechanic Lab |
| Abdel Raouf Abu Noor | IIP Consultant |
| Magdy Kamel | IAS Agric. Eng., Herz Numinaya |
| William Hamada | IAS Civil Eng.,Beni Ebid |
| Ramadan Omer | IAS Field Agent, Beni Ebid |
| Youssef Adli | IAS Field Agent, Beni Ebid |
| Ragab Mohamed | IAS Field Agent, Beni Ebid |
| Hassam Hassan | IAS Field Agent, Beni Ebid |
| Abdel Fattah Zyain | IAS Field Agent, Beni Ebid |
| Adel Nehab | IAS Agric. Eng., Ashrouba |
| Said Mohamed | IAS Field Agent, Ashrouba |
| Alaa Ashal | IAS Civil Eng., Mantout |
| Gamal Hussein | IAS Agric. Eng., Mantout |
| Gabriel Fathy | IAS Field Agent, Mantout |
| Anwar Naguib | IAS Construction Eng. Design |
| Farmers | Herz Numiniya, Beni Ebid, Ashrouba |

## F - Fayoum

**Irrigation Improvement Inspectorate**

| | |
|---|---|
| Mostafa Korany Mohamed Moneysi | Inspector General |
| Salah Ahmed | Director of Works |
| Abdel Moneim Mostafa | IAS Coordinator |
| Magdi Abdel Monem | Director of Works for Design |
| Hassan Mohamed Ibrahim | Agricultural Engineer |
| Farmers | Bahr El Gharag project site |

## G - Mansoura

**MPWWR**

| | |
|---|---|
| Said Abdel Monem Yousef | Diretor of Irrigation, E. Dakalia |

**Integrated Soil & Water Improvement Project (ISAWIP)**

| | |
|---|---|
| Abbass Abdo Rabbo | General Manager |
| Mohamed Fathi Saudi | General Supervisor |
| Hussein Lashine | Irrigation & Drainage Advisor |
| Ahmed Hussein | Irrigation Director of Works |
| Abdel Monem Hamza | Director of Drainage |
| Mohamed El-Bakrey | Engineer, Automation & Water Balance |
| Farouk Ahmed Fouad | Agricultural Extension Service |

## H - Esna

**Irrigation Improvement Directorate**

| | |
|---|---|
| Mohamed El Ameer Osman | Director General |
| Mahamed Hassan Abdel Karim | Deputy Director General |
| Abdel Atti El Samman Ahmed | ISA Director |
| Abdel Moez Abdel Fattah Ahmed | Director of Works |
| Nabil Ahmed Sekkina | Civil Engineer, IAS |
| Ragab Ahmed Abed El Naeem | Agriculture Engineer, IAS |
| Mohamed Abdel Mageed | Agricultural Engineer, IAS |
| Ashraf Amer El Sayed | Site Engr., Farouk Mohamed Contracting |
| Yousef Abdel Fattah | Assistant Director of Works |
| Zakaria Mohi Ed Dean Ali | Assistant Director of Works |
| Farmers | Abbadi Project site |

ANNEX 3

Scope and Statement of Work

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# SCOPE OF WORK

## A. ACTIVITY TO BE EVALUATED

| | |
|---|---|
| Project : | Irrigation Management Systems Project (263-0132) |
| Sub-activity : | Irrigation Improvement Project Component (IIP) |
| Implementing Agency : | Ministry of Public Works and Water Resources (MPWWR) |
| Grant Amount : | $ 336 million ($ 63 million in grant funds currently planned for IIP plus $ 10 million local currency equivalent from the Special Account) |
| Grant Period : | September 1981 - September 1995 |

The Irrigation Management Systems (IMS) Project consists of 10 sub-projects.
Its purpose is to :

1. improve the operating efficiency of the total irrigation system;
2. strengthen the Ministry's operation, maintenance and planning capabilities;

The Irrigation Improvement Project (IIP) is one of the IMS Project sub-projects with a focus on improving MPWWR's capacity to :

Plan, Design, Operate and Maintain improved irrigation systems.

## B. PURPOSE OF THE EVALUATION

The purpose of this interim evaluation of the Irrigation Improvement Project is to:

1. a. Assess progress towards meeting the objectives of the Irrigation Improvement Project component;

   b. evaluate the effectiveness of U.S. and GOE funded activities in contributing to project objectives;

2. a. Identify constraints to effective implementation;

   b. Provide recommendations on how to address those constraints;

3. a. Evaluate efforts to improve sustainability of project activities;

   b. Recommend ways to improve the sustainability;

4. a. Estimate technical assistance (TA) needs through the remaining life project;

   b. Recommend adjustments as deemed appropriate;

5. a. Determine whether or not project objectives are being produced in a co effective manner;

   b. Then assess project implementation efficiency;

6. a. Assess planned versus actual accomplishments;

   b. Review the project design and implementation methodology;

   c. Determine whether specific irrigation improvement activities could l carried out more effectively;

      i. in a different manner, or
      ii. by different entities.

The evaluation is expected to provide insight and guidance to USAID and the MPWWR f making decisions concerning more effective implementation of irrigation improvement activiti through the PACD and, also, to provide guidance for the design of future irrigation improveme activities after completion of the project.

## C. BACKGROUND

1. In 1981, the IMS Project was initiated and was amended and expanded in 198

   a. To increase its potential impact;

b. To take advantage of the lessons learned from six years of research carried out under the USAID Egyptian Water Use and Management Project (EWUP) (263-0017).

The project was again expanded in 1987 and it now consists of ten components. IIP is one of them.

2. Some components such as the Irrigation Improvement Project (IIP) are designed:

a. To remove specific constraints to agricultural production by improving the effectiveness of the current irrigation and drainage system;

b. Others are to support the MPWWR through continued research, training and improved data collection and management.

The IMS Project provides technical and capital assistance for the planning, design, construction (rehabilitation) and management of Egypt's irrigation system.

**3. Goal and Purpose of the IMS Project**

a. The <u>**GOAL**</u> of the IMS project is :

i. Effective control of the Nile waters for irrigation and particularly for their optimal allocation to and within agriculture as a means of helping increase agricultural production and productivity.

ii. A sub-goal is :

To improve operating efficiency of the water distribution system for agricultural irrigation and for other water uses.

b. The <u>**PURPOSE**</u> of the IMS Project is to strengthen the capability and capacity of the MPWWR to :

i. Plan
ii. Design
iii. Operate and
iv. Maintain

the water distribution system.



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## 4. The Overall Irrigation and Drainage System

The Egyptian irrigation delivery system includes :

Two dams at Aswan
Seven major barrages
31,000 km of public canals (some discharge up to 1,000 $m^3$/sec.)
Approximately 80,000 km of mesqas
560 large public pumping stations
Over 17,000 km of public drains
Over 22,000 water control structures.

The system provides water for over 7 million feddans [2] of which :

6.0 million are for alluvial lands along the Nile Valley and in the Delta (old lands)
1.0 million are recently (1952-1980) irrigated desert lands.

The main characteristics of the irrigation system are :

- Operation and control of the water is based on the elevation of the water upstream or downstream of the offtake structures;
- Traditionally water has been supplied to farmers on a rotation system that alternates on/off periods that vary by season and cropping pattern;

With the current Ministry policy that improved commands will be provided with continuous flow the areas under improvement are beginning to shift to a continuous flow regime :

- Most farmers have to lift water onto their fields rather than have it delivered by gravity flow;
- The drainage system for removing excess water from cultivated lands consists of open drains, tile drains and pump stations.

---

[1] A mesqa is a private ditch serving 10 to 300 feddans and 10 to 200 farmers, and farm drains.

[2] One feddan equals 1.038 acres or 0.42 hectare

MPWWR is responsible for all aspects of the irrigation and drainage system which include :

- Planning
- Design
- Construction
- Operation
- Maintenance
- Management

The Ministry has four Departments :

- Irrigation
- Finance
- Planning
- Mechanical

The Ministry has five Authorities :

- Drainage
- High Dam
- Coastal Protection
- Survey
- The Water Research Center

To administer the irrigation system, the Irrigation Department has:

19 Directorates [3]
48 Inspectorates
167 Districts.

MPWWR regulates water supplies to and within each of the fifty canal commands, normally based on monthly water needs prepared jointly by the regional offices of MPWWR and the Ministry of Agriculture (MOA). Since the High Dam was completed in 1968, the supply of water has generally been sufficient to enable farmers to achieve close to 190 percent cropping intensities.

[3] essentially the same area coverage as a governorate



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### 5. On-Farm Irrigation and Delivery System

Most farm sizes in the six million feddans of old lands are small
70 percent are < 1 feddan
25 percent of the farms are >1 and <5 feddans
5 percent > 5 feddans

## D. <u>IRRIGATION IMPROVEMENT PROJECT (IIP)</u>

### 1. The Irrigation Improvement Project is :

a. Planning
b. Designing and
c. Implementing

a rehabilitation/modernization program in <u>eleven</u> canal commands currently estimated to cover a net area of more than 75,000 feddans with operational mesqas during the life of the project.

### 2. The objectives of the Irrigation Improvement Project are as follows:

a. To strengthen the institutional capacity of MPWWR so that it has the:

i. Equipment
ii. Staffing
iii. Managerial
iv. Administrative skills
v. Operational policies and procedures

to continue IIP with limited expatriate assistance.

3. To develop a rational interdisciplinary approach for :

a. Planning
b. Designing, and
c. Implementing

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[4] Farmers are required to lift water from 50 to 75 cm because Government policy favors lift irrigation on the assumption that gravity flow encourages excess water applications. Water delivered to the farmer is not based on precise plant needs, but on rotation with on and off periods. Under rotation, farmers at the upper end of a mesqa can often irrigate twice in a turn, and farmers at the lower end may not get a turn.

the renovation of specific canal commands identified in MPWWR's current five year plan.

4. To develop an Irrigation Advisory Service to provide for:
   a. The transfer of water management technical information;

   b. Technical assistance to farmers and water user groups.

5. To organize operational water user associations in all IIP areas to provide:

   a. Farmer input during the renovation process;
   b. Communicate local concerns to government officials;
   c. Coordinate local scheduling of water on mesqas;
   d. Perform maintenance;
   e. Resolve disputes; and
   f. Participate in a cost sharing program.

6. Establish policies and procedures for the recovery of :

   a. An appropriate portion of the operation costs;

   b. An appropriate portion of the maintenance costs of the irrigation system; and

   c. 100% of the nominal costs of mesqa and on-farm improvements.

7. In each of the areas to be improved, IIP implementation consists of four phases:

   a. Identification of constraints to improved agricultural production;

   b. a feasibility study of potential solutions;

   c. The design and implementation of the appropriate alternatives (which must be technically sound, economically viable and socially acceptable); and

   d. the monitoring of the implemented solutions and the evaluation of progress towards the effectiveness of future improvements.

## E. USAID Financing

USAID is helping finance both physical improvements and institutional changes.

1. Physical improvements include :

   a. Water control structures;
   b. Canal improvements;
   c. Several different types of improved mesqas ;
   d. Drainage;
   e. Land leveling; and
   f. A change from a rotation system to continuous flow.

2. Institutional changes include :

   a. Developing effective monitoring systems;

   b. Promoting farmer organizations which may be charged with operating and maintaining the improved system and establishing an irrigation advisory service;

   c. Funding provision for commodities, training and technical assistance.

Irrigation improvement activities under the IMS Project were initiated in 1984 with the first amendment to the Project Agreement.

The aim of the Regional Irrigation Improvement Project (RIIP), as it was called at that time, was to bridge the gap between irrigation improvement research done under the Egyptian Water Use and Management Project [5] and a major national program of investment in irrigation system renovation.

An area of 40,000 to 50,000 feddans was planned for improvement as a pilot project.

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[5] The Egyptian Water Use and Management Project, EWAP (1977-1984) was a research effort designed to develop an applied program of increased water use and management efficiency that would lead to increases in agricultural yields. The approach consisted of surveys to identify problems at the farm level and then to develop and field test alternative solutions for technical and economic feasibility, and acceptance by both farmers and government. Project trials were carried out in three areas, the delta, middle and upper Egypt. A summary of the projects accomplishments and recommendations is found in the final technical report entitled "Improving Egypt's Irrigation System in the Old Lands - Findings of the Egypt Water Use and Management Project."



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## F. Technical Assistance

Technical assistance for this first improvement effort was provided by the Consortium of International Development (CID) through the lead university, the Colorado State University (CSU). CID/CSU provided services, commodities and training to both RIIP and the Water Research Center under their contract.

CID/CSU provided considerable training, both in-country and in the US, procured commodities for both the Cairo and El Minya offices and completed 20 studies and reports.

Studies and reports included recommendations for

1. Redesign of the Serry Canal;
2. An Environmental Assessment;
3. A development plan for the IAS;
4. Problem identification studies of two unit commands; and
5. Feasibility studies of the two unit commands.

At the completion of the RIIP portion of the contract in December 1987, improvements in only 3,400 feddans of the Herz Numania Unit Command were under construction.

The fourth Project Agreement Amendment executed in 1987 expanded the area planned for irrigation improvement to an approximate 400,000 feddans located in eleven irrigation commands throughout Egypt.

The project became much more complex with requirements for :

1. Feasibility studies prior to construction;
2. Development of a cost recovery program; and
3. The formation and legalization of WUAs.

In December 1988, a contract was signed with the joint venture of Morrison Knudsen Engineers, Inc. and Louis Berger International, Inc. to provide technical assistance, training and assistance in commodity procurement. The contract was originally for three years. With a four year extension of the IMS Project, the contract was extended through September 1995.

## G. IIP Progress

IIP progress to date has been much slower than planned.

While considerable progress has been made in the areas of training, commodity procurement and the preparation of feasibility studies, yet

1. Progress in the construction of improvements and making new improved mesqas operational is far behind schedule;

2. The original targets for improvement of the irrigation system and in fact even the reduced targets developed after a 1990 evaluation <u>will not be met</u> by the PACD;

3. The targets have been further scaled back to reflect a more probable level of IIP capacity :

   a. The area proposed for improvement is now estimated at about 75,000 feddans under operational mesqas; and

   b. the number of WUAs to be fully developed is estimated at between 1,200 and 1,300.

4. Currently, about 25 mesqa improvement construction contracts covering 41,000 feddans have been awarded.

5. An additional 19 contracts for delivery system improvements have also been awarded.

The USAID contribution to the IIP budget first planned at $ 105.9 million has been reduced to $ 63 million. This component was evaluated in June 1990 by the Irrigation Support Project for Asia and the Near East (ISPAN).

An additional evaluation of the Irrigation Advisory Service was completed in July 1992.



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# STATEMENT OF WORK

In the performance of the evaluation, the contractor shall, as a minimum, carry out the tasks set forth below. Following each task statement is a list of questions to be addressed. Addressing these questions is considered essential to effectively carrying out each task. However, the list is not to be considered all inclusive and the contractor is expected to develop and address additional issues as required to effectively perform each task and to achieve the overall purposes of the evaluation.

## I. TASK 1

Assess progress in the development of the institutional capacity of MPWWR to continue irrigation improvement activities as envisioned under the Irrigation Improvement Project with limited technical assistance.

A. Is IIP staffing

1. Adequate
2. Appropriate
3. Consistent with staffing projected in the project design ?

If not, what has been the impact on project implementation ?
What staffing and organizational changes are required to enhance implementation ?

B. Are operational policies and procedures in :

1. Planning
2. Design
3. Construction
4. Financial

necessary to ensure smooth continuity of the project in place ?
Are they being effectively used by IIP staff ?

C. Have the

1. Administrative
2. Managerial and
3. technical skills

of project staff been adequately enhanced ?
Is the training program effective and appropriate ?

D. Is equipment, procured or planned for procurement, appropriate and, for equipment in-country, effectively used ?

## II. TASK 2

Assess progress in developing the rational interdisciplinary approach for planning, designing and implementing irrigation improvements called for in the project design.

### A. *Planning*

1. a. Has an interdisciplinary approach been applied in the planning phase?

   b. Is the project's approach to obtaining non-engineering professional services an effective and sustainable solution ?

2. a. Are the feasibility studies as now being developed of good quality and are they an effective means of determining recommended improvements and establishing economic justification ?

   b. Can another more efficient process be used ?

   c. Are the feasibility studies being used as a useful tool by MPWWR in their planning for irrigation improvement activities?



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3. a. Is there an appropriate mechanism for selecting priority areas for improvement ? If not

b. what criteria should be incorporated into such a selection mechanism?

## B. *Design*

1. Are engineering designs appropriate for meeting the water requirement needs of the water user associations ?

2. Are main system improvement designs using automatic gates, distributors and double gated orifices an appropriate and cost effective means of providing continuous flow in the improved areas?

3. a. Do the contract documents and contracting procedures provide a sound basis for timely and good quality construction ? If not

b. What modifications are recommended ?

4. Are standard designs appropriate and effectively used by the Directorates in their development of construction contracts ?

## C. *Construction*

1. Is construction of good quality ?

2. Are the material testing labs in the Directorates being effectively used to control the quality of construction?

3. Is construction supervision being carried out in a manner that insures quality construction ?

4. Are construction contractors qualified and capable of meeting contract requirements ?

5. Is construction generally on schedule ? If not, what are the reasons and what can be recommended to improve timely completion?

## III. TASK 3

Assess the effectiveness of the Irrigation Advisory Service in organizing operational water user associations, providing water management technical assistance to farmers and water user associations.

### A. Effectiveness of IAS

1. Was the June 1992 evaluation of the IAS and WUAs a useful exercise in identifying means of developing more a more effective IAS and sustainable WUAs ?

2. a. Which recommendations of the June 1992 evaluation are key and should be pushed to implementation ?

   b. Have any key recommendations been implemented? If not

   c. What constraints are holding up implementation of the recommendations ?

### B. Farmer' Inputs (WUAs)

1. Has farmer input been used during the renovation process : i.e. during the planning, design and construction of mesqa improvements?

2. a. How effective has IIP been in assisting WUAs to move into the operational stage ?

   b. Are there alternative, more feasible means of providing group pumps for the improved mesqas ?

   c. Are mesqa operational and maintenance plans well developed and being put into use by WUAs ?

   d. Have WUAs been provided with training to enable them to resolve disputes affecting success of the improved mesqas?

3. Taking into account legal issues and the capabilities and the mission of both MPWWR's IAS and the Ministry of Agriculture's extension service, what is a realistic role for the IAS to play in irrigation water management ?

## IV. TASK 4

Assess the adequacy of the IIP Component monitoring and evaluation system.

### A. Adequacy of the IIP Component

1. a. Will the monitoring/evaluation system provide the capability to measure benefits, and

   b. provide information required by IIP, MPWWR and USAID to evaluate the effectiveness of the Project?

2. Are the field data collection activities providing the required information in a timely manner ?

3. Are there constraints affecting the timely collection and analysis of data ?

## V. TASK 5

Assess progress to date in developing a cost sharing program at the mesqa level.

A. Will the proposed program lead to sustainable continuation of irrigation improvement activities ?

B. Is there evidence that the WUAs on improved mesqas are financially able and willing to continue working as a viable group in the future ?



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## VI. TASK 6

Assess the effectiveness of technical assistance provided to the project since its inception.

A. Has TA been appropriate and effective ?

B. What types and numbers of TA are required in the future to enhance the success of IIP ?

C. 1. Are the training materials and technical papers developed by the TA team of good quality and effectively used ?

2. Should they be translated into Arabic ?

## VII. TASK 7

Assess the cost effectiveness of project activities funded by both USAID and the GOE.

### A. Use of Project of funds

Have project funds been efficiently used in providing :

1. Technical assistance;

2. Commodities; and

3. Training needed to enhance MPWWR's capability to carry out irrigation improvement activities ?

### B. Cost justification

Are the capital and recurrent costs of irrigation improvement justifiable in terms of benefits attributable to the project ?

## VIII. TASK 8

Compare planned versus actual accomplishments and review the project design and implementation to determine whether or not irrigation improvement activities could be carried out more effectively in a different manner or by different entities.

A. 1. Is more private sector involvement in mesqa improvement a realistic alternative ?

2. Should planning activities and feasibility studies be undertaken by the Project Planning Unit or the private sector ?

3. Is there potentially a greater role in the project for private pipeline and pump manufacturing companies, construction firms and the Principal Bank for Development and Agricultural Credit ?

B. 1. Can the organizational structure of IIP be modified to carry out irrigation improvement in a more efficient and expeditious manner ?

2. Will the establishment of a National Irrigation Improvement Authority improve the Ministry's capability to carry out a nationwide improvement program ?

3. What are the organizational, procedural and financial implications of the proposed authority ? Can it be established by the PACD ?

4. Can IIP collaborate more effectively with other IMS Project components, other units within MPWWR, and with the Ministry of Agriculture ?

## METHODS AND PROCEDURES

1. The evaluation team shall base their findings, conclusions, and recommendations on data, reports and other information provided by the USAID Project Officer, MPWWR and the TA contractor, as well as site visits and interviews. Documents consulted should include, but not limited to, the Project Paper, project implementation letters, the 1990 IMS Project evaluation report, the 1992 IAS/WA evaluation report, feasibility studies, TA team reports, the IAS strategy, training documents, annual workplans, quarterly progress reports and applicable AID evaluation guidance. A complete list of IIP documents will be provided to the evaluation team.

2. The evaluation team shall interview appropriate USAID, MPWWR Cairo officials, IIP staff both in Cairo and the Directorates and TA staff. The team shall also interview water user association members and shall employ surveys and questionnaires in the study when appropriate.

3. The evaluation team shall conduct site visits to several representative IIP Directorates.

4. The team shall prepare an evaluation report providing findings, conclusions and recommendations responding to the questions in the Statement of Work and based on the analysis of information obtained from 1 through 3 above. The report shall meet the requirements outlined in the following section.

5. Prior to departure, key evaluation team members will meet with high level MPWWR officials to brief them on the evaluation findings and recommendations, field questions and obtain Ministry feedback.

## REPORTING REQUIREMENTS

All reports shall be submitted to the USAID project officer and the evaluation officer.

1. The contractor shall hold regular meetings, frequency of which will be determined by the evaluation officer, to brief the USAID and MPWWR staff on evaluation progress. Final debriefing(s) shall be held for USAID and MPWWR after acceptance of the first draft.

2. On or before the fifth working day, the contractor shall submit a workplan which describes roles and responsibilities of each team member and includes a detailed outline and suggested table of contents for the evaluation report.

3. The contractor shall submit a draft report by the end of the sixth working week. The draft findings shall be reviewed and discussed with key USAID and MPWWR staff and comments provided to the contractor within 5 working days. The final draft report, due before the team's departure from country, shall include changes or relevant revisions requested by USAID. Executive summaries in English and Arabic for both the draft and the final draft reports shall be provided. Within a month after departure, the contractor shall provide 30 copies of the final report to the USAID/Cairo Mission for distribution along with an electronic (in Word Perfect 5.1) copy of the report. In addition, the contractor will send a copy of the report to the following USAID offices :

a) Document Acquisitions
PPC/CDIE/DI
Room 209, SA-18
US Agency for International Development
Washington, DC, USA 20522-1802

b) Egypt Desk Officer
NE/ENA/E
Room 102 SA-2
US Agency for International Development
Washington, DC, USA 20522-0201

c) Development Information Officer
USAID CAIRO
Unit 64902
APO, AE, 09839-4902

4. The format for the report shall be as follows :

EXECUTIVE SUMMARY :

Not to exceed three single-spaced pages. This shall be provided in Arabic and English.

LISTING OF THE MAJOR FINDINGS, CONCLUSIONS AND RECOMMENDATIONS :

This section shall briefly summarize the most important conclusions and recommendations in the evaluation. The recommendations shall be listed in priority order with responsible parties assigned to implement each recommendation. The report shall provide only principal recommendations which are viable in view of the constraints facing each responsible party. (Other suggestions, ideas, or improvements for project implementation should be provided in a separate annex.)

MAIN REPORT :

The report shall respond directly to the key questions in the Statement of work and should not exceed (30) double spaced typed pages.

DRAFT PROJECT EVALUATION SUMMARY :

The Project Evaluation Summary (PES) shall follow the format provided to the contractor by the Evaluation Officer. This format includes both an abstract and a detailed portions specified in the format. The contractor shall prepare all portions of the document except for the section called "Mission Comments." Both hard and electronic (in Word Perfect 5.1) copies of this document shall be provided to the mission with the final report.

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# ANNEX 4

## Logframe

# *PROJECT DESIGN SUMMARY*

# *LOGICAL FRAMEWORK*

**Project Title And Number:** Irrigation Management Systems (IMS) Project 263-0132

| NARRATIVE SUMMARY | OBJECTIVELY VERIFIABLE INDICATORS | MEANS OF VERIFICATION | IMPORTANT ASSUMPTIONS |
|---|---|---|---|
| **Program or Sector Goal: The broader objective to which this project contributes:**<br><br>To increase production and productivity in the agricultural sector. | **Measures of Goal Achievement:**<br><br>• Minimum of 4% average annual increase in agricultural productivity.<br><br>• Minimum of 3% average annual increase in agricultural production. | • Ag Production Growth Rate from Official Ministry of Agriculture and Land Reclamation (MALR) Statistics.<br><br>• Economic yield per acre and agricultural GDP per farm worker (MALR statistics). | **Assumptions for achieving goal targets:**<br><br>• Factors affecting agricultural productivity other than water stay the same or improve.<br><br>• Agricultural policies improved to free up production and markets. |
| **Project Purpose:**<br><br>To improve the system-wide water use efficiency for irrigation. | **Conditions that will indicate purpose has been achieved: End of project status.**<br><br>• Irrigation efficiency system-wide will increase by 3% over the Life of Project. (Defined as total value of agricultural production divided by total volume of irrigation water used).<br><br>• MPWWR utilizing a rational, interdisciplinary irrigation management system in the planning, design, operation and maintenance of Egypt's water distribution network. | • Crop production and area records from MALR.<br><br>• Estimation of total irrigation water used by summing (1) calculations of crop evapotranspiration, (2) measurement of drainage water lost to the sea and (3) calculations/estimates of evaporation from free water surfaces.<br><br>• Evaluations.<br><br>• Contractor report.<br><br>• MPWWR system operation documents.<br><br>• MPWWR organization chart.<br><br>• MPWWR MIS manuals application and utilization.<br><br>• MPWWR budget requests. | **Assumptions for achieving purpose:**<br><br>• Data will be sufficiently accurate and consistent for crop production areas and drainage water lost to the sea.<br><br>• Farmers cooperate in the appropriate use and maintenance of the irrigation systems.<br><br>• MPWWR integrates IMS organizational units and activities into MPWWR<br><br>• Irrigation cost recovery program developed and adopted by GOE for IMS organizational units. |

| NARRATIVE SUMMARY | OBJECTIVELY VERIFIABLE INDICATORS | MEANS OF VERIFICATION | IMPORTANT ASSUMPTIONS |
|---|---|---|---|
| **Outputs:** | **Magnitude of outputs:** | | **Assumptions for achieving outputs:** |
| 1. MPWWR's capacity strengthened in irrigation system improvement planning, design, construction, operation and maintenance. | • 17 Feasibility Studies (394,000 feddans) completed.<br>• 75,000 feddans improved and operational.<br>• Continuous flow provided in the 75,000 feddan improved area.<br>• Computer models tested for planning and operational improvements. | • Review of studies: contractor reports.<br>• Contractor reports, review of vouchers, field trip reports.<br>• Contractor reports, field trips.<br>• User manuals for software, case study reports, contractor reports. | • Irrigation Department accepts the changes in canal operation proposed by IIP.<br>• Legislation enacted to recover mesqa improvement costs. |
| 2. Improve MPWWR capabilities in analyzing project proposals and developing feasibility studies according to international standards. | • MPWWR employees conduct 32 pre-feasibility and special studies. | • Completed studies, progress reports, and annual workplans. | • PPD retains trained staff and its function is integrated into MPWWR's overall planning process. |
| 3. Water User Associations formed and independently operating and maintaining mesqa level irrigation facilities. | • 1200 Water User Associations registered with MPWWR making operating and maintenance decisions. | • MPWWR's WUA registration records.<br>• WUA operating data collected by the Irrigation Advisory Service | • Legislation approving Water User Associations is adopted. |
| 4. Improved management capabilities of MPWWR to carry out structural replacement. | • 19,200 Irrigation Structures replaced or rehabilitated.<br>• 5 Large irrigation structures replaced.<br>• Construction control manual developed and utilized.<br>• Contracting administration procedures developed and utilized.<br>• A monitoring and reporting system developed for the structural replacement program. | • MPWWR Structural Replacement records.<br>• Completed construction control manual and site inspections.<br>• Completed contract administration procedures manual and related implementation documents.<br>• Completed monitoring and reporting systems manual. | |
| 5. MPWWR's irrigation maintenance process strengthened. | • Maintenance manual prepared with standards, responsibilities, and procedures.<br>• Systems for management of equipment, spare parts, and facility maintenance utilized. | • Completed manual.<br>• Quarterly equipment utilization reports.<br>• MPWWR organizational chart and job descriptions. | • Project organizations will become permanent MPWWR units. |
| 6. A water measuring, data collection and communication network established to allow decision makers to access water discharge data. | • 200 meteorbursts and 600 voice data collection sites, 2 master stations and 24 submaster stations installed in the Irrigation Directorates. | • Data from all 800 sites received daily at the Directorate and national level | • Equipment will be installed on time and decision makers will avail themselves of the information. |
| 7. A Nile Forecast Center established to monitor and forecast Nile River flows. | • A primary data user system for satellite monitoring of the Nile Basin in place.<br>• A meteorological data distribution system operational for receiving meteorological data and weather analysis information.<br>• Work stations and staff for data processing, forecasting and simulation of hydrological and meteological processes in the Nile Basin in place.<br>• A comprehensive hydro-climatic data base and file retrieval system in place. | • Center organizational chart, equipment inventory list, and daily forecast reports to senior decision makers.<br>• Site visits, contractor reports and MPWWR personnel records. | • Skilled staff will be made available. |

| NARRATIVE SUMMARY | OBJECTIVELY VERIFIABLE INDICATORS | MEANS OF VERIFICATION | IMPORTANT ASSUMPTIONS |
|---|---|---|---|
| 8. Institutionalization of a process for identifying research needs and setting research priorities; and institutional strengthening for conducting priority research and disseminating research results. | • Number of research activities addressing priority MPWWR problems will increase by 15% over the Life of Project. | • Research unit reports or research undertaken.<br>• TA contractor reports. | • MPWWR retains trained and qualified staff.<br>• WRC assumes local operating costs by June 30, 1994. |
| | • A Documentation and Management Information System established | • Developed and installed MIS. | |
| | • A Strategic Research Unit staffed and equipped to support integrated resource management at MPWWR for addressing long-term strategic policy issues. | • Five Year Work Plan and organization charts. | |
| | • A system-wide Water Quality Monitoring and Data Management and Dissemination unit established and operational. | • Organizational and personnel charts. | |
| | • 31 PHD and 43 MSC participants completed degree training and return to assume key research positions. | • Returnee reports. | |
| | • 157 person months of technical training completed and 50 person months of management training completed to strengthen WRC's research and management capabilities. | • Training unit reports. | |
| 9. The National Irrigation Training Institute constructed, equipped and operational. | • A comprehensive policy manual reflecting the entire NITI operations in place; | • Completed policy manual; | |
| | • Promotional materials developed and completed; | • Completed promotional materials; | • NITI retains trained staff. |
| | • 80 courses developed and offered annually. | • Course curriculum and NITI participant registration records. | |
| 10. The Egyptian Survey Authority modernized and operational. | • Production department equipped with state-of-the-art digital survey and mapping equipment. | • Production department equipment inventory list and contractor reports. | |
| | • Summer and winter sod and crop maps for the Delta. | • Contractor reports. | |
| | • Cadastral Maps w/ 2 meter contour overlays<br>Topographic Maps:<br>50,000 sq km @ 1:50,000<br>Orthophoto maps:<br>35,000 sq km @ 1:10,000<br>Town/village maps:<br>135 sq km @ 1:1,000 | | • ESA assumes local operating costs by August 31, 1993. |
| | • Pilot Land Information System in place. | • Site inspection. | |

| NARRATIVE SUMMARY | OBJECTIVELY VERIFIABLE INDICATORS | MEANS OF VERIFICATION | IMPORTANT ASSUMPTIONS |
|---|---|---|---|
| **Inputs:**<br>**AID:** | **Implementation Target (Type and Quantity)** | | **Assumptions for providing inputs:** |
| Technical assistance advisors and consultants. | • $131.83 million | • Project accounts. | • USAID funding available as planned. |
| Participant training abroad and in-country training | • Off Shore long term: 125<br>• Off Shore short term: 850<br>• In-country training: 8,000 | • AID and contractor records. | • MPWWR satisfies USAID conditionality. |
| Equipment, supplies, vehicles to support field activities. | • $85.48 Million. | • Evaluation reports. | |
| Dollar financing of local costs of the SR and IIP construction programs. | • $71.4 million. | | |
| **GOE:**<br>MPWWR staff time, salaries, per diem, recurrent local operating costs, incentives, office space, laboratory, furniture and other local costs. | • $127 million. | | |

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| IMS PROJECT | | | IRRIGATION IMPROVEMENT PROJECT* | | | | |
|---|---|---|---|---|---|---|---|
| **IMS PROJECT GOAL** | **IMS PROJECT PURPOSE** | **END OF IMS PROJECT STATUS** | **IIP OBJECTIVES** | **OUTPUTS (PP)** | **MAGNITUDE OF OUTPUTS (PP)** | **REVISED OUTPUTS** | **MAG. OF REV. OUTPUTS** |
| To improve the control of Nile water for all uses and particularly their optimal allocation to and within agriculture as a means of helping increase agricultural production and productivity.<br><br>Subgoal: to improve the operating efficiency of the water distribution system for agricultural irrigation and for other uses. | To strengthen PWWR's capabilities for:<br>A. Planning and Design | PWWR implementing projects and programs that are well designed, carefully analyzed, and adequately financed by international donors and/or the GOE. | 1. Strengthen the institutional capacity of PWWR so that it has the equipment, staffing, managerial and administrative skills, and operational policies and procedures to continue IIP with limited expatriate assistance.<br><br>2. Develop a "rational" interdisciplinary approach for planning, designing and implementing the renovation of specific canal commands identified in PWWR's current five year plan. | Feasibility studies completed for eleven commands covering a total area of 320,000 feddans. | | IIP staffed by multidisciplinary personnel trained and equipped to continue irrigation improvement with limited technical assistance.<br><br>Feasibility studies addressing all water related constraints to agricultural production. | Trained and equipped staff at Headquarters and six Directorate offices.<br><br>17 Feasibility studies for eleven canal commands or subcommands covering a total area of 384,000 feddans completed. |
| | B. Operation | Improved operation of HAD/Lake Nasser and improved control of the water distribution system resulting in the timely distribution of the proper amounts of water to end users on an equitable basis. | 3. Develop an Irrigation Advisory Service (IAS) to provide for the transfer of water management technical information and technical assistance to farmers and water user groups.<br><br>4. Organize operational water user associations in all IIP areas to provide farm input during the renovation process, communicate local concerns to government officials, coordinate local scheduling of water on mesqas, perform maintenance, and resolve disputes. | Water user associations will be formed. | Not quantified | IAS providing water management technical assistance to WUAs and farmers.<br><br>Water user associations formed and legalized.<br><br>PWWR adopts continuous flow as a policy in improved commands. | Water management technical assistance provided to WUAs and farmers in 180,000 feddans improved under IIP.<br><br>3,000 WUAs established and operating and maintaining their improved mesqa systems.<br><br>All areas improved under IIP are provided with continuous flow. |
| | C. Maintenance | The irrigation and drainage system is maintained to prolong the infrastructure investment and so that maintenance is a positive factor in the performance of the canals, drains, and their control structures. | 5. Establish policies and procedures for the recovery of an appropriate portion of the operation and maintenance costs of the irrigation system and 100% of the costs of the mesqa and on-farm improvements. | | | Legislation enacted to recover mesqa improvement capital costs.<br><br>Water user associations formed and legalized. | 3,000 WUAs providing 100% of the cost of operation and maintenance of improved mesqa systems. |
| | D. All primary functions (planning, design, operation and maintenance) | Irrigation improvement program providing an integrated systems approach to carry out PWWR primary functions(i.e. rational planning, improved design, more efficient operation and adequate maintenance) | Objectives 1 thru 5 above. | A systems approach developed and tested for improved planning, design, operation, maintenance and management of on-farm water management and canal delivery systems through actual field experience in RIIP areas.<br><br>Staff capability developed to handle a national program of canal command modernization and rehabilitation. | 14 canal commands planned and designed for more efficient water utilization. Six of these canal commands with improvement programs constructed and having moved to the operation, maintenance and management phase.<br><br>IIP will plan, design and construct a rehabilitation/modernization program in selected canal commands covering an area of over 300,000 feddans. | A system approach developed and tested for improved planning, design, operation, maintenance and management of on-farm water management and canal delivery systems through actual field experience in RIIP areas.<br><br>Staff capability developed to handle a national program of canal command modernization and rehabilitation. | 180,000 feddans in eleven canal commands rehabilitated/modernized and having moved to an improved operation, maintenance and management phase. |

*IIP goal is to increase agricultural production, improve efficiency of water use and improve equity of water distribution.

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Note: Outputs and Magnitude of Outputs in italics are from the PP Log Frame, while those in plain type are taken from the PP narrative.

# ANNEX 5

## Project Status

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Table 5 – 1 : STATUS OF SUPPLEMENTAL FEASIBILITY STUDIES

| No | Command Area | Areas in Feddans | | Approved Gross Area | |
|---|---|---|---|---|---|
| | | Gross | Net | IIP | USAID |
| 1 | Abbadi | 5,885 | 4,960 | 5,885 | 5,885 |
| 2 | Ashruba | 4,000 | 3,665 | 4,000 | 4,000 |
| 3 | Bahr El Gharag | 59,000 | 47,043 | 59,000 | 59,000 |
| 4 | Bahig | 33,600 | 30,000 | | |
| 5 | Bahr El Saidi | 30,600 | 26,668 | 30,600 | 30,600 |
| 6 | Balagtar | 12,000 | 11,484 | 12,000 | 12,000 |
| 7 | Beni Ebeid | 5,000 | 4,455 | 5,000 | 5,000 |
| 8 | Iqal Shamia | 20,245 | 17,470 | 20,245 | |
| 9 | Khor Sahel | 9,960 | 7,810 | 9,960 | 9,960 |
| 10 | Mantout | 11,340 | 10,700 | 11,340 | 11,340 |
| 11 | Qahwagi | 12,800 | 11,779 | 12,800 | 12,800 |
| 12 | Qiman El Arous | 7,160 | 6,250 | 7,160 | 7,160 |
| 13 | Radissia | 8,900 | 8,500 | (1) | (1) |
| 14 | Saidiya – 1 | 8,050 | 7,160 | 8,050 | 8,050 |
| 15 | Saidiya – 2 | 17,180 | 15,340 | 17,180 | 17,180 |
| 16 | Saidiya – 3 | 52,100 | 47,200 | 52,100 | 52,100 |
| 17 | Serry Canal | 95,849 | 90,435 | | |
| | TOTAL | 393,669 | 350,919 | 255,320 | 235,075 |

NOTE: (1) – Not Feasible, Cancelled

SOURCE: Irrigation Improvement Project (IIP) – Quarterly Review Report, October 1993

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## Table 5 - 2A : Planned Improvement By PACD

### IIP FY 93/94 AWP

| No. | Directorate | Command Area | Gross Area | Net Area | Area Improved By PACD: Main Delivery Improvement (Gross) | Area Improved By PACD: Under CF Operation (Gross) | Area Improved By PACD: Mesqa Improvement (Net) |
|---|---|---|---|---|---|---|---|
| 1 | ZAGAZIG | Saidia #1 | 8,050 | 7,160 | 8,050 | 8,050 | 6,760 |
| 2 | | Saidia #2 | 17,180 | 15,340 | 17,180 | 17,180 | 15,340 |
| 3 | | Saidia #3 | 52,100 | 47,200 | 52,100 | | |
| 4 | TANTA | Qahwagi | 12,800 | 11,779 | 12,800 | 12,800 | 6,900 |
| 5 | | Bahr Saidi | 30,600 | 26,666 | 30,600 | 30,600 | 22,625 |
| 6 | DAMANHUR | Balaqtar | 12,000 | 11,484 | 12,000 | 12,000 | 11,044 |
| 7 | | Bahig | 33,600 | 30,000 | | | |
| 8 | EL MINYA | Qiman El Arous | 7,160 | 6,250 | 7,160 | 7,160 | 6,200 |
| 9 | | Bahr El Gharak | 59,000 | 47,043 | | | 290 |
| 10 | | Beni Ebied | 5,000 | 4,455 | 5,000 | 5,000 | 4,400 |
| 11 | | Ashruba | 4,000 | 3,665 | 4,000 | 4,000 | 3,600 |
| 12 | | Mantut | 11,340 | 10,700 | 11,340 | 11,340 | 10,544 |
| 13 | | Iqal/Shamia | 20,245 | 17,470 | 20,245 | 20,245 | 400 |
| 14 | | Herz/Numania | 4,000 | 3,600 | 4,000 | 3,600 | 3,600 |
| 15 | | Serry Canal | 95,849 | 90,435 | | | |
| 16 | ESNA | Abbaddi | 5,885 | 4,960 | 5,885 | 5,885 | 3,000 |
| 17 | | Khore Sahel | 9,960 | 7,810 | 9,960 | 9,960 | 1,100 |
| | TOTAL | | 388,769 | 346,017 | 200,320 | 147,820 | 95,803 |

## Table 5 - 2B : Projected Improvement By PACD

## USAID Estimates

| No. | Directorate | Command Area | Gross Area | Net Area | Area Improved By PACD | | |
|---|---|---|---|---|---|---|---|
| | | | | | Main Delivery Improvement (Gross) | Under CF Operation (Gross) | Mesqa Improvement (Net) |
| 1 | ZAGAZIG | Saidia #1 | 8,050 | 7,160 | 8,050 | 8,050 | 6,760 |
| 2 | | Saidia #2 | 17,180 | 15,340 | 17,180 | 17,180 | 10,000 |
| 3 | | Saidia #3 | 52,100 | 47,200 | 12,000 | | |
| 4 | TANTA | Qahwagi | 12,800 | 11,779 | 12,800 | 12,800 | 5,600 |
| 5 | | Bahr Saidi | 30,600 | 26,666 | 30,600 | 30,600 | 21,000 |
| 6 | DAMANHUR | Balaqtar | 12,000 | 11,484 | 12,000 | 12,000 | 5,600 |
| 7 | | Bahig | 33,600 | 30,000 | | | |
| 8 | EL MINYA | Qiman El Arous | 7,160 | 6,250 | 4,600 | 4,600 | 4,600 |
| 9 | | Bahr El Gharak | 59,000 | 47,043 | | | 290 |
| 10 | | Beni Ebied | 5,000 | 4,455 | 5,000 | 5,000 | 4,455 |
| 11 | | Ashruba | 4,000 | 3,665 | 4,000 | 4,000 | 3,665 |
| 12 | | Mantut | 11,340 | 10,700 | 11,340 | 11,340 | 6,000 |
| 13 | | Iqal/Shamia | 20,245 | 17,470 | | | 400 |
| 14 | | Herz/Numania | 4,000 | 3,600 | 4,000 | 3,600 | 3,600 |
| 15 | | Serry Canal | 95,849 | 90,435 | | | |
| 16 | ESNA | Abbaddi | 5,885 | 4,960 | 5,885 | 5,885 | 3,000 |
| 17 | | Khore Sahel | 9,960 | 7,810 | 5,000 | | 560 |
| | **TOTAL** | | **388,769** | **346,017** | **132,455** | **115,055** | **75,530** |

About 12 kms of Serry Canal has been improved under SR Project.

Source : Mabrouk files USAID/AGR/ILD Cairo.

Table 5 – 3 : STATUS OF OFF–SHORE COMMODITY PROCUREMENT
September 30, 1993

| No | Description | RCPP Estimate | Actual | Procurement Planned (1) | Total | Remaining Balance |
|---|---|---|---|---|---|---|
| 1 | Utility Vehicles | 584,338 | 582,170 | 0 | 582,170 | 2,168 |
| 2 | Pickups | 443,520 | TBD | 0 | 0 | 443,520 |
| 3 | Vans | 391,457 | 391,457 | 0 | 391,457 | 0 |
| 4 | Motorcycles | 537,038 | 537,038 | 0 | 537,038 | 0 |
| 5 | Engineering/Survey Equipment | 318,776 | 318,776 | 0 | 318,776 | 0 |
| 6 | Drafting Equipmement | 98,803 | 47,627 | 0 | 47,627 | 51,176 |
| 7 | Earth Augers | 49,336 | 49,336 | 0 | 49,336 | 0 |
| 8 | Soil Testing Equipment | 315,334 | 288,538 | 0 | 288,538 | 26,796 |
| 9 | Laboratory Equipment | 48,054 | 48,054 | 0 | 48,054 | 0 |
| 10 | Engineering Text Books | 9,495 | 11,183 | 0 | 11,183 | (1,688) |
| 11 | Admin. & Training Equipment | 52,872 | TBD | 52,872 | 52,872 | 0 |
| 12 | Computer Equipment | 882,593 | TBD | 250,000 | 250,000 | 632,593 |
| 13 | Automatic Gates – 1 | 470,070 | 386,719 | 0 | 386,719 | 83,351 |
| 14 | Automatic Gates – 2 | 827,480 | 619,507 | 0 | 619,507 | 207,973 |
| 15 | Automatic Gates – 3 | 1,523,942 | TBD | 422,000 | 422,000 | 1,101,942 |
| 16 | Miscellaneous | 446,892 | 121,354 | 120,000 | 241,354 | 205,538 |
| | TOTAL | 7,000,000 | 3,401,759 | 844,872 | 4,246,631 | 2,753,369 |

NOTES:

(1) – Estimated Costs

(2) – Amounts are in US DOLLARS

SOURCE: Revised Commodity Procurement Plan (RCPP) & IIP Quarterly Review Report, October 1993

# Table 5 - 4 : Construction Contracts

Nov 3, 93

| Command Area | Contract: Type | No. | Contractor | Priv. | Pub. | Del. Area | Msq Area | Start | End | Period | Award Price | Amount Spent | % Work Comp. | % Time Passed | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Saidia #1 UCA# 1,4&5 ( Zagazig) | Delivery | 1 | El Karakat El Massna Co | | x | 2,604 | | 12/15/90 | 6/14/92 | 18 | 1,016,064 | 1,180,000 | 116% | 100% | Comp |
| | | 2 | Sharkia Co-Operative | | x | 5,446 | | 12/5/90 | 6/4/92 | 18 | 1,000,000 | 642,000 | 64% | 195% | |
| | | 5 | Mahmoud Moustafa Mortada | x | | | | 8/1/91 | 1/31/92 | 6 | 228,150 | 220,136 | 101% | 100% | Comp |
| | Mesqa | 3 | Sadek Taher UCA#1 | x | | | 1,190 | 3/5/91 | 9/4/92 | 18 | 1,326,257 | 748,000 | 90% | 178% | |
| | | 4 | Irrigation for Public Works, UCA#1 | | x | | 1,170 | 3/5/91 | 9/4/92 | 18 | 1,414,470 | 706,803 | 50% | 178% | |
| | | 6 | Moh Sayed Ahmed UCA#4 | x | | | 2,415 | 9/15/91 | 9/14/93 | 24 | 2,567,261 | 1,873,000 | 73% | 107% | |
| Jun-8-93 | | 7 | Moh Sayed Ahmed UCA#5 | x | | | 2,435 | 9/15/91 | 9/14/93 | 24 | 2,100,413 | 1,928,061 | 92% | 107% | |
| Sub-total | | | | 4 | 3 | 8,050 | 7,210 | 12% | | 12% | 9,652,614 | 7,308,000 | 76% | | 2 |
| Saidia #2 UCA# 2,3,6,7&8 ( Zagazig) | Delivery | 9 | Mahmoud Mortada UCA#6/7/8 | x | | 10 058 | | 11/1/92 | 4/30/94 | 18 | 1,477,360 | 562,330 | 60% | 67% | |
| | | 12 | H Abu Serie (Kemery #1&2 UCA#28 | x | | 7,500 | | 7/1/93 | 6/30/94 | 12 | 1,100,534 | 99,000 | 9% | 25% | |
| | | 15 | B/O on 9/1/93 Lined Pitching along Kemery Canal from km 5 to km 8 | | | | | | | | | | | | |
| | | | Ground Water Contract | | | | | | | | | | | | |
| | Mesqa | 8 | El Karakat El Massria Co (UCA#6) | | x | | 2,200 | 12/1/92 | 9/30/94 | 22 | 2,392,850 | 417,000 | 17% | 51% | |
| | | 10 | Noubaria UCA#7 R | | x | | 850 | 5/20/93 | 8/19/94 | 15 | 1,286,955 | 28,000 | 2% | 37% | |
| | | 11 | Egyptian Aqaria Company UCA#7 L | | x | | 1 130 | 7/15/93 | 1/14/95 | 18 | 1,487,175 | | 0% | 20% | |
| | | 13 | Egyptian Aqaria Company UCA#2 | | x | | 2,900 | 11/1/93 | 2/28/95 | 16 | 2,009,950 | | 0% | 1% | |
| | | 14 | Egyptian Aqaria Company UCA#3 | | x | | 3,900 | 11/1/93 | 6/30/95 | 20 | 3,027,350 | | 0% | 0% | |
| | | | Saidia Mesqas UCA 8-1 #2 (planned - 18 months Area 995 feddans) | | | | | | | | | | | | |
| | | | Saidia Mesqas UCA 8-2 #2 (planned - 18 months Area 1 200 feddans) | | | | | | | | | | | | |
| Jun-8-93 | | | Saidia Mesqas UCA 8-3 #2 (planned - 18 months Area 1 212 feddans) | | | | | | | | | | | | |
| Sub-total | | | | 2 | 5 | 17,558 | 10,980 | 19% | | 16% | 12,782,174 | 1,106,330 | 9% | | 0 |
| Saidia #3 | Delivery | 16 | B O on 11/17/93 (UCA 16&17) from XR Abu Shalabi(km 28 7 .0) to the end (km 44 200) Estimated LE1 000,000 (18 months) | | | | | | | | | | | | |
| | | | Main Delivery #2 (planned-18 months-estimated cost 1,300 000) | | | | | | | | | | | | |
| | | | Main Delivery #3 (planned-18 months-estimated cost 1,660 000) | | | | | | | | | | | | |
| | | | Main Delivery #4 (planned-18 months-estimated cost 1 325 000) | | | | | | | | | | | | |
| Sub-total | | | | 0 | 0 | 0 | 0 | 0% | | | 0 | 0 | | | 0 |
| Qahwagi (Tanta) | Delivery | 1 | Irrigation for Public Works | | x | 12 000 | | 12/15/90 | 12/14/92 | 24 | 891,290 | 785,000 | 38% | 144% | |
| | | 6 | Irr Co for WKS (Elatwa PS) | | x | | Bids were d | 9/20/93 | 9/19/95 | 24 | 3,675,720 | | | | |
| | Mesqa | 2 | Irrigation for Public Works | | x | | 1,100 | 3/15/91 | 3/24/92 | 13 | 637,400 | 425,400 | 67% | 100% | Comp |
| | | 3 | Eng Essam El Bahlawan | x | | | 1,240 | 10/15/91 | 1/14/93 | 15 | 1,410,150 | 700,000 | 50% | 164% | |
| | | 4 | Eng Essam El Bahlawan | x | | | 2,000 | 1/25/92 | 7/24/93 | 18 | 1,710,900 | 466,000 | 27% | 119% | |
| | | 5 | El Karakat El Massna Co | | x | | 1 293 | 3/15/92 | 5/14/93 | 14 | 1,100,600 | 415,000 | 38% | 141% | |
| | | | Qahwagi Mesqas (was designed but hold for farmer concurrence) | | | | | | | | | | | | |
| Mar-31-93 | | | Qahwagi Mesqas (was designed but hold for farmer concurrence) | | | | | | | | | | | | |
| Sub-total | | | | 2 | 4 | 12,000 | 5,633 | 10% | | 12% | 9,426,060 | 2,791,400 | 30% | | 1 |
| Bahr Saidi (Tanta) | Delivery | 1 | El Karakat El Massria Co. (Qassabi) | | x | 12,740 | | 11/20/91 | 2/19/93 | 15 | 858,950 | 953,900 | 111% | 100% | Comp |
| | | 6 | Ahmed El Kilany (El Nahal) | x | | 4 740 | | 1/15/93 | 7/14/94 | 18 | 541,700 | 299,000 | 55% | 54% | |
| | | 10 | Mohamed El Gharib (El Sakhawi) | x | | 6 020 | | 8/1/93 | 1/31/95 | 18 | 788,488 | | 0% | 17% | |
| | | 14 | B/O on 11/16/93 (Area #5&6) along Abdel Rahman and El Ziny and branches (18 months costing 1,300,000) | | | | | | | | | | | | |
| | Mesqa | 2 | El Karakat El Massna Co UCA#1 | | x | | 2 339 | 8/15/92 | 2/14/94 | 18 | 2,339,300 | 972,000 | 42% | 81% | |
| | | 3 | Egyptian Aqaria Company UCA#2 | | x | | 1 890 | 11/1/92 | 1/31/94 | 15 | 2,170,820 | 116,000 | 5% | 81% | |
| | | 4 | Egyptian Aqaria Company UCA#3 | | x | | 870 | 12/1/92 | 9/30/93 | 10 | 1,095,732 | | 0% | 111% | |
| | | 5 | Unico Co for Engineering UCA#4 | x | | | 1 541 | 12/1/92 | 1/31/94 | 14 | 1,671,055 | 304,000 | 18% | 79% | |
| | | 7 | Noubaria (UCA#8 El Nahal) | | x | | 2 067 | 7/15/93 | 7/14/95 | 24 | 1,823,850 | | 0% | 15% | |
| | | 8 | Abaco for Projects UCA#7 | x | | | 925 | 5/15/93 | 5/14/94 | 12 | 983,950 | | 0% | 47% | |
| | | 9 | Noubaria (UCA#8 Sheikh Ahmed) | | x | | 986 | 8/20/93 | 8/19/94 | 12 | 1,072,615 | | 0% | 21% | |
| | | 11 | Noubaria Co UCA#5 | | x | | 1,619 | 9/20/93 | 3/19/95 | 18 | 1,542,250 | | 0% | 8% | |
| | | 12 | B/O on 9/9/93 Umum El Sakhayi canal from 0 000 to km 3 000 (Area 1,918 feddans) | | | | | | | | | | | | |
| | | 13 | B/O on 9/29/93 Sakhawi Esat from 0 000 to 5 550 (Area 1,400 feddans) | | | | | | | | | | | | |
| | | | Sakhawi Esat D/S B El Saidai (Planned - Area 1,800 feddands) | | | | | | | | | | | | |
| | | 15 | B/O on 11/22/93 Along Abdel Rahman and Ewais Canals from 0 000 to the ends (1,700 feddans) | | | | | | | | | | | | |
| | | 16 | B/O on 11/24/93 Along Fadali Canal from 0 000 to the end (1,600 feddans) | | | | | | | | | | | | |
| Jul 6-93 | | | Ganabiet B El Saidai Mesqas (Planned - Area 1,700 feddans) | | | | | | | | | | | | |
| Sub-total | | | | 4 | 7 | 23,500 | 12,237 | 21% | | 18% | 14,888,710 | 2,644,900 | 18% | | 1 |

Source : Mabrouk's files, USAID/AGR/ILD, Cairo.

| Command Area | Contract: Type | No. | Contractor | Priv. | Pub. | Del. Area | Msq Area | Start | End | Period | Award Price | Amount Spent | % Work Comp. | % Time Passed | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Balaqtar ( Damanhur) | Delivery | 5 | Eng Ali Ahmed Nawar | x | | 3,362 | | 1/18/93 | 7/15/94 | 18 | 336,100 | 109,500 | 33% | 53% | |
| | Mesqa | 1 | Irrigation for Public Works | | x | | 1 487 | 4/1/91 | 9/22/92 | 18 | 1,890,434 | 1,365,000 | 72% | 176% | |
| | | 2 | El Karakat El Massna Co | | x | | 1 407 | 8/15/91 | 1/14/93 | 17 | 1,204,150 | 979,000 | 81% | 157% | |
| | | 3 | Plastic Pipes & Products (PPP) | x | | | 962 | 9/1/91 | 11/30/92 | 15 | 481,896 | 594,000 | 123% | 174% | Comp |
| | | 4 | El Karakat El Massna Co | | x | | 1 807 | 12/15/92 | 6/15/94 | 18 | 1,571,675 | | 0% | 59% | |
| | | | Designed, Hold on for farmers | | | | | | | 18 | | | | | |
| | | | Designed, Hold on for farmers | | | | | | | 12 | | | | | |
| | | | Not Designed | | | | | | | 18 | | | | | |
| Mar-8-93 | | | Not Designed | | | | | | | 18 | | | | | |
| Sub-total | | | | 2 | 3 | 3,362 | 5,663 | 10% | | 7% | 5,484,255 | 3,047,500 | 56% | | 1 |
| Qiman Arous ( Minya) | Delivery | 1 | Farouk Abou Baker | x | | 4 200 | | 1/1/91 | 4/30/92 | 16 | 1,104,811 | 1,093,000 | 100% | 100% | Comp |
| | | 5 | B/O on 4/20/93 Awarding Committee Stage. Qiman El Arous Irrigation Structures. Cost 339,000 | | | | | | | | | | | | |
| | | | Drainage Reuse Pump Station is planned (Waiting to recive bid documents model from shoubra - Esimated cost 600,000) | | | | | | | | | | | | |
| | | | Ground Water Contract is planned | | | | | | | | | | | | |
| | Mesqa | 2 | Irrigation for Public Works | | x | | 1 400 | 3/23/91 | 7/22/92 | 16 | 1,264,705 | 1,224,125 | 100% | 100% | Comp |
| | | 3 | Irrigation for Public Works | | x | | 2 100 | 2/1/92 | 1/31/94 | 24 | 1,984,000 | 1,265,915 | 64% | 88% | |
| | | 4 | El Karakat El Massna Co | | x | | 1 100 | 12/15/92 | 12/14/93 | 12 | 1,261,250 | 550,000 | 44% | 89% | |
| Dec-2-92 | | | Planned ( Area1 500 feddans) Under Design | | | | | | | | | | | | |
| Sub-total | | | | 1 | 3 | 4,200 | 4,600 | 8% | | 7% | 5,614,766 | 4,133,040 | 74% | | 2 |
| Bahr El Gharak | Mesqa | 1 | Egyptian Agaria Company | | x | | 290 | 8/7/93 | 6/6/94 | 10 | 416,050 | | 0% | 29% | |
| Oct-3-93 | | | (Qourmoni km 3 300) off B. Ghark Canal | | | | | | | | | | | | |
| Sub-total | | | | 0 | 1 | 0 | 290 | 0% | | 1% | 416,050 | 0 | 0% | | 0 |
| Beni Ebied (Minya) | Delivery | 3 | Mortagi Mohamed Kamel | x | | 5 000 | | 9/4/91 | 9/3/93 | 24 | 2,345,775 | 559,000 | 24% | 108% | |
| | Mesqa | 1 | El Karakat El Massna Co | | x | | 1 965 | 8/1/91 | 6/20/93 | 23 | 1,517,340 | 708,000 | 71% | 120% | |
| Apr-21-93 | | 2 | El Karakat El Massna Co | | x | | 2 385 | 8/1/91 | 6/20/93 | 23 | 1,875,180 | 1,218,000 | 91% | 120% | |
| Sub-total | | | | 1 | 2 | 5,000 | 4,350 | 7% | | 7% | 5,738,295 | 2,485,000 | 43% | | 0 |
| Ashruba (Minya) | Delivery | 3 | Egyptian Agaria Company | | x | 4 000 | | 3/1/93 | 8/31/94 | 18 | 1,729,640 | 93,000 | 5% | 45% | |
| | Mesqa | 1 | Farouk Abou Baker | x | | | 1,360 | 3/1/93 | 8/31/94 | 18 | 1,539,000 | 389,000 | 23% | 45% | |
| Apr-21-93 | | 2 | El Karakat El Massna Co | | x | | 2,400 | 3/1/93 | 8/31/94 | 18 | 2,902,680 | 49,000 | 2% | 45% | |
| Sub-total | | | | 1 | 2 | 4,000 | 3,760 | 6% | | 8% | 6,171,320 | 531,000 | 9% | | 0 |
| Mantut (Minya) | Delivery | 3 | B/O on 8/17/93 Mantut#1 from 0.000 to 9.700 (Area 5,100 feddans 24 months-Est cost 3 000 000) | | | | | | | | | | | | |
| | | 4 | B/O on 8/17/93 Mantut#2 from 9.700 to 20.615 end (Area 6 800 feddans-24 months-Est cost 3,000,000) | | | | | | | | | | | | |
| | Mesqa | 1 | Egptian Arab Co (UCA#1&2) | | x | | 2,108 | 8/1/93 | 2/15/95 | 19 | 2,508,000 | | | | |
| | | 2 | B/O on 7/26/93 (UCA #3&4) Area 2,742 feddans at estimated cost of 3,880,000 | | | | | | | | | | | | |
| | | 5 | B/O on 11/29/93 (UCA #5&6) Area 3 141 feddans at estimated cost of 3,500,000 | | | | | | | | | | | | |
| | | 6 | B/O on 11/29/93 (UCA #7&8) Area 2,503 feddans at estimated cost of 3,200,000 | | | | | | | | | | | | |
| Sub-total | | | | 0 | 1 | 0 | 2,108 | 4% | | 3% | 2,508,000 | 0 | 0% | | 0 |
| Iqal/Shamia (Minya) | Delivery | | Delivery #1 (Planned - 18 months) | | | | | | | | | | | | |
| | | | Delivery #2 (Planned - 18 months) | | | | | | | | | | | | |
| | | | Delivery #3 (Planned - 18 months) | | | | | | | | | | | | |
| | Mesqa | 1 | B/O on 11/29/93 ( Area is 290 feddans) | | | | | | | | | | | | |
| Sub-total | | | | 0 | 0 | 0 | 0 | 0% | | 0% | 0 | 0 | - | | 0 |
| Herz/Numania (Minya) | Mesqa | 1 | Noshy | | x | | 3,310 | | | 0 | 3,635,000 | | | | |
| Sub-total | | | | 0 | 1 | 0 | 3,310 | | | 5% | 3,635,000 | 0 | | | 0 |

Source : Mabrouk's files, USAID/AGR/ILD, Cairo.

| Command Area | Type | No. | Contractor | Priv. | Pub. | Del. Area | Msq Area | Start | End | Period | Award Price | Amount Spent | % Work Comp. | % Time Passed | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Khore Sahel ( Esna) | Delivery | 1 | Saber Moustafa Mashali | x | | | | 10/1/93 | 5/31/94 | 8 | 348,680 | | | | |
| | | | Main Delivery #2 Planned-12 months | | | | | | | | | | | | |
| | Mesqa | | B/O on 8/18/93 (215 feddans)-12 months | | | | | | | | | | | | |
| | | | B/O on 9/5/93 (343 feddans)-12 months | | | | | | | | | | | | |
| | | | Planned - 12 months In Future (Est Cost LE 500,000) | | | | | | | | | | | | |
| Sub-total | | | | 1 | 0 | 0 | 0 | 0% | | 0% | 348,680 | 0 | | | 0 |
| Abbaddi ( Esna) | Delivery | 1 | Farouk Moh Moustafa (Ganabies) | x | | 5,000 | | 11/20/91 | 5/19/93 | 18 | 854,000 | 603,000 | 71% | 100% | Comp |
| | | 2 | Farouk Moh Moustafa (Lining PS#4) | x | | | | 11/15/91 | 5/14/93 | 18 | 357,000 | 356,000 | 100% | 100% | Comp |
| | | 3 | Nasr El Dien Mitwally | x | | | | 12/15/92 | 8/14/93 | 8 | 97,000 | 123,179 | 127% | 130% | Comp |
| | | 4 | Farouk Moh Moustafa | x | | | | 12/1/92 | 7/31/93 | 8 | 202,200 | 203,498 | 101% | 100% | Comp |
| | | 6 | Ghanem Hilaly & Terafy (Abu Tara) | x | | | | 1/15/93 | 9/14/93 | 8 | 429,962 | 383,680 | 89% | 100% | Comp |
| | | 7 | Aswan National Company (M.L) | x | | | | 2/1/93 | 9/30/93 | 8 | 237,820 | 294,520 | 124% | 100% | Comp |
| | | 8 | Farouk Moh Moustafa (Essalam) | x | | | | 2/1/93 | 9/30/93 | 8 | 339,000 | 39,400 | 12% | 114% | |
| | | 9 | Rizk Allah Zikry & Partner (D) | x | | | | 2/17/93 | 10/16/93 | 8 | 308,759 | 173,000 | 56% | 100% | Comp |
| | | 10 | A Motaleb Hassanien Lining PS 1-2 | x | | | | 8/1/93 | 3/31/94 | 8 | 1,130,865 | 165,200 | 15% | 33% | |
| | | 11 | El Nouby Orabi (Lining PS 2-3) | x | | | | 8/1/93 | 1/31/94 | 6 | 732,648 | | 0% | 52% | |
| | | 13 | Advertised (Abbadi/Raddissia Completion) | | | | | | | | | | | | |
| | | | Lining Abbadi PS 3-4 | | | | | | | | | | | | |
| | | | Pumps, new and reahabilitation | | | | | | | | | | | | |
| | | | F-G-H Canal, Bid Open should have been on December 16 1992 (Deferred until a decision is taken as to proceed construction of G#3 or not) | | | | | | | | | | | | |
| | Mesqa | 5 | Farouk Moh Moustafa | x | | | 684 | 2/1/93 | 9/30/93 | 8 | 849,015 | 226,800 | 27% | 114% | |
| | | 12 | Noubana Co | | x | | 1,088 | 11/1/93 | 10/31/94 | 12 | 2,000,000 | | 0% | 1% | |
| Feb-8-93 | | 14 | Advertised ( 927 feddans) - 12 months | | | | | | | | | | | | |
| Sub-total | | | | 11 | 1 | 5,000 | 1,772 | 3% | | 9% | 7,538,269 | 2,568,277 | 34% | | 7 |
| Grand-total | | | | 29 | 32 | 82,670 | 58,603 | 100% | | 100% | 80,569,193 | 26,615,447 | 33% | | 14 |
| Planned 93/94 | | | | 104 | | | 97,164 | | | | 150,000,000 | 150,000,000 | | | |
| LEFT | | | | 43 | | | 38,561 | | | | 69,430,807 | 123,384,553 | | | |

*Main Delivery = 25* LE *22,132,516* *27%*
*Mesqa = 36* LE *58,436,677* *73%*
*Completed = 14*
*Under Awarding = 18*
*Under Designing = 25*

| | No. | Amount | Area (Fed) |
|---|---|---|---|
| *Private Sector* | *29* | *27,600,748* | *23,174* |
| | *48%* | *34%* | *40%* |
| *Public Sector* | *32* | *52,968,445* | *35,429* |
| | *52%* | *66%* | *60%* |

Source : Mabrouk's files, USAID/AGR/LD, Cairo.

## Table 5 - 5 : Commands Summary

| Command | Target Area Under AWP 93/94 | No. Of Signed Contracts | | | UNDER Awarding | AREA Contracted | | | Total Contract Amount | Amount IIP Spent | % Spent Contr-acted | Comp Cont-racts |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Priv. | Pub | Total | | Delivery | Mesqa | %AWP | | | | |
| Saidia #1 | 7,160 | 4 | 3 | 7 | 0 | 8,050 | 7,210 | 101% | 9,652,614 | 7,308,000 | 76% | 2 |
| Saidia #2 | 15,300 | 2 | 5 | 7 | 1 | 17,558 | 10,980 | 72% | 12,782,174 | 1,106,330 | 9% | 0 |
| Saidia #3 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0% | 0 | 0 | | 0 |
| Qahwagi | 6,900 | 2 | 4 | 6 | 0 | 12,000 | 5,633 | 82% | 9,426,060 | 2,791,400 | 30% | 1 |
| B. El Saidi | 26,666 | 4 | 7 | 11 | 5 | 23,500 | 12,237 | 46% | 14,888,710 | 2,644,900 | 18% | 1 |
| Balaqtar | 11,484 | 2 | 3 | 5 | 0 | 3,362 | 5,663 | 49% | 5,484,255 | 3,047,500 | 56% | 1 |
| Qiman | 6,200 | 1 | 3 | 4 | 1 | 4,200 | 4,600 | 74% | 5,614,766 | 4,133,040 | 74% | 2 |
| B. El Gharaq | 290 | 0 | 1 | 1 | 0 | 0 | 290 | 100% | 416,050 | 0 | | 0 |
| Beni Ebied | 4,350 | 1 | 2 | 3 | 0 | 5,000 | 4,350 | 100% | 5,738,295 | 2,485,000 | 41% | 0 |
| Ashruba | 3,760 | 1 | 2 | 3 | 0 | 4,000 | 3,760 | 100% | 6,171,320 | 531,000 | 9% | 0 |
| Mantut | 10,554 | 0 | 1 | 1 | 5 | 0 | 2,108 | 20% | 2,508,000 | 0 | 0% | 0 |
| Iqal/Shamia | 400 | 0 | 0 | 0 | 1 | 0 | 0 | 0% | 0 | 0 | | 0 |
| Khore Sahel | 1,100 | 1 | 0 | 1 | 2 | 0 | 0 | 0% | 348,680 | 0 | | 0 |
| Abbadi | 3,000 | 11 | 1 | 12 | 2 | 5,000 | 1,772 | 59% | 7,538,269 | 2,568,277 | 34% | 7 |
| TOTAL | 97,164 | 29 | 32 | 61 | 18 | 82,670 | 58,603 | 60% | 80,569,193 | 26,615,447 | 33% | 14 |

## Table 5 -6 : Directorates Summary

| Directorate | Target Area Under AWP 93/94 | No. Of Signed Contracts | | | UNDER Awarding | AREA Contracted | | | Total Contract Amount | Amount IIP Spent | % Spent Contr-acted | Comp Cont-racts |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Priv | Pub | Total | | Delivery | Mesqa | %AWP | | | | |
| Zagazig | 22,460 | 6 | 8 | 14 | 2 | 25,608 | 18,190 | 81% | 22,434,788 | 8,414,330 | 38% | 2 |
| Tanta | 33,566 | 6 | 11 | 17 | 5 | 35,500 | 17,870 | 53% | 24,314,770 | 5,436,300 | 22% | 2 |
| Damanhur | 11,484 | 2 | 3 | 5 | 0 | 3,362 | 5,663 | 49% | 5,484,255 | 3,047,500 | 56% | 1 |
| El Minya | 25,554 | 3 | 9 | 12 | 7 | 13,200 | 15,108 | 59% | 20,448,431 | 7,149,040 | 35% | 2 |
| Esna | 4,100 | 12 | 1 | 13 | 4 | 5,000 | 1,772 | 43% | 7,886,949 | 2,568,277 | 33% | 7 |
| TOTAL | 97,164 | 29 | 32 | 61 | 18 | 82,670 | 58,603 | 60% | 80,569,193 | 26,615,447 | 33% | 14 |



Source : Mabrouk's files, USAID/AGR/ILD, Cairo.

## Table 5 - 7 : IIP - MESQA IMPROVEMENT COST

| Command Area | Contract | | | | | | | Average Cost | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. | Contractor | Type | No. Meskas | Area | Length Kms | Award Price | LE/Meska | LE/Feddan | LE/Meter |
| Saidia #1 | 1 | Sadek Taher | L/P/J | 22 | 1,190 | 13 | 1,326,257 | 60,284 | 1,115 | 102 |
| | 2 | Irrigation Co | L/P/J | 7 | 1,170 | 13 | 1,414,470 | 202,067 | 1,209 | 109 |
| | 3 | Moh. Sayed. | P/J | 43 | 2,415 | 30 | 2,567,261 | 59,704 | 1,063 | 86 |
| | 4 | Moh. Sayed. | P/J | 44 | 2,435 | 27 | 2,100,413 | 47,737 | 863 | 78 |
| Subtotal/Average | 4 | | | 116 | 7,210 | 83 | 7,408,400 | 63,866 | 1,028 | 89 |
| Saidia #2 | 1 | El Karakat | L/P/J | 30 | 2,200 | | 2,392,850 | 79,762 | 1,088 | |
| | 2 | Noubaria | L/P/J | 14 | 850 | | 1,286,955 | 91,925 | 1,514 | |
| | 3 | Aqaria | L/P/J | 19 | 1,130 | | 1,487,175 | 78,272 | 1,316 | |
| | 4 | Aqaria | L/P/J | | 2,900 | | 2,009,950 | | 693 | |
| | 5 | Aqaria | L/P/J | | 3,900 | | 3,027,350 | | 776 | |
| Subtotal/Average | 5 | | | 63 | 10,980 | 0 | 10,204,280 | 161,973 | 929 | |
| Qahwagi | 1 | Irrigation Co | P/J | 12 | 1,100 | 11 | 637,400 | 53,117 | 579 | 58 |
| | 2 | El Bahlawan | P/J | 16 | 1,240 | 16 | 1,410,150 | 88,134 | 1,137 | 88 |
| | 3 | El Bahlawan | P/J | 32 | 2,000 | 23 | 1,710,900 | 53,466 | 855 | 74 |
| | 4 | El Karakat. | P/J | 18 | 1,293 | 15 | 1,100,600 | 61,144. | 851 | 73 |
| Subtotal/Average | 4 | | | 78 | 5,633 | 65 | 4,859,050 | 62,296 | 863 | 75 |
| B. El Saidi | 1 | El Karakat | P/J | 28 | 2,339 | 28 | 2,339,300 | 83,546 | 1,000 | 84 |
| | 2 | Aqaria | P/J | 31 | 1,890 | 27 | 2,170,820 | 70,026 | 1,149 | 80 |
| | 3 | Aqaria | P/J | 11 | 870 | 11 | 1,095,732 | 99,612 | 1,259 | 100 |
| | 4 | Unico | P/J | 19 | 1,541 | 17 | 1,671,055 | 87,950 | 1,084 | 98 |
| | 5 | Noubaria | P/J | 24 | 2,067 | 16 | 1,823,850 | 75,994 | 882 | 114 |
| | 6 | Abaco | P/J | 12 | 925 | 8 | 983,950 | 81,996 | 1,064 | 123 |
| | 7 | Noubaria | P/J | 15 | 986 | 11 | 1,072,600 | 71,507 | 1,088 | 98 |
| | 8 | Noubaria | P/J | 29 | 1,619 | 14 | 1,542,250 | 53,181 | 953 | 110 |
| Subtotal/Average | 8 | | | 169 | 12,237 | 132 | 12,699,557 | 75,145 | 1,038 | 96 |
| Balaqtar | 1 | Irrigation Co | J | 10 | 1,487 | 14 | 1,890,434 | 189,043 | 1,271 | 135 |
| | 2 | El Karakat | J | 16 | 1,407 | 13 | 1,204,150 | 75,259 | 856 | 93 |
| | 3 | PPP | Pipeline | 10 | 962 | 8 | 481,896 | 48,190 | 501 | 64 |
| | 4 | El Karakat | P/J | 19 | 1,807 | 16 | 1,571,675 | 82,720 | 870 | 98 |
| Subtotal/Average | 4 | | | 55 | 5,663 | 51 | 5,148,155 | 93,603 | 909 | 102 |
| Qiman Arous | 1 | Irrigation Co. | P/J | 27 | 1,400 | 19 | 1,264,705 | 46,841 | 903 | 67 |
| | 2 | Irrigation Co. | P/J | 35 | 2,100 | 25 | 1,984,000 | 56,686 | 945 | 78 |
| | 3 | El Karakat | P/J | 21 | 1,100 | 15 | 1,261,250 | 60,060 | 1,147 | 84 |
| Subtotal/Average | 3 | | | 83 | 4,600 | 59 | 4,509,955 | 54,337 | 980 | 76 |
| Bahr El Gharak | 1 | Aqaria | P | 1 | 290 | 1 | 416,050 | 416,050 | 1,435 | 416 |
| Subtotal/Average | 1 | | | 1 | 290 | 1 | 416,050 | 416,050 | 1,435 | 416 |
| Beni Ebied | 1 | El Karakat. | P/J | 31 | 1,965 | 19 | 1,517,340 | 48,946 | 772 | 80 |
| | 2 | El Karakat | P/J | 33 | 2,385 | 19 | 1,875,180 | 56,824 | 786 | 99 |
| Subtotal/Average | 2 | | | 64 | 4,350 | 38 | 3,392,520 | 53,008 | 780 | 89 |
| Ashruba | 1 | Farouk Baker | P/J | 27 | 1,360 | 15 | 1,539,000 | 57,000 | 1,132 | 100 |
| | 2 | El Karakat | P/J | 43 | 2,400 | 26 | 2,902,680 | 67,504 | 1,209 | 110 |
| Subtotal/Average | 2 | | | 70 | 3,760 | 42 | 4,441,680 | 63,453 | 1,181 | 106 |
| Mantut | 1 | Egyp Arab Co | P/J | | 2,108 | | 2,508,000 | | 1,190 | |
| Subtotal/Average | 1 | | | 0 | 2,108 | 0 | 2,508,000 | | 1,190 | |
| Abbadi | 1 | Farouk | P | 6 | 684 | 16 | 849,015 | 141,503 | 1,241 | 53 |
| | 2 | Noubaria | P | 7 | 1,088 | | 2,000,000 | 285,714 | 1,838 | |
| Subtotal/Average | 2 | | | 13 | 1,772 | 16 | 2,849,015 | 219,155 | 1,608 | 178 |
| Herz /Numania | 1 | | P/J | 97 | 3,310 | 63 | 3,635,000 | 37,474 | 1,098 | 58 |
| Subtotal/Average | 1 | | | 97 | 3,310 | 63 | 3,635,000 | 37,474 | 1,098 | 58 |
| Grand total/Average | 37 | | | 809 | 61,913 | 550 | 62,071,662 | 76,726 | 1,003 | 113 |

N.B.

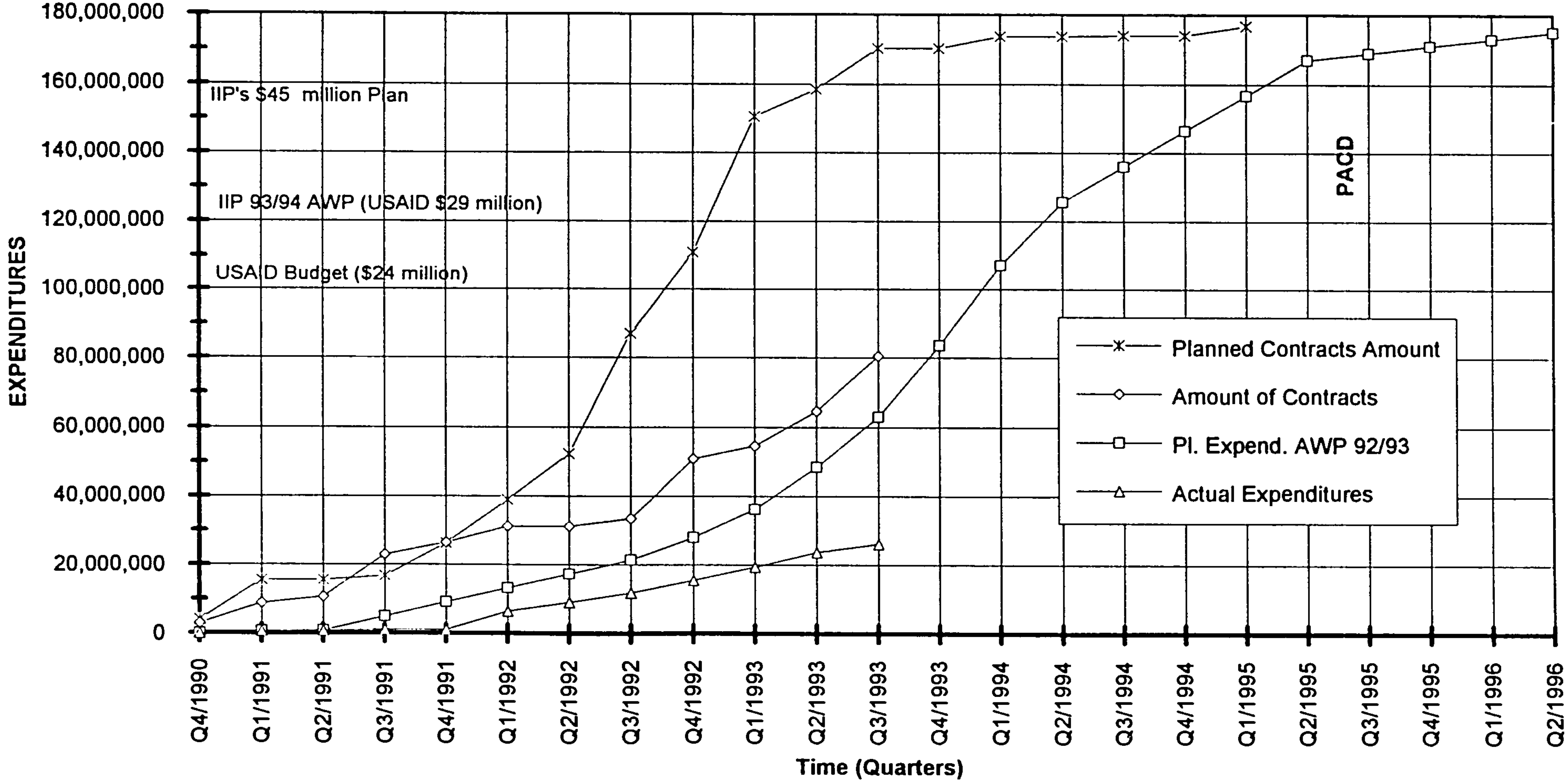
*Average Mesqa Length (ms):- 679*

*Average Mesqa Area (Fed):- 77*

Source Mabrouk's files USAID/AGR/ILD Cairo.

**Figure 5 - 1 : Construction Contracts**

**Projected and Actual Expenditures**

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Source : Mabrouk's files. USAID/AGR/ILD Cairo.

# ANNEX 6

## Institutional Capacity

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# ANNEX 6

## Institutional Capacity

### A. Introduction

The purpose of this annex is to provide detailed findings pertaining to the evaluation team's charge to "assess progress in the development of the institutional capacity of the Ministry of Public Works and Water Resources (MPWWR) to continue irrigation improvement activities as envisioned under the Irrigation Improvement Project (IIP) with limited technical assistance". Given the restricted nature of this evaluation, a comprehensive organizational analysis of the MPWWR's capacity to carry on IIP functions is beyond the scope of the assignment. What will be done is to focus on the basic organizational questions that have been asked regarding staffing and training. What should be noted is that these two functions are only particular aspects of a much broader evaluation which needs to be conducted to truly answer the above mentioned charge. This annex will address that larger evaluation issue in its examination of the specific points of staffing and training. Before we can properly look at staffing and training, the context surrounding IIP will be briefly described.

### B. Organizational Context

A central directorate for the Regional Irrigation Improvement Project (RIIP) was created by Ministerial Decree Number 231 (1984) in the Horizontal Expansion and Improvement Projects Sector in the Department of Irrigation within the MPWWR. The Regional Irrigation Improvement Project's name was changed to the Irrigation Improvement Project (IIP) in 1989 by Ministerial Decree Number 53. Appendix 6-1 presents an organizational chart of the MPWWR to show where in the Ministry IIP is located. At this time there is a proposed decree being evaluated to make IIP a separate authority within the Ministry. Establishing IIP as an authority would place the organization on the same level as the other authorities in the Ministry and thereby providing the organization a different status than it now possesses. The issue of IIP attaining the status of an authority will be further discussed.

The overall goal of the Ministry regarding irrigation is to improve the control of Nile waters for all uses and particularly their optimal allocation to and within agriculture as a means of helping production and productivity. The basic approach of IIP is to integrate the rehabilitation and improvement of the irrigation delivery system infrastructure with improvement of the farm delivery and its management practices. The major objectives of IIP are:



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- to increase agricultural output within the improved systems;

- to conserve water for use in expanding agriculture;

- to improve equity among farmers;

To achieve these objectives, IIP will perform a combination of improvements which include the following:

- installation of measuring and control devices on mains and branches;

- implementation of continuous flow in distributaries;

- mesqa improvements, such as reconstruction to proper cross-sections, lining to reduce seepage losses, installing turnouts and check structures, and installing low pressure pipes where slopes are very flat;

- land leveling, whether of the precision land leveling type or by less precise means;

- advisory services that integrate inputs from agents of the MPWWR and the Ministry of Agriculture (MOA) to improve irrigation and agricultural practices, organize water users associations (WUA), and create an effective Irrigation Advisory Service (IAS).

In order to achieve its objectives and perform the activities to which it has been charged, an organization has been established with offices in Cairo (the IIP headquarters) and at the project sites. Appendix 6-1 shows the organizational structure for both the Cairo office and the field offices. In addition to showing the organizational structure, Appendix 6-1 also presents the proposed staff make-up of each office that was envisioned at the beginning of the project. Two observations from this appendix which will form the basis of the evaluation on staffing are the numbers projected to effectively carry out IIP's mission and the initial interdisciplinary make up of the staff to appropriately perform the identified activities.

## C. IIP Staffing

### 1. Proposed Initial Staffing

The IIP, organizationally, is divided into four major functions:

- o planning, studies, and evaluation;
- o construction supervision;
- o design; and
- o the IAS.

The total number of professional staff members planned for the IIP main office to carry out those functions were forty-three, excluding administrative staff and consultants. Those forty-three staff members included fifteen civil engineers, nine computer operators, five draftsmen, three economists, two agronomists and one each of the following: pedologist, rural sociologist, sociologist, mechanical engineer, electrical engineer, geotechnician, translator, graphics expert, and video expert/librarian.

In the governorates, staff were assigned to perform the following major functions: feasibility studies, delivery system design, mesqa system design, construction supervision, and IAS operation. The planned professional staff requirements for the different functions at each project area were:

- o feasibility studies- civil engineer, pedologist, agronomist, agro-economist, and survey specialist;
- o delivery system design- civil engineers, mechanical engineers, and survey specialists;
- o mesqa system design- civil engineers;
- o construction supervision- civil engineers, mechanical engineers, and survey specialists; and
- o IAS operation-civil engineers, sociologists, and field agents.

Technicians and administrative personnel were included in all activity sectors. The number of staff was related to the size of the project area with the largest variance occurring with field agents and technicians.

Staffing was based on the expectations of completing 381,000 feddans by 1994. Basic work responsibilities for the IIP professional staff at the project sites is described in Appendix 6-2. The feasibility studies sector concerned itself with conducting research on socioeconomic conditions of the areas; water resource conditions such as groundwater tables and salinity situations; soil conditions; canal and drain alignments, profiles, and sections; cropping patterns and crop water requirements; and operation and maintenance procedures. For the design sectors, the staff must have knowledge and experience in water application procedures, layout and design of systems and structures for both the main and mesqa schemes, operation and maintenance procedures, contract specifications and bidding procedures, and supervision of contractors. Responsibilities of the construction sector include reviewing designs, drawing up bills of quantities, producing technical specifications for bids, calling for tenders, evaluating bids, and selecting and supervising contractors.

Appendix 6-3 provides detailed job responsibilities for the IAS staff including main office directors, the directorate director, the water delivery technical specialists, the water users technical specialist, the on-farm water use specialist, field supervisors, and field agents. The responsibilities generally fall into four major categories:

- performing technical tasks- estimating crop water requirements, making mesqa maps, providing on-farm water management information, etc.;
- conducting training programs;
- developing communication links among the farmers, the MPWWR, the Ministry of Agriculture (MOA), and private companies; and
- monitoring the work of IIP.

The actual staffing pattern for IIP is now quite different; not only in numbers but also in disciplinary make-up. Appendix 6-4 shows the staffing pattern for 1993-1994. The actual numbers are continually fluctuating but are based on the projected completion 92,000 feddans by the PACD. What will now be examined is the adequacy and appropriateness of the present staffing patterns.

### 2. Present Staffing Size

Table 6-1 summarizes the total number of staff positions which were planned for initially and which are presently identified. The total number of identified project staff positions for the present time is 509. In addition to the 486 marked in Table 6-1, there are 23 management positions which were not included because the planning documents did not separate such positions and therefore no comparison could be made. The tremendous difference in the total number of personnel probably represents the difference in the total number of feddans on which the project is presently working versus the planned rehabilitated area. What needs to be addressed now is are the number of staff members adequate for the present work load.

Table 6-1: Comparison of Number of IIP Staff Positions Identified at the Design of the Project With the Present Identified Positions

| Area | 1* | 2 | 3 | 4 | 5 | TOTAL |
|---|---|---|---|---|---|---|
| Main Office (Planned) | 11 | 11 | 6 | 7 | 8 | 43 |
| (Present) | 7 | 7 | 6 | 2 | 3 | 25 |
| Esna (Planned) | 8 | 20 | 12 | 11 | 33 | 84 |
| (Present) | 7 | 4 | 1 | 12 | 32 | 56 |
| Minya (Planned) | 30 | 40 | 46 | 44 | 233 | 393 |
| (Present) | 7 | 6 | 6 | 35 | 63 | 117 |
| Fayoum (Planned) | 16 | 25 | 32 | 23 | 75 | 171 |
| (Present) | 7 | 4 | 11 | 10 | 45 | 77 |
| Zagazig (Planned) | 20 | 35 | 40 | 29 | 97 | 221 |
| (Present) | 7 | 3 | 8 | 0 | 44 | 62 |
| Tanta (Planned) | 11 | 20 | 29 | 24 | 46 | 130 |
| (Present) | 8 | 4 | 11 | 46 | 37 | 106 |
| Damanhour (Planned) | 11 | 15 | 26 | 31 | 59 | 142 |
| (Present) | 24 | 0 | 4 | 15 | 0 | 43 |
| TOTAL (Planned) | 107 | 166 | 191 | 169 | 551 | 1184 |
| (Present) | 67 | 28 | 47 | 120 | 224 | 486 |

KEY: 1. Feasibility Studies; 2. Delivery Design; 3. Mesqa Design; 4. Construction; 5. IAS

If one looks only at the construction of mesqas, the argument can be made that the delays in completing the work are not principally due to a lack of staff but due to other factors.

However, when one contrasts the effective functioning of the IIP with the project's perspective to fulfill its mission, there is a lack of a consistent staff present to build a successful implementation entity.

Table 6-2 shows the actual number of staff personnel now on the project compared to the identified positions that the Project General Directors see as necessary to continue the Project's work (data taken from Appendix 4). What this table shows is that from the Project's point of view only 61.5 percent of the staff positions needed for 1993-1994 are filled. The largest deficiency is in the feasibility studies function where only 44.8 percent of the needed staff are on board. By contrast, the IAS function is the most complete with 74.6 percent of its positions filled.

The Project areas in the Delta are more deficient in personnel than the areas in middle and upper Egypt. When one looks at this data, one must view it from the perspective of the Project staff. The IIP leaders see this as a pilot project whose in-the-field rehabilitation work will progress to 92,000 completed feddans by the PACD. In addition, they see their mandate in terms of not only completing the originally planned 397,000 feddans, but also to rehabilitate the entire country. For instance, even though the feasibility studies for the existing project areas are complete, the 1992-1993 work plan states, "The duties of the feasibility studies staffs will *shift* (italics added).

They will continue to conduct studies, including necessary revisions and updating of the completed studies. They will be monitoring the implementation of the feasibility studies, to see that they are implemented according to the study plan. They will also assist in the monitoring of the effects of the improvements." Therefore, when one looks at the staffing adequacy of the feasibility studies function from this perspective, there is a need for more staff, especially in the area of monitoring. Similar arguments can be made for the other functions given the context of the project goals and objectives as the project is presently organized.

Table 6-2: Number of IIP Staff Positions Filled

| Area | | 1* | 2 | 3 | 4 | 5 | TOTAL |
|---|---|---|---|---|---|---|---|
| Main Office | (Positions) | 7 | 7 | 6 | 2 | 3 | 25 |
| | (Filled) | 7 | 7 | 6 | 2 | 3 | 25 |
| | (Percent) | 100 | 100 | 100 | 100 | 100 | 100 |
| Esna | (Positions) | 7 | 4 | 1 | 12 | 32 | 56 |
| | (Filled) | 1 | 0 | 0 | 8 | 27 | 36 |
| | (Percent) | 14.3 | 0 | 0 | 66.7 | 84.4 | 64.3 |
| Minya | (Positions) | 7 | 6 | 6 | 35 | 63 | 117 |
| | (Filled) | 2 | 3 | 3 | 15 | 49 | 72 |
| | (Percent) | 28.6 | 50.0 | 50.0 | 42.9 | 77.8 | 61.5 |
| Fayoum | (Positions) | 7 | 4 | 11 | 10 | 45 | 77 |
| | (Filled) | 1 | 1 | 3 | 5 | 44 | 54 |
| | (Percent) | 14.3 | 25.0 | 27.3 | 50.0 | 97.8 | 70.1 |
| Zagazig | (Positions) | 7 | 3 | 8 | 0 | 44 | 62 |
| | (Filled) | 1 | 2 | 7 | 0 | 23 | 33 |
| | (Percent) | 14.3 | 66.7 | 87.5 | - | 52.3 | 53.2 |
| Tanta | (Positions) | 8 | 4 | 11 | 46 | 37 | 106 |
| | (Filled) | 2 | 4 | 5 | 23 | 21 | 55 |
| | (Percent) | 25.0 | 100 | 45.5 | 50.0 | 56.8 | 51.9 |
| Daman-hour | (Positions) | 24 | 0 | 4 | 15 | 0 | 43 |
| | (Filled) | 16 | 0 | 0 | 8 | 0 | 24 |
| | (Percent) | 66.7 | - | 0.0 | 53.3 | - | 55.8 |
| TOTAL | (Positions) | 67 | 28 | 47 | 120 | 224 | 486 |
| | (Filled) | 30 | 17 | 24 | 61 | 167 | 299 |
| | (Percent) | 44.8 | 60.7 | 51.1 | 50.8 | 74.6 | 61.5 |

* KEY: 1. Feasibility Studies; 2. Delivery Design;
3. Mesqa Design; 4. Construction; 5. IAS



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Another issue regarding the adequacy of staff is the continual shifting and replacing of individuals within the IIP. While actual numbers may stay at a particular level, the adequacy of the staff is adversely affected when trained and experienced people are continually leaving to be replaced by new untrained individuals. This situation seems to be prevalent in IIP. Since January 1989, the IIP has had six directors. The number of IIP General Directors who have changed since the beginning are as follows: Minya (3); Fayoum (3); Esna (3); Zagazig (2); Tanta (2); Damanhour (4). The former Fayoum IIP Directorate has been abolished and the IIP work is now under the General Director of El-Minya, who himself is only recently appointed. To illustrate this situation even more, we will look at the IAS. Table 6-3 shows changes in the IAS staff from July 1989, when this function actually began operation.



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Table 6-3 : Changes In IAS Staff July 1989 to August 1993

| Directorate | Number of IAS Directors To Date | Number of IAS Engineers Transferred |
|---|---|---|
| Esna | 2 | 5 |
| Minya | 3 | 4 |
| Fayoum | 1 | 2 |
| Zagazig | 3 | 3 |
| Tanta | 3 | 4 |
| Damanhour | 1 | 4 |
| MAIN OFFICE | | |
| General Director | Never Filled | NA |
| Acting Gen. Director | 2 | NA |
| Director of Operations | 2 | NA |
| Director of Formation | 4 | NA |
| Engineers | NA | 3 |

Complete IAS staff turnover has occurred in Fayoum, Damanhour, and Tanta. One of the critical problems in this staff turnover pertains to individual agricultural engineers who are recruited from the MOA. By regulations and for their own career paths, they must return to the MOA after four years with IIP. In terms of staffing of field agents, the most stable area (Esna) has the following history (Table 6-4).

Even though the situation seems to be stabilizing, losing and adding even one agent every three months puts a lot of strain on a unit that has to spend additional resources and time in training an individual while the field work responsibilities are increasing. Also, effective work with the farmers need consistency in order to build a trusting relationship. This is adversely affected with continual turnover. Overall, individuals who come from the MOA as agricultural engineers or as field agents are caught in a situation where there is no stability and little consistency. These are the individuals who have tremendous responsibilities in working with a major facet of IIP, that of laboring with the farmers. Finally, of the twenty-seven IAS engineers and directors trained in the first course in June-July 1989 only seven are now with the IAS.

Table 6-4 : Staffing of Field Agents in Esna:
Number of Agents Per Quarter

| Quarter | 1989 | 1990 | 1991 | 1992 | 1993 |
|---|---|---|---|---|---|
| First | - | 14 | 12 | 19 | 17 |
| Second | - | 11 | 9 | 19 | 19 |
| Third | - | 11 | 10 | 19 | 18 |
| Fourth | 15 | 12 | 16 | 17 | - |

To summarize, from the perspective of the Ministry there is a shortage of staff professionals to even complete the work scheduled for the end of the PACD. The evaluation team concurs that the present staffing patterns in IIP are not sufficient to carry on the necessary tasks. In the last week of this evaluation, the team was informed that MPWWR has budgeted for the next fiscal year 40 new positions of agricultural engineers.

The issues raised with the IAS bring us to the other facet of staffing, that of the make-up of the IIP staff. This will now be discussed and then we will examine the more central issue of organizational appropriateness as it relates to staffing IIP.

3. Present Staffing Make-Up

In addition to the adequacy of staff in terms of numbers, an extremely important area of concern is the appropriateness of the individuals in performing the Project tasks. Appendix 4 also designates the number of staff identified by professional disciplines summarized in Table 6-5. This table only includes the professional disciplines and field supervisors/agents to illustrate the point pertaining to the interdisciplinary make-up of the staff. Managers, draftsmen, and technicians are not be part of this analysis.

Table 6-5: Number of IIP Staff Positions Filled Per Discipline

| Area | | 1* | 2 | 3 | 4 | 5 | TOTAL |
|---|---|---|---|---|---|---|---|
| Main Office | (Positions) | 12 | 2 | 0 | 1 | - | 15 |
| | (Filled) | 12 | 2 | 0 | 1 | - | 15 |
| | (Percent) | 100 | 100 | - | 100 | - | 100 |
| Esna | (Positions) | 18 | 2 | 2 | 2 | 22 | 46 |
| | (Filled) | 10 | 0 | 0 | 0 | 22 | 32 |
| | (Percent) | 55.6 | 0.0 | 0.0 | 0.0 | 100 | 69.6 |
| Minya | (Positions) | 35 | 1 | 1 | 1 | 53 | 91 |
| | (Filled) | 25 | 0 | 0 | 0 | 40 | 65 |
| | (Percent) | 71.4 | 0.0 | 0.0 | 0.0 | 75.5 | 71.4 |
| Fayoum | (Positions) | 24 | 2 | 2 | 1 | 34 | 63 |
| | (Filled) | 13 | 0 | 0 | 0 | 34 | 47 |
| | (Percent) | 54.2 | 0.0 | 0.0 | 0.0 | 100 | 74.6 |
| Zagazig | (Positions) | 18 | 1 | 1 | 1 | 36 | 57 |
| | (Filled) | 11 | 0 | 0 | 0 | 18 | 29 |
| | (Percent) | 61.1 | 0.0 | 0.0 | 0.0 | 50.0 | 50.9 |
| Tanta | (Positions) | 32 | 1 | 1 | 1 | 30 | 65 |
| | (Filled) | 10 | 1 | 0 | 0 | 19 | 30 |
| | (Percent) | 31.3 | 100 | 0.0 | 0.0 | 63.3 | 46.2 |
| Damanhour | (Positions) | 17 | 1 | 2 | 1 | 18 | 39 |
| | (Filled) | 8 | 0 | 0 | 0 | 11 | 19 |
| | (Percent) | 47.1 | 0.0 | 0.0 | 0.0 | 61.1 | 48.7 |



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| | | | | | | |
|---|---|---|---|---|---|---|
| TOTAL (Positions)<br>(Filled)<br>(Percent) | 156<br>89<br>57.1 | 10<br>3<br>30.0 | 9<br>0<br>0.0 | 8<br>1<br>12.5 | 193<br>144<br>74.6 | 376<br>237<br>63.0 |

* KEY: 1. Engineers; 2. Economists; 3. Pedologists;
4. Agronomists; 5. IAS Field Supervisors/Field Agents

As can be seen, the IIP has practically forsaken an interdisciplinary approach to their work. Outside of the field agents who comprise both agricultural engineers and technicians, of which the latter compose approximately 70+ percent, the staff is predominately civil engineers. The other disciplines are only represented on paper in a token way. There are no social scientists even identified despite the major work involved in organizing WUAs, conducting socio-economic studies, and the very urgent need to monitor the farmer organization work.

### 4. Organizational Appropriateness

As was initially stated, both staffing and training (which is to follow in the next section) are only singular aspects in evaluating the institutional capacity of IIP. From the previous discussion, if we look at IIP from the perspective of where the Ministry wants to go, there is indeed a shortage of personnel to continue the work effectively. More importantly, the disciplinary make-up of the present and future staffing needs demonstrates that IIP is not seriously thinking about carrying on the initial thrust of having an interdisciplinary organization to manage the rehabilitation of the nation's irrigation system. These two points plus other findings from discussions with IIP staff indicate that there is a serious organizational impediment to implementing the Project objectives as envisioned in the PP.

The evaluation team has been informed of many organizational problems that exist with IIP. These problems include the numbers of staff members, the inability to keep agricultural engineers from the MOA on the project, the constant shift of personnel, the highly centralized authority pattern of managing the project from Cairo, the lack of financial incentives for field personnel, the lack of operating funds for field equipment and vehicles, and so forth.

The team has also been told that once IIP becomes an authority, many of these problems will be solved. The issue of IIP becoming an authority is beyond the defined scope of this annex, but there is an important point that is related to this discussion. That point is there is no guarantee that becoming an authority will solve the above-mentioned issues because many of the problems are endemic to the organizational management patterns within the Ministry as a whole. Therefore, the accomplishments of the project as initially envisioned may not be totally dependent on IIP attaining authority status.



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The focus of improving IIP organizationally needs to begin internally. Given the fact that granting IIP authority status is politically stalemated at this time, other efforts should be initiated to look at how to improve the management of the organization. A first step is to conduct a detailed and comprehensive organizational evaluation of IIP. Many of the ideas associated with the rehabilitation effort such as interdisciplinary teamwork, WUAs, the IAS; were originated by non-Egyptian "experts". While the ideas are fundamentally sound, they have been introduced in the Egyptian circumstances under experimental conditions. The Egyptians who are responsible for implementing these ideas are doing so from limited experience and at times under opposition within the Ministry. Since this is a prototype project, different methods of irrigation delivery are being tried, but there has been no significant attempt to explore different organizational methods to manage and implement the new techniques associated with the physical improvements.

A technical assistance team of both American and Egyptian organizational development experts should be hired to do an organizational development analysis of IIP. This evaluation would be strictly limited to the management of IIP. The evaluation should focus on the following dimensions as a minimum :

- o the organizational environment of IIP;
- o the organizational culture of IIP; and
- o the organizational structure of IIP.

The organizational environment includes IIP's relationships with other organizations. What is the actual status of the authority decree, how would IIP be integrated within the MPWWR, how would it work with the MOA are only a few of the questions which need to be addressed. The purpose of this work would be to realistically understand how IIP is viewed within the Ministry and what constraints will be placed before it as it continues its work. Also, within this framework, one can look at the resource support IIP will have within the government.

The cultural aspect of this study would include the rules governing the different activities of the organization and the values, beliefs, and perceptions of the individuals in the IIP. Here is where issues such as decentralization of authority, privatization, relationships among disciplines, the true feelings about having an interdisciplinary team, etc. can be examined. Also, the evaluation team found that there really is not an IIP ethos. The IAS has developed one for the IAS, but it does not transfer to IIP. A key question which needs to be asked is to what extent is IIP considered a cohesive organization ?

In evaluating the structural component, one looks at positions of the organization and their ability to accomplish the goals of IIP. Other issues to be examined include decision-making procedures, communication networks, coordination of activities, organizational control, how the



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organization sustains itself, etc. Here one can look at conflict resolutions and the performance of organizational tasks.

Hopefully, through this evaluation improved organizational procedures can be identified and realistically implemented under the rubric of a demonstration project. The end of the TA should be an agreement by the Project director to experiment with suggested improvements. Also, this study should be able to shed light on how an authority can be effectively implemented, or if there is some another organizational form that can be implemented and still provide the legal and resource base needed to carry on IIP activities. To summarize, the findings on staffing are not surprising because there is an erroneous assumption that somehow an organization will evolve that will encapsulate the spirit of managing new technologies in an old bureaucratic environment.

## C. Training

### 1. Introduction

Training has been an integral part of the IIP from its inception. Over one thousand individuals have participated in some sort of training since 1989. Nineteen overseas courses have been provided for 121 IIP engineers and senior officials. In Egypt, an estimated 1600 engineers have been trained in 52 special courses related to IIP needs. An estimated 1400 WUA leaders and council members have been trained in different types of courses which cover irrigation scheduling, operation and maintenance, WUA finances and record keeping.

The questions which the evaluation team is asked to examine are : (1) have the administrative, managerial, and technical skills of project staff been adequately enhanced, and (2) is the training program effective and appropriate ? The overall question which needs to be examined is whether or not the training which has been conducted provided the means to further the progress of the Project. This question will be addressed by first looking at past training, a look at future training, and an assessment of the training program in the project.

### 2. Past Training Experience

Table 6-6 summarizes the number of courses and participants who have been exposed to some type of training from 1989 (the inception of the Project) to June 1993.



\\\9

Table 6-6: Summary of IIP Staff Training-
January 1989 to June 1993

| | Number of Courses | Number of Participants |
|---|---|---|
| On-Shore Courses | 31 | 983 |
| Off-Shore Courses | 13 | 82 |
| TOTAL | 44 | 1065 |

(Source: IIP Training Plan, July 1993)

First, we will look at the off-shore training program. Appendix 6-5 provides a list of off-shore training activities for all of IIP from 1984 when the contractor was the Consortium for International Development/Colorado State University (CID/CSU) to the present. Table 6-7 summarizes this appendix. The table breaks down the training activities for both project and non-project staff on both contracts. What must be understood is that this table refers to training opportunities. A number of individuals had more than one opportunity for off-shore training. The purpose for this table is to show the distribution of training chances for project and non-project participants as well as for participants who left IIP. This will give one indication of how off-shore training is directly benefitting IIP.

Table 6-7: IIP Participant Training

| Participant Status | | CID/CSU | MKE/LB |
|---|---|---|---|
| Not Directly Working With Project | Participants | 66 (54%) | 46 (33.6%) |
| | Person-Months | 59.5 (51.1%) | 34.7 (29.4%) |
| Worked With Project, but Left | Participants | 28 (23%) | 30 (21.9%) |
| | Person-Months | 29.3 (25.2%) | 24.9 (21.1%) |
| Still Working With Project | Participants | 28 (23%) | 61 (44.5%) |
| | Person-Months | 27.6 (23.7%) | 58.5 (49.5%) |
| TOTAL | Participants | 122 (100%) | 137 (100%) |
| | Person-Months | 116.4 (100%) | 118.1 (100%) |

For the CID/CSU period, there were few individuals assigned to IIP and much of the training budget went for training Ministry people on on-farm water management. The tours set up showed the relationship between improved delivery system and on-farm water management techniques. Another large block of training focused on the development of the Irrigation Advisory Service (IAS). The off-shore training for the MKE/LBII portion of the contract emphasized on-farm irrigation techniques, computer programs in design, design and management of local irrigation organizations and WUAs, irrigation systems planning, soil and water conservation management, and monitoring and evaluation.

During the MKE/LBII portion of the contract, one-third of the off-shore training went to non-project personnel. Of the ninety-one IIP personnel who received such training, thirty-four percent left the project for various reasons. When one compares this figure with the fifty percent attrition rate during the CID/CSU contract, there does seem to be more stability in the IIP organization, but that is still a large percentage of individuals lost for a developing organization. So while the content of training for off-shore programs is appropriate, much of the direct benefit is lost when one-third of the participants leave the project. In addition to the short-term training, two academic M.S. degree programs are being funded : one in hydraulics, and the other in irrigation and drainage.

The on-shore training for staff members covered the major functions of IIP operations : feasibility studies, delivery design, mesqa design, construction, and the IAS. Training was conducted to develop the following skills :

- computer programs;
- team building;
- English language;
- laboratory equipment and procedures;
- irrigation system planning;
- surveying;
- water measurement;
- drafting;
- mesqa design and maintenance;
- irrigation system hydraulics;
- soil-plant-water relationships;
- irrigation scheduling;
- irrigation system operation and maintenance;
- on-farm water management;
- organizing, training, and monitoring WUAs; and
- pump operation and maintenance.

In addition to training staff members, an extensive training program for farmer water users associations has evolved. Table 6-8 summarizes this aspect of IIP training.



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Table 6-8 : WUA Training

| Canal Command | Type | Number of Sessions | Participants per Session | Total Participants |
|---|---|---|---|---|
| Abbadi | Tour/Minya | 1 | 10 | 10 |
| Iqal Shamia | Tour/Minya | 1 | 50 | 50 |
| Herz Numania | Regular | 20 | 30 | 600 |
| Beni Ebied | Regular | 3 | 30 | 90 |
| Qiman Arus | Regular<br>Tour/Minya<br>Command Mtg. | 5<br>1<br>1 | 30<br>40<br>200 | 150<br>40<br>200 |
| Saidiyia | Regular<br>Tour/Minya<br>Tour | 3<br>1<br>1 | 15<br>20<br>60 | 45<br>20<br>60 |
| Qahwagi | Regular | 2 | 18 | 36 |
| Balaqtar | Regular<br>Tour/Minya | 2<br>3 | 20<br>20 | 40<br>60 |
| Total | | 44 | 543 | 1401 |

(Source: IIP Training Plan, July 1993)

The regular training program was a maximum three-day event which covered the following activities:

- o benefits of the new irrigation system;
- o WUAs' roles and responsibilities;
- o acquiring, purchasing, operating, and maintaining the mesqa pump;
- o irrigation scheduling along the mesqa;
- o maintenance of the new mesqa;

- developing, managing, and monitoring the WUA bank account;
- establishing basic WUA rules for operation and maintenance, finance, and management;
- establishing mesqa delivery schedules, maintenance plans, and budgets; and
- walk-through on mesqas for initiating design work.

To summarize, IIP has conducted an extensive training program. From the identified courses and from looking at the project accomplishments, there seems to be a good fit between the courses offered and the work activities needed to be completed. In addition, it should be noted that many of the tours offered to Senior Ministry officials who are not directly associated with the Project are also beneficial in terms of bringing a better understanding of Project objectives and concepts to a group of stake holders who may have influence on how IIP as an organization evolves.

### 3. Future Training Plans

Appendix 6-6 shows the planned training program for the Project up to the PACD. For off-shore training, 103 short term programs are scheduled and five M.S. degree programs (two of which are already in progress) are to be started. Programs are for design and management of irrigation systems, construction quality control, modeling of water delivery systems, evaluating irrigation system improvements, audio-visual programming, management of WUAs. In addition there will be a proposal made to fund a tour to Indonesia to look at their cost sharing program.

On-shore training for the staff will be scheduled for about 397 participants covering the areas of computer programming and maintenance, equipment operation and maintenance, testing and quality control of materials, design of micro irrigation systems, feasibility studies, on-farm water management, operation and maintenance of improved mesqas, developing WUA federations, management, and English language training. Training of WUA leaders is scheduled to be extended to an additional 2302 farmer leaders before the PACD.

The future plans rightfully show that training is still to be considered one of the Project's major activities. Given the nature of this multifaceted project and the expected increase of staff personnel, training needs to be on the forefront. What seems to be missing from future plans is a special need to train staff in monitoring and evaluation of on-farm water management and crop interaction.

4. Comments

Training has been given extensive support in the Project. Also, the type of training, for the most part, has addressed key activities which IIP has been conducting. Staff members in the field are continually asking for more training in particular activity-related skills. Therefore, training has been and will be in the future extremely important to the progress of IIP. Given the fact that training is so important, the Project should do more to institutionalize the process in the organization.

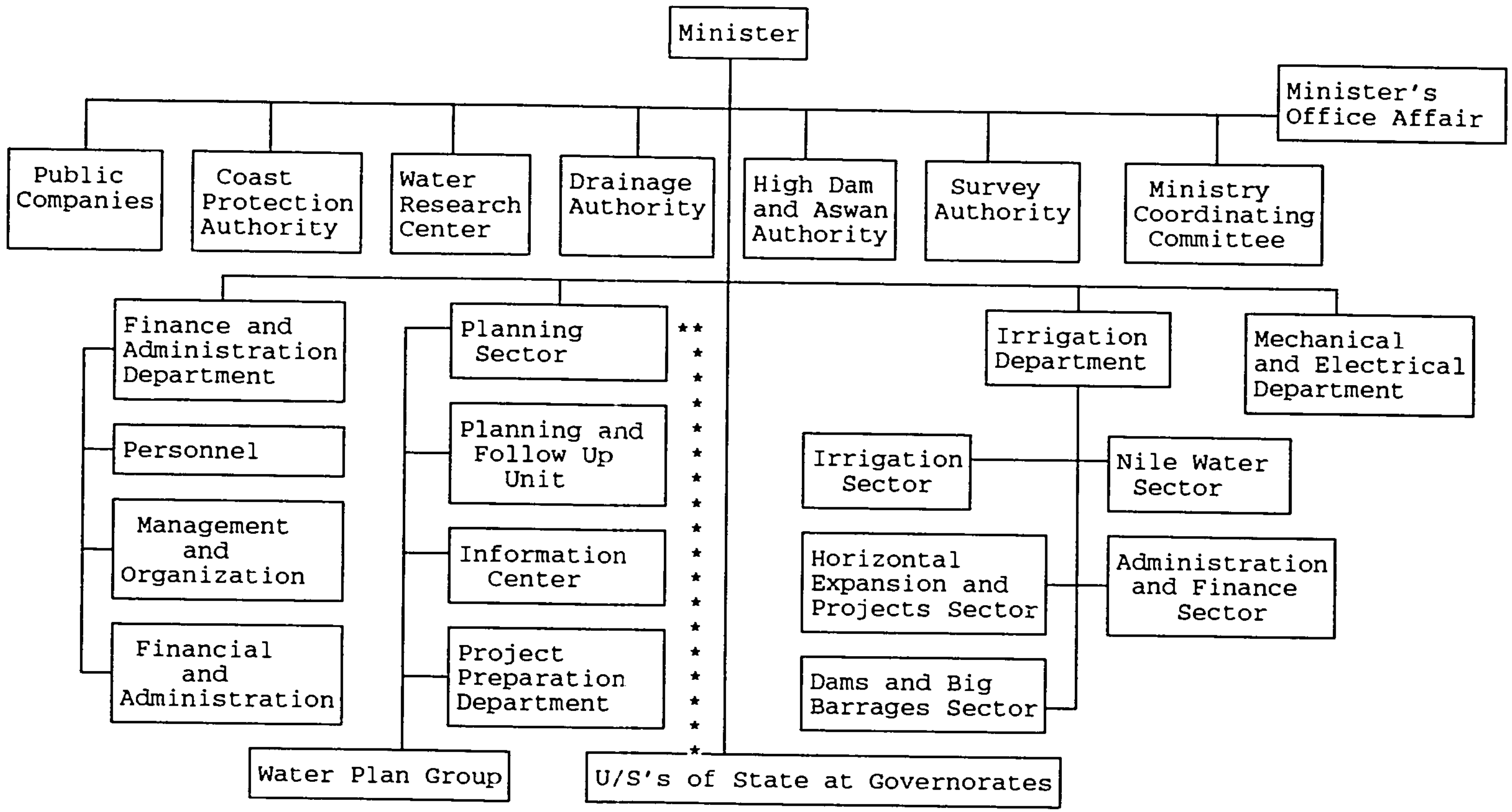
Institutionalizing the process means that there should be a training office in the Project that can facilitate and administer a truly large scale effort. The Project has made contact with the Ministry's training and support center, but meaningful output has not been forthcoming. There has been difficulty in having the training center develop relevant courses as identified by IIP. Also, the training methodology is focused on including university professors who come in and lecture and do not have the practical experience needed for project related courses. In fact, the training center has used IIP staff as trainers for other courses by the training center. This relationship should continue to be pursued and can be one of the items for the suggested organizational evaluation mentioned above. However, the Project should also examine the alternative to set up their own training office.

Another point, which is related, is that there needs to be a more systematic approach to train trainers. Discussions in the field bring up the point that field agents are waiting to be trained from Cairo. If the Project staff increases as it should, the small staff in Cairo doing the training will not be able to keep up with the demand. There are problems now regarding this point. Field agents are working in phases in which they have no training. This has been a major point of concern in our discussions. Again, this recommendation is related to the overall organizational evaluation which needs to be conducted. Training trainers in an applied situation and administering a program based on this principle is foreign to the existing organizational environment within the Ministry. By seriously developing such a structure and process, the very good programs that have already been taught can be diffused much faster to a much larger audience that needs the available information.

D. Conclusion

The questions regarding staffing and training demonstrate that a more significant concern needs to be raised. That concern is what is the proper organizational environment into which the rehabilitation of the irrigation system should be managed ? This question is beyond the scope of the present evaluation effort. However, efforts should be made to examine that concern in a way where the innovative field work can be effectively managed by an innovative organizational entity.

Figure 6-1 : Organization Chart of Ministry of Public Works and Water Resources



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2. Project Paper. Egypt Irrigation Management Systems Project: 263-0132.

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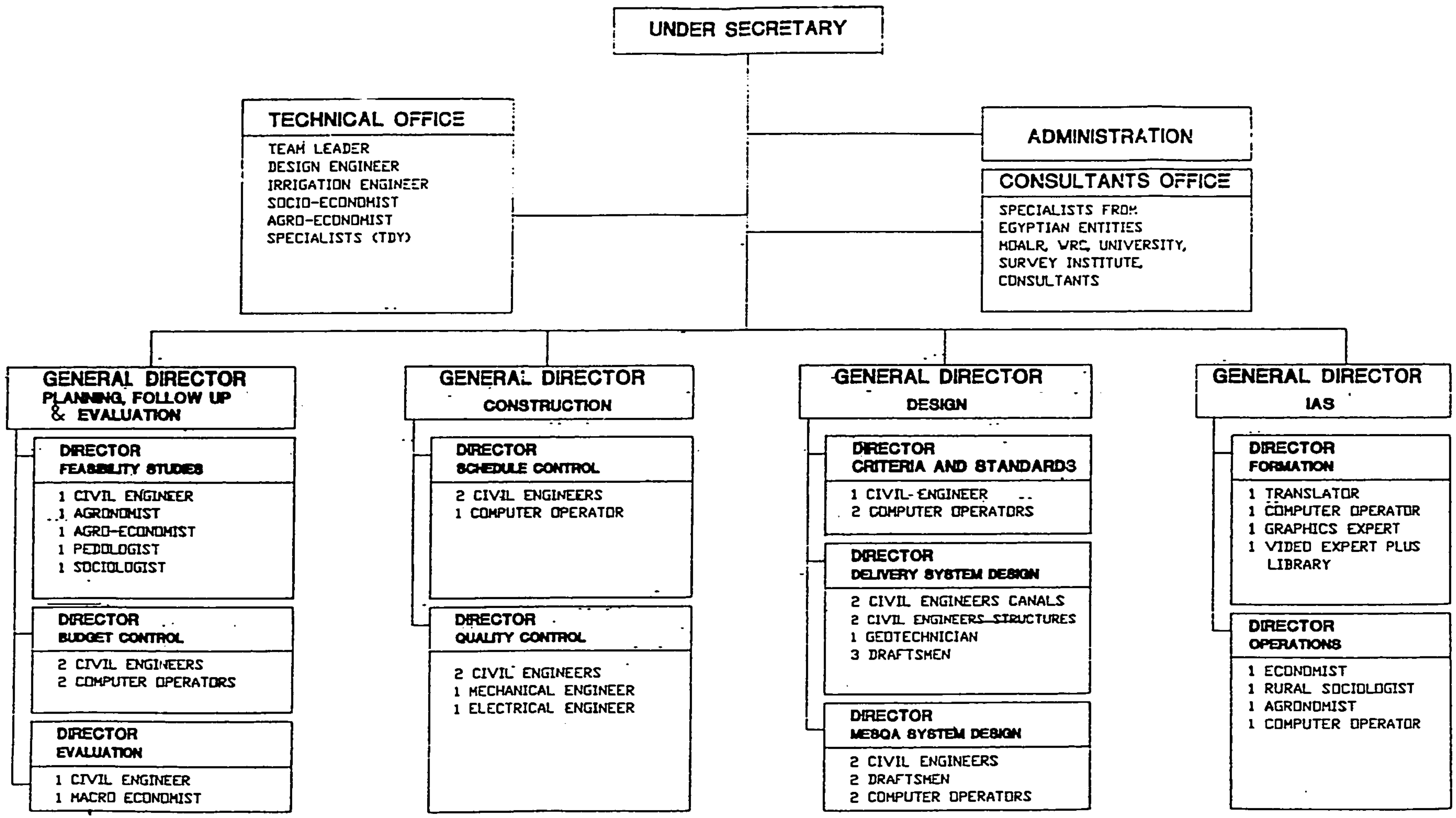
4. Lowdermilk, Max. "Impact of Staff Transfers On Building An Effective IAS and Sustainable WUAs in the IIP".

# APPENDIX 6-1


UNDER SECRETARY
TECHNICAL OFFICE
TEAM LEADER
DESIGN ENGINEER
IRRIGATION ENGINEER
SOCIO-ECONOMIST
AGRO-ECONOMIST
SPECIALISTS (TDY)
ADMINISTRATION
CONSULTANTS OFFICE
SPECIALISTS FROM
EGYPTIAN ENTITIES
MOALR, WRC, UNIVERSITY,
SURVEY INSTITUTE,
CONSULTANTS
GENERAL DIRECTOR
PLANNING, FOLLOW UP & EVALUATION
DIRECTOR
FEASIBILITY STUDIES
1 CIVIL ENGINEER
1 AGRONOMIST
1 AGRO-ECONOMIST
1 PEDOLOGIST
1 SOCIOLOGIST
DIRECTOR
BUDGET CONTROL
2 CIVIL ENGINEERS
2 COMPUTER OPERATORS
DIRECTOR
EVALUATION
1 CIVIL ENGINEER
1 MACRO ECONOMIST
GENERAL DIRECTOR
CONSTRUCTION
DIRECTOR
SCHEDULE CONTROL
2 CIVIL ENGINEERS
1 COMPUTER OPERATOR
DIRECTOR
QUALITY CONTROL
2 CIVIL ENGINEERS
1 MECHANICAL ENGINEER
1 ELECTRICAL ENGINEER
GENERAL DIRECTOR
DESIGN
DIRECTOR
CRITERIA AND STANDARDS
1 CIVIL ENGINEER
2 COMPUTER OPERATORS
DIRECTOR
DELIVERY SYSTEM DESIGN
2 CIVIL ENGINEERS CANALS
2 CIVIL ENGINEERS STRUCTURES
1 GEOTECHNICIAN
3 DRAFTSMEN
DIRECTOR
MESQA SYSTEM DESIGN
2 CIVIL ENGINEERS
2 DRAFTSMEN
2 COMPUTER OPERATORS
GENERAL DIRECTOR
IAS
DIRECTOR
FORMATION
1 TRANSLATOR
1 COMPUTER OPERATOR
1 GRAPHICS EXPERT
1 VIDEO EXPERT PLUS
LIBRARY
DIRECTOR
OPERATIONS
1 ECONOMIST
1 RURAL SOCIOLOGIST
1 AGRONOMIST
1 COMPUTER OPERATOR

# IRRIGATION IMPROVEMENT PROJECT

## ORGANIZATION CHART

DATE: ---------

| CONSULTANTS | |
|---|---|
| AGRICULTURAL ECONOMIST | MM |
| SOCIOLOGIST | MM |
| AGRONOMIST | MM |
| MACRO ECONOMIST | MM |

GENERAL DIRECTORATE

---- ESNA ------

ENG. --------------

COMMAND AREAS

| NAME | GROSS AREA (FED) |
|---|---|
| ABBADI RIDISSIA | 13 000 |
| KHOR SAHEL | 12 000 |
| TOTAL | 25 000 |

AREA TEAM ([illegible])

- — ENGINEER
- — SOCIOLOGIST
- —
- — ADM. ASSIST.

| 100 FEASIBILITY STUDIES ______ (FED) | |
|---|---|
| 101 | 1 C.E. PROJECT ENGINEER |
| 102 | 1 C.E. IRRIGATION |
| 103 | 1 PEDOLOGIST (MOALR) |
| 104 | 1 AGRONOMIST (MOALR) |
| 105 | 1 AGRO ECONOMIST |
| 106 | 1 TECHNICIANS |
| 107 | 1 SURVEY PARTIES |
| 108 | 1 ADMINISTRATIVE |
| 109 | — |
| 110 | — |
| 111 | — |
| 112 | — |
| 113 | — |
| 114 | — |
| 115 | — |
| TOTAL | 8 PERSONS MAX. |

| 200 DELIVERY SYSTEM DESIGN ___ (FED) | |
|---|---|
| 201 | 1 C.E. PROJECT ENGINEER |
| 202 | 2 C.E. CANALS & DRAINS |
| 203 | 1 MECHANICAL ENGINEER |
| 204 | 2 C.E. STRUCTURES |
| 205 | 1 C.E. GEOTECHNICAL |
| 206 | 5 TECHNICIANS |
| 207 | 5 SURVEY PARTIES |
| 208 | 3 ADMINISTRATIVE |
| 209 | — |
| TOTAL | 20 PERSONS MAX. |

| 300 MESQA SYSTEM DESIGN ____ (FED) | |
|---|---|
| 301 | 1 C.E. PROJECT ENGINEER |
| 302 | 3 C.E. IRRIGATION |
| 303 | 3 TECHNICIANS |
| 304 | 3 SURVEY PARTIES |
| 305 | 2 ADMINISTRATIVE |
| 306 | — |
| TOTAL | 12 PERSONS MAX. |

| 400 CONSTRUCTION SUPERVISION (FED) | |
|---|---|
| 401 | 1 C.E. PROJECT ENGINEER |
| 402 | 1 C.E. QUALITY CONTROL |
| 403 | 1 M.E. QUALITY CONTROL |
| 404 | 1 C.E. CONTRACT ADMIN. |
| 405 | 1 C.E. SCHEDULE CONTROL |
| 406 | 1 C.E. MATERIALS LAB. |
| 407 | 3 ~~TECHNICIANS~~ |
| 408 | 1 LAB. TECHNICIANS |
| 409 | 1 ADMINISTRATIVE |
| TOTAL | 11 PERSONS MAX. |

| 500 IRRIGATION ADVISORY SERVICE | |
|---|---|
| 501 | 1 C.E. COORDINATOR |
| 502 | 1 C.E. WATER DELIVERY |
| 503 | 1 C.E. ON FARM IRRIG. |
| 504 | 1 RURAL SOCIOLOGIST |
| 505 | 2 FIELD SUPERVISOR |
| 506 | 26 FIELD AGENTS |
| 507 | 1 ADMINISTRATIVE |
| 508 | — |
| 509 | — |
| 510 | — |
| TOTAL | 33 PERSONS MAX. |

DATE: ________

# IRRIGATION IMPROVEMENT PROJECT

## ORGANIZATION CHART

**CONSULTANTS**

| | |
|---|---|
| AGRICULTURAL ECONOMIST | MM |
| SOCIOLOGIST | MM |
| AGRONOMIST | MM |
| MACRO ECONOMIST | MM |

**GENERAL DIRECTORATE**

MINYA

ENG. ______________

**COMMAND AREAS**

| NAME | GROSS AR (FED) |
|---|---|
| IQAL SHAMIA | 16 000 |
| SERRY CANAL | 120 000 |
| TOTAL | 136 000 |

**AREA TEAM (MKE-LB1)**

- ENGINEER
- SOCIOLOGIST
- —
- ADM. ASSIST.

**100 FEASIBILITY STUDIES (FED)**

- 101 1 C.E. PROJECT ENGINEER
- 102 4 C.E. IRRIGATION
- 103 3 PEDOLOGIST (MOALR)
- 104 2 AGRONOMIST (MOALR)
- 105 2 AGRO ECONOMIST
- 106 6 TECHNICIANS
- 107 6 SURVEY PARTIES
- 108 6 ADMINISTRATIVE
- 109 —
- 110 —
- —
- —
- —
- —
- —

TOTAL 30 PERSONS MAX.

**200 DELIVERY SYSTEM DESIGN (FED)**

- 201 1 C.E. PROJECT ENGINEER
- 202 3 C.E. CANALS & DRAINS
- 203 1 MECHANICAL ENGINEER
- 204 4 C.E. STRUCTURES
- 205 1 C.E. GEOTECHNICAL
- 206 12 TECHNICIANS
- 207 11 SURVEY PARTIES
- 208 7 ADMINISTRATIVE
- 209 —

TOTAL 40 PERSONS MAX.

**300 MESQA SYSTEM DESIGN (FED)**

- 301 1 C.E. PROJECT ENGINEER
- 302 12 C.E. IRRIGATION
- 303 12 TECHNICIANS
- 304 13 SURVEY PARTIES
- 305 8 ADMINISTRATIVE
- 306 —

TOTAL 46 PERSONS MAX.

**400 CONSTRUCTION SUPERVISION (FED)**

- 401 1 C.E. PROJECT ENGINEER
- 402 6 C.E. QUALITY CONTROL
- 403 1 M.E. QUALITY CONTROL
- 404 2 C.E. CONTRACT ADMIN.
- 405 2 C.E. SCHEDULE CONTROL
- 406 2 C.E. MATERIALS LAB.
- 407 18 TECHNICIANS
- 408 6 LAB. TECHNICIANS
- 409 6 ADMINISTRATIVE

TOTAL 44 PERSONS MAX.

**500 IRRIGATION ADVISORY SERVICE**

- 501 1 C.E. COORDINATOR
- 502 3 C.E. WATER DELIVERY
- 503 3 C.E. ON FARM IRRIG.
- 504 3 RURAL SOCIOLOGIST
- 505 20 FIELD SUPERVISOR
- 506 197 FIELD AGENTS
- 507 6 ADMINISTRATIVE
- 508 —
- 509 —
- 510 —

TOTAL 233 PERSONS MAX.

# IRRIGATION IMPROVEMENT PROJECT

## ORGANIZATION CHART

DATE: ________

**CONSULTANTS**

| | |
|---|---|
| AGRICULTURAL ECONOMIST | MM |
| SOCIOLOGIST | MM |
| AGRONOMIST | MM |
| MACRO ECONOMIST | MM |

**GENERAL DIRECTORATE**

FAYOOM

ENG. ______________

**COMMAND AREAS**

| NAME | GROSS AREA (FED) |
|---|---|
| QIMAN EL ARUS | 7 000 |
| BAHR EL GHARAQ | 52 000 |
| TOTAL | 59 000 |

**AREA TEAM (MWE-IIP)**

- — ENGINEER
- — SOCIOLOGIST
- —
- — ADM. ASSIST.

### 100 FEASIBILITY STUDIES ______ (FED)

101 1 C.E. PROJECT ENGINEER
102 2 C.E. IRRIGATION
103 2 PEDOLOGIST (MOALR)
104 1 AGRONOMIST (MOALR)
105 1 AGRO ECONOMIST
106 4 TECHNICIANS
107 3 SURVEY PARTIES
108 2 ADMINISTRATIVE
109 —
110 —
111 —
112 —
113 —
114 —
115 —

TOTAL 16 PERSONS MAX.

### 200 DELIVERY SYSTEM DESIGN ____ (FED)

201 1 C.E. PROJECT ENGINEER
202 2 C.E. CANALS & DRAINS
203 1 MECHANICAL ENGINEER
204 2 C.E. STRUCTURES
205 1 C.E. GEOTECHNICAL
206 7 TECHNICIANS
207 7 SURVEY PARTIES
208 4 ADMINISTRATIVE
209 —

TOTAL 25 PERSONS MAX.

### 300 MESQA SYSTEM DESIGN ____ (FED)

301 1 C.E. PROJECT ENGINEER
302 8 C.E. IRRIGATION
303 8 TECHNICIANS
304 10 SURVEY PARTIES
305 5 ADMINISTRATIVE
306 —

TOTAL 32 PERSONS MAX.

### 400 CONSTRUCTION SUPERVISION (FED)

401 1 C.E. PROJECT ENGINEER
402 3 C.E. QUALITY-CONTROL
403 1 M.E. QUALITY-CONTROL
404 1 C.E. CONTRACT ADMIN.
405 1 C.E. SCHEDULE CONTROL
406 1 C.E. MATERIALS LAB.
407 10 TECHNICIANS
408 2 LAB. TECHNICIANS
409 3 ADMINISTRATIVE

TOTAL 23 PERSONS MAX.

### 500 IRRIGATION ADVISORY SERVIC

501 1 C.E. COORDINATOR
502 1 C.E. WATER DELIVE
503 1 C.E. ON FARM IRRI
504 1 RURAL SOCIOLOGIS
505 6 FIELD SUPERVISOR
506 64 FIELD AGENTS
507 2 ADMINISTRATIVE
508 —
509 —
510 —

TOTAL 75 PERSONS MAX.

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# IRRIGATION IMPROVEMENT PROJECT

## ORGANIZATION CHART

DATE: --------

**CONSULTANTS**

| | |
|---|---|
| AGRICULTURAL ECONOMIST | MM |
| SOCIOLOGIST | MM |
| AGRONOMIST | MM |
| MACRO ECONOMIST | MM |

GENERAL DIRECTORATE
ZAGAZIG
ENG. ------------

COMMAND AREAS

| NAME | GROSS AREA (FED) |
|---|---|
| SAIDIYA | 80.000 |
| TOTAL | 80.000 |

AREA TEAM (MKE-EX)
-- ENGINEER
-- SOCIOLOGIST
--
-- ADM. ASSIST.

**100 FEASIBILITY STUDIES ______ (FED)**

101 1 C.E. PROJECT ENGINEER
102 3 C.E. IRRIGATION
103 2 PEDOLOGIST (MOALR)
104 1 AGRONOMIST (MOALR)
105 1 AGRO ECONOMIST
106 4 TECHNICIANS
107 4 SURVEY PARTIES
108 4 ADMINISTRATIVE
109 —
110 —
111 —
112 —
113 —
114 —
115 —
TOTAL 20 PERSONS MAX.

**200 DELIVERY SYSTEM DESIGN ___ (FED)**

201 1 C.E. PROJECT ENGINEER
202 2 C.E. CANALS & DRAINS
203 1 MECHANICAL ENGINEER
204 3 C.E. STRUCTURES
205 2 C.E. GEOTECHNICAL
206 10 TECHNICIANS
207 10 SURVEY PARTIES
208 6 ADMINISTRATIVE
209 —
TOTAL 35 PERSONS MAX.

**300 MESCA SYSTEM DESIGN ____ (FED)**

301 1 C.E. PROJECT ENGINEER
302 10 C.E. IRRIGATION
303 10 TECHNICIANS
304 12 SURVEY PARTIES
305 7 ADMINISTRATIVE
306 —
TOTAL 40 PERSONS MAX.

**400 CONSTRUCTION SUPERVISION (FED)**

401 1 C.E. PROJECT ENGINEER
402 3 C.E. QUALITY CONTROL
403 1 M.E. QUALITY CONTROL
404 1 C.E. CONTRACT ADMIN.
405 1 C.E. SCHEDULE CONTROL
406 1 C.E. MATERIALS LAB.
407 14 TECHNICIANS
408 3 LAB. TECHNICIANS
409 4 ADMINISTRATIVE
TOTAL 29 PERSONS MAX.

**500 IRRIGATION ADVISORY SERVICE**

501 1 C.E. COORDINATOR
502 1 C.E. WATER DELIVER
503 1 C.E. ON FARM IRRIG
504 1 RURAL SOCIOLOGIST
505 8 FIELD SUPERVISOR
506 83 FIELD AGENTS
507 2 ADMINISTRATIVE
508 —
509 —
510 —
TOTAL 97 PERSONS MAX.

IIP

# IRRIGATION IMPROVEMENT PROJECT

## ORGANIZATION CHART

DATE: ________

GENERAL DIRECTORATE
--- TANTA ----
ENG. ______________

COMMAND AREAS

| NAME | GROSS AREA (FED) |
|---|---|
| BAHR EL SAIDI | 30 000 |
| QAHWAGI | 12 000 |
| TOTAL | 42 000 |

**CONSULTANTS**

| | |
|---|---|
| AGRICULTURAL ECONOMIST | MM |
| SOCIOLOGIST | MM |
| AGRONOMIST | MM |
| MACRO ECONOMIST | MM |

**AREA TEAM (MKE-LS1)**

- — ENGINEER
- — SOCIOLOGIST
- —
- — ADM. ASSIST.

**100 FEASIBILITY STUDIES ______ (FED)**

- 101 1 C.E. PROJECT ENGINEER
- 102 1 C.E. IRRIGATION
- 103 1 PEDOLOGIST (MOALR)
- 104 1 AGRONOMIST (MOALR)
- 105 1 AGRO ECONOMIST
- 106 2 TECHNICIANS
- 107 2 SURVEY PARTIES
- 108 2 ADMINISTRATIVE
- 109 —
- 110 —
- 111 —
- 112 —
- 113 —
- 114 —
- 115 —

TOTAL 11 PERSONS MAX.

**200 DELIVERY SYSTEM DESIGN ____ (FED)**

- 201 1 C.E. PROJECT ENGINEER
- 202 2 C.E. CANALS & DRAINS
- 203 1 MECHANICAL ENGINEER
- 204 2 C.E. STRUCTURES
- 205 1 C.E. GEOTECHNICAL
- 206 5 TECHNICIANS
- 207 5 SURVEY PARTIES
- 208 3 ADMINISTRATIVE
- 209 —

TOTAL 20 PERSONS MAX.

**300 MESQA SYSTEM DESIGN _____ (FED)**

- 301 1 C.E. PROJECT ENGINEER
- 302 6 C.E. IRRIGATION
- 303 6 TECHNICIANS
- 304 5 SURVEY PARTIES
- 305 4 ADMINISTRATIVE
- 306 —

TOTAL 29 PERSONS MAX.

**400 CONSTRUCTION SUPERVISION (FED)**

- 401 1 C.E. PROJECT ENGINEER
- 402 3 C.E. QUALITY CONTROL
- 403 1 M.E. QUALITY CONTROL
- 404 1 C.E. CONTRACT ADMIN.
- 405 1 C.E. SCHEDULE CONTROL
- 406 1 C.E. MATERIALS LAB.
- 407 11 TECHNICIANS
- 408 2 LAB. TECHNICIANS
- 409 3 ADMINISTRATIVE

TOTAL 24 PERSONS MAX.

**500 IRRIGATION ADVISORY SERVICE**

- 501 1 C.E. COORDINATOR
- 502 1 C.E. WATER DELIVERY
- 503 1 C.E. ON FARM IRRIG.
- 504 1 RURAL SOCIOLOGIST
- 505 4 FIELD SUPERVISOR
- 506 37 FIELD AGENTS
- 507 1 ADMINISTRATIVE
- 508 —
- 509 —
- 510 —

TOTAL 46 PERSONS MAX.

Fig 5-9

IIP

# IRRIGATION IMPROVEMENT PROJECT

## ORGANIZATION CHART

DATE: ---------

**CONSULTAINTS**

| | |
|---|---|
| AGRICULTURAL ECONOMIST | MM |
| SOCIOLOGIST | MM |
| AGRONOMIST | MM |
| MACRO ECONOMIST | MM |

**GENERAL DIRECTORATE**
DAMANHOUR
ENG. ---------------

**COMMAND AREAS**

| NAME | GROSS AREA (FED) |
|---|---|
| BALAQTAR | 11 000 |
| BAHIG | 30 000 |
| TOTAL | 41 000 |

**AREA TEAM (MKE-LB?)**
- ENGINEER
- SOCIOLOGIST
- 
- ADM. ASSIST.

**100 FEASIBILITY STUDIES ------ (FED)**

| | | |
|---|---|---|
| 101 | 1 | C.E. PROJECT ENGINEER |
| 102 | 1 | C.E. IRRIGATION |
| 103 | 1 | PEDOLOGIST (MOALR) |
| 104 | 1 | AGRONOMIST (MOALR) |
| 105 | 1 | AGRO ECONOMIST |
| 106 | 2 | TECHNICIANS |
| 107 | 2 | SURVEY PARTIES |
| 108 | 2 | ADMINISTRATIVE |
| 109 | — | |
| 110 | — | |
| 111 | — | |
| 112 | — | |
| 113 | — | |
| 114 | — | |
| 115 | — | |

TOTAL 11 PERSONS MAX.

**200 DELIVERY SYSTEM DESIGN --- (FED)**

| | | |
|---|---|---|
| 201 | 1 | C.E. PROJECT ENGINEER |
| 202 | 1 | C.E. CANALS & DRAINS |
| 203 | 1 | MECHANICAL ENGINEER |
| 204 | 2 | C.E. STRUCTURES |
| 205 | 1 | C.E. GEOTECHNICAL |
| 206 | 4 | TECHNICIANS |
| 207 | 3 | SURVEY PARTIES |
| 208 | 2 | ADMINISTRATIVE |
| 209 | — | |

TOTAL 15 PERSONS MAX.

**300 MESQA SYSTEM DESIGN ----- (FED)**

| | | |
|---|---|---|
| 301 | 1 | C.E. PROJECT ENGINEER |
| 302 | 7 | C.E. IRRIGATION |
| 303 | 7 | TECHNICIANS |
| 304 | 6 | SURVEY PARTIES |
| 305 | 5 | ADMINISTRATIVE |
| 306 | — | |

TOTAL 26 PERSONS MAX.

**400 CONSTRUCTION SUPERVISION - (FED)**

| | | |
|---|---|---|
| 401 | 1 | C.E. PROJECT ENGINEER |
| 402 | 4 | C.E. QUALITY CONTROL |
| 403 | 1 | M.E. QUALITY CONTROL |
| 404 | 1 | C.E. CONTRACT ADMIN. |
| 405 | 1 | C.E. SCHEDULE CONTROL |
| 406 | 1 | C.E. MATERIALS LAB. |
| 407 | 15 | TECHNICIANS |
| 408 | 3 | LAB. TECHNICIANS |
| 409 | 4 | ADMINISTRATIVE |

TOTAL 31 PERSONS MAX.

**500 IRRIGATION ADVISORY SERVICE**

| | | |
|---|---|---|
| 501 | 1 | C.E. COORDINATOR |
| 502 | 1 | C.E. WATER DELIVERY |
| 503 | 1 | C.E. ON FARM IRRIG. |
| 504 | 1 | RURAL SOCIOLOGIST |
| 505 | 5 | FIELD SUPERVISOR |
| 506 | 49 | FIELD AGENTS |
| 507 | 1 | ADMINISTRATIVE |
| 508 | — | |
| 509 | — | |
| 510 | — | |

TOTAL 59 PERSONS MAX.

APPENDIX 6-2

The Irrigation Improvement Project (IIP) will be under the management of the Project Director IIP (Under Secretary).

The Project Director will have overall responsibility for the day-to-day operation of the activities of the assigned staff including:

1. the supervision of the workof the General Directorates in Esna, Minia, Fayoum, Tanta, Damanhour and Zaqazig
2. the supervision of the headquarters organization in Cairo consisting of the General Directorates for:
   a. Planning, Follow-up and Finance : Director Gen
   b. Design
   c. Construction
   d. Irrigation Advisory Service

Each General Directoroutside of the CairoHeadquarters will be responsible for the following activities taking place in his Directorate:

Supervision of the work of five Directors:

a. Director of Studies
b. Director of Design of Mesqas
c. Director of Design of Delivery Systems
d. Director of Construction
e. Director of IAS

2. Provide logistical and administrative support for all assigned staff
3. Coordinate all technical and administrativeactivities with Cairo Headquarters

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The duties and responsibilities of the Directors reporting to the General Director are described below:

Director of Studies

Damanhour, Tanta, Zagaziq, Fayoum, Minia and Esna.

An Engineer Experienced in Multidiscplinary Studies (Irrigation,water resources, socio economy, soil science, etc.).

He will supervise, the work ofa team preparing technoeconomic feasibility studies or evaluating and complementing already available feasibility studies, including:

- Socioeconomic surveys and analysis.
- Water resources, ground table condition, salinity and alkalinity problems, etc.
- Soil surveys, laboratory analyses, soil and land usemapping, suitability for irrigated agriculture.
- Ground surveys, canal and drains alignments, profiles and sections.
- Irrigated crops, water requirements, calendars andschedules, including farm level economics.
- Operation and maintenance.
- Macroeconomics of irrigated schemes.

After completion of studies in respect to the eleven command areas involved in USAID funded Irrigation Improvement Project, he will be responsible for new command areas studies.

Director Mesqa System Design

A Civil Engineer, experienced in onfarm and tertiary distribution system design and operation. He must know about water application procedures, establishment of water requirements as regards one or alternative cropping patterns, layout and design of tertiary and quaternary (mesqa and marwa) systems channels and structures, field and subsurface drainage systems including lifting devices, development of bill of quantities, technical specifications and bidding documents, analysis of tender proposals and selection of contractor, and supervision of contractors, definition of O & M procedures, implementation and costing.

Director Delivery System Design:

A Civil Engineer experienced in irrigation and drainage main systems layout and design, for new schemes to develop and rehabilitation of existing commands as well, as ground water pumping, drainage and water reuse pumping plants.

He shall undertake and coordinate activities related to canal and drain discharge distribution, layout and design of either, earthen or lined canals and relevant structures, regulators, bridges and culverts, offtakes andturnouts, tail escapes and side weirs, etc, and pumping plants, including civil works and hydromecamical equipments. The tasks include supervision of the preparation of drawings at final designstage, taking off and bill of quantities, adaptation of standard technical specifications to local, specific conditions, bidding documents, call for tenders, analysis of proposals and Selection of Contractor, then Supervision of construction. Development of specific O & M procedures are also required.

## Director Irrigation Advisory Service

The position of the Director IAS requires a Civil Engineer with a background, training and experience in irrigation project management especially at the distribution and on-farm levels, namely operation of tertiary and quaternary canals (mesqa and marwa), field water application practices (irrigation procedures at the plot level, operation and maintenance of lower order channels and ditches, etc.).

He will be responsible, for supervising:

- establishment of work programmes,
- manning of various teams with IIP personnel, specialists seconded from, other Departments and Ministries (MALR in particular), local consultants and hired personnel after due selection, assistance to these teams in terms of administrative direction and support and problems solving,
- continuous cooperation with other relevant organizations involved, MARL, Extension, etc,
- provision of technical expertise to field teams,
- monitoring of the progress of work. adapt work programmes accordingly, report to General Director in IIP Directorate and Central Cairo Headquarters.

An important first task will be to supervise the design and execution of the socioeconomic surveys and the formation Water Users Associations, followed shortly by farmers I adversing activities in the field of on farm, marwa and mesqa water management, transfer of technological pakages from research, liaisonwith other agencies, agriculture, extension, etc concerned with farmers training and advising.

Director Construction

A Civil Engineer experienced in irrigation and drainage system construction, he will participate with the design teams in reviewing final design maps and drawings, bill of quantities, technical specifications,bidding documents,calling for tenders, evaluating bids and selecting the firms awarded the Contracts.

He will be then in charge of supervising the administration of the construction contracts to ensure the works conform to the design and specifications, check the quantities of work, and schedule conformance.

He will accept as cpmpleted parts and entirity of works constructed and monitor the operationduring the guarantee period.

At Central Cairo Headquarters

Director General DG, Planning Follow-up and Finance

A SeniorCivil Engineer, with broad experiencein Irrigation and Drainage System planning, will be responsible, reporting to the Under Secretary, Irrigation Improvement Project Director, for programming,evaluating and accepting feasibility Studies prepared at the Directorate level and take necessary action for them to be brought to financing Agency (USAID), with a view to decide on proceeding with final design studies.

This activity includesreview of the feasibility studiesfor the eleven of the first phase and then new Commands to be improved according to NIIP program.

It will closely monitorthe·Studies performed in thevarious IIP Directorate, with a special view to try and standardizeelements of feasibility studies, as well as components of the physical systems. He will besupported by a Director FeasibilityStudies and a Director Planning Follow-up and Finance.

He will have overallresponsibility to ensure that theData Base line studies are carried out. These studies will develop soils, agronomic, agri-economic, sociologic and economic data to be used for post-constructionevaluation of the IIP. Hewill also supervise the execution of these evaluation.

During construction of the civil works, he will review and approve all payments to the construction contractors and monitor the finance of the project.

Director General Desigr

A Senior Engineer with wide experience in Irrigation Drainage System Desigr (main delivery, mesqas, drainage, etc), he will be in charge of directing and supervising final design activities carried out in the Directorates for main delivery systems as well as the mesqas.

He will serve as a General Supervisor of these operations, as well as a main Resource Engineer for problem solving; in the mean time, after standarized and typified systems components have been selected, he will control their pertinent adaptations to specific project conditions.

He will also coordinate technical specifications and other bidding documents format, as well as the call for tenders procedures. He will preform the final reviewof design for the IIP Project Director by the Directorate DesignTeams which will be the responsible of the General Directors.

He wil be supportedby a Director Delivery Systemsand Director Mesqas.

Director General Constructions

A Senior Civil Engineer experienced in Irrigation works construction and planning, he will be responsible for the monitoring of the construction programmes: in this capacity, he will review the Directorates construction activities to ensure that :

- contract schedules are met and
- the quality of the of completed works components conform technical specifications and designs of the contract.

He will be supported by a Director Schedule Control and a Director Quality Control.

Director General Irrigation Advisory Service

A Senior Engineer with wide experience in management o Irrigation systems, mainly secondary canals and on farm systems. He will be responsible for the overall implementation of IA activities inthe Directorates concernedwith recruitment, trainin and execution of the work assigned to the IAS.

Acting under the authority of IIP Director, he will manage an supervise formation of the IAS teams and trainingof the personne as well as IAS operations proper.

He will be the principal responsible person in problem solvin for the IAS team and provide liaison and support at the head-quarters level in Cairo with other organization involved in improvement of irrigation agriculture in Egypt. Such as the Ministry of Agriculture and Land Rehabilitation. He will be the local point through the General Directors for all IAS activities. He will be supported by a Director Formation and a Director Operation.

APPENDIX 6-3

MINISTRY OF PUBLIC WORKS
AND WATER RESOURCES

IRRIGATION IMPROVEMENT DEPARTMENT
FUM EL-ISMAILIA IRRIGATION BLDG.
SHOUBRA, EL-MEZALAT
KHALAFAWI POST NO. 11614
PHONE 643-796.645-928

IIP
IRRIGATION IMPROVEMENT PROJECT

وزارة الاشغال العامة
والموارد المائية
الإدارة المركزية لتطوير الري
مشروع تطوير الري
شبرا المظلات . فم ترعة الإسماعيلية
ص.ب ١١٦١٤ الخلفاوى
ت ٦٤٣٧٩٦١ - ٦٤٥٩٢٨

MPWWR/AID-040
13 August 1989

Mr. David Smith
Project Officer
USAID
Cairo Center

Subject : Staffing Covenant

Dear Mr. Smith,

Reference to you letter dated July 20, 1989, concerning the Staffing Covenant, Section 5.12 of the Grant Agreement.

Please find enclose a list of IIP personnel assigned as counterparts to the 14 person MKE/LBI technical assistance team. And position description of Director General IAS.

Very Truely Yours,

A. Sawaf
13/8/1989
Eng. Ahmed H. El Sawaf
Project Director

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# ORGANIZATION CHART

| NAME | TITLE | NAME | TITLE |
|---|---|---|---|
| Eng. Ahmed Helmy El Sawaf | Undersecretary<br>Project Director | Eng. Nolan L.Pike | Team Leader<br>MKE/LBII |
| Eng. Hassan Hussein Shoman | Director General (Design) | Eng. Georges A. Tordjman | Design Engineer |
| Eng. Essam Fawzy Barakt | Director of Works | Dr. Max Lowdermilk | Sociologist |
| Eng. Nabil Mohamed Hussein Soliman | Director of Works | Dr. Erroll D. Coles | Irrigation Engineer |
| Mr. Ahmed Maher El Hamzawi | Administrator | Mr. Robert D. Lowery | Administrator |
| Mr. El Shenawi Abdel Atti El Shenawi | Economist | Mr. Richard S. Pond | Economist |
| Eng. Mohamed Abdel Aziz El Sergany | D.G. Esna | Eng. John H. Cloward | Area Engineer |
| Eng. Abdel Aziz El Baz | D.G. Zagazig | Eng. Mark A. Schiele | Area Engineer |
| Eng. Mohamed Mahmoud El Attar | D.G. Damanhour | Eng. Juan J. Conzales | Area Engineer |
| Eng. Salem Sayed Ahmed | D.G. Tanta | Eng. Carroll Hackbart | Area Engineer |
| Eng. Mohamed Abdel Wahab Asaal | D.G. Fayoum | Eng. James McClung | Area Engineer |
| Eng. Saad Mohamed El Kayed | D.G. Minia | Eng. Brice Boesch | Area Engineer |
| Eng. Wagih Micheal | Civil Engineer Minia | Eng. Anthony Gillman | Area Engineer |
| Eng. Madih Mohamed Khalifa | Agri. Special. Minia | Eng. Edwin F. Shinn Jr. | Sociologist |

## POSITION DESCRIPTION
## DIRECTOR GENERAL IAS & (MAIN OFFICE LEVEL)

**GENERAL QUALIFICATIONS:**

An irrigation Engineer with prior EWUP and or RIIP is needed for the important position of Director General of the Irrigation Advisory Service. This should be with a sound understanding of irrigation water management and the importance of Water user Organization. Prior experience in management of Irrigation Systems mainly secondary canals and on Farm Systems is desired.

**DUTIES:**

Overall implementation of IAS Activities

Establish Standards for Staff

Organize Recruitment of Staff

Manage Training Programs

Defines WUP Training Needs

Supervises all Operation IAS & WUAs

Coordinates Training Materials Development

Monitors Progress of WUA - formation

Overall Planning & Operation

Defines And Approves Procedures Manuals

Coordinates with MOALR and Laison with other Organizations overseas IIP Main Oppice support Activities under Directors of Formation and Operations.

## POSITION STATEMENTS FOR THE TWO IAS DIRECTORS UNDER THE IAS DIRECTOR GENERAL FOR THE IIP MAIN OFFICE (DIRECTOR OF FORMATION-DIRECTOR OF OPERATIONS)

### A. DIRECTOR OF FORMATION (MAIN OFFICE)

1. Screening, selection and posting of field staff
2. Design, delivery and evaluation of training programs
3. Working with local and expatriate experts for the design of training programs, training modules, training materials (including audio visuals) and IAS field manuals.

4. Developing linkages with the Ministry National Training Center for conducting specific training courses designed by IAS and careful supervision of this training.

5. Maintaining an up to date listing of World-Wide short courses related to the need of the IIP and with Director General of IAS and the Director of IIP identify, select process and evaluate the overseas training.

6. Identify overseas courses and materials which can be transferred to Egypt.

7. Evaluate the impact of training on the job in order to identify its value.

8. Conducting regular updated assessments of IIP training needs.

9. formation of special professional development seminars, workshops, conferences etc. as needed.

10. Investigate the costs and benefits of computer based training systems, such as simulation games, interactive learning systems and the use of irrigation system models.

11. Develop a close linkage and working relationship with all Egyptian institutions and organizations which can provide input to an IIP professional development program.

12. Work on a regular basis with the Director of Operations

13. develop a quarterly newsletter for IAS on progress, issues, lessons learned etc. about WUA in Egypt and elsewhere.

14. Any other tasks assigned by the IAS general director and the IIP Director.

15. Establish linkages with the Wua unit of the International Irrigation Management, Institute and obtain their literature as well as that of other centers of excellence in irrigation water management world-wide.

**B. DIRECTOR OF OPERATIONS**

1. Supervision of all IAS field staff in all aspects of their work.

2. Coordination of all work plans and policies related to the IAS.

3. Provide administrative direction and support i.e. logistics, facilities; personnel. equipment supplies etc.

4. Develop functional coordination of IAS with all relevant organizations i.e. MOA, COOPS Research Institutions of MOA and MPWWR; etc.

5. Provide technical expertise to the IAS.

6. Monitor the progress of the IAS and report the progress to the IAS DG.

7. Evaluate the field activities on a regular basis and report to the IAS DG.

8. Identify and recommend TDY Expertise needed to support the IAS.

9. Assist in the development of all technical short courses for IAS staff.

10. Gain experience of WUAs in other countries and identify lessons which can be transferred.

11. Represent the IAS on operational matters to the MOA and MPWWR organizational units which are needed to province inputs and support services to IAS.

12. Design a method for monitoring and evaluating the progress of WUAs.

13. To work with the Director of Formation to identify the training needs of Staff.

14. Develop strong linkages between IAS staff and the interdisciplinary IIP staff for the improvement program.

15. Working with the water law experts.

## JOB DESCRIPTION FOR IAS STAFF AT THE DIRECTORATE LEVEL

**A. Director**

1. Planning work and developing workplans for staff

2. Directing the work of IAS

3. Provide administrative direction and support (logistics, facilities, personnel, equipment etc)

4. Coordination with IIP design unit, feasibility study team (contractors, MOA extension, Coops, Banks etc.)

5. Problem solving and linkages with Main Office

6. Monitoring progress of work and regular reporting to Director General and Main Office.

7. Evaluating the work of IAS and WUAs

8. Coordinations and implements training of technical specialists, field supervisors, field agents and farmers.

9. Keeps Main Office Director of Operations informed of technical assistance needs.

10. Coordinations and supervises information gathering by field staff.

11. Coordination of IAS/WUAs with improvement program activities.

## B. WATER DELIVERY TECHNICAL SPECIALISTS

1. Monitor water delivery for improved water control through implementing water measurements, developing irrigation scheduling, operation and maintenance plan for meskas, direct outlets and field drains through field supervisors and field agents.

2. Providing technical support for field supervisors and field agents.

3. Providing support in developing meska maps and data collection with field agents.

4. Training of field supervisors and field agents.

5. Developing functional communication linkages between irrigation staff and IAS field staff and farmers.

6. Working closely with engineers and construction units to assure that water users are actively involved in planning design, implementation and operation of improvements.

7. Keeping water users informed of policies, procedures and regulations related to their activities.

8. Taking part in all training courses provided to build up professional capabilities.

9. Other activities assigned by IAS director and IAS Main Office.

C. Water Users Technical Specialist

1. Assisting field supervisors and field agents in orgaanizing and training WUAs.

2. Implementing the five phase strategy of WUA organization and assure that each WUA meets the four criteria for initial organization.

3. Working closely with field supervisors and field agents to assure that WUAs are actively involved in planning , design, implementation and operations needed for system improvements.

4. Linking WUAs with IIP activities and Services avaailable from MOA extension service, cooperatives, village banks, etc.

5. Playing an active role in developing and implementing training programs for field supervisors, field agents and WUAsw

6. Maintaining regular communications with IAS Director and IAS main office about the work of the IAS and WUAs.

7. Asisting in the develkopment of meska profile mapss and seeeing that these are updated each season and made available to the IAS director.

8. Participating in all training courses to build up professional capabilities.

9. Other activities as assigned by IAS director and Main office.

D. On-Farm Water Use Specialist

1. Providing technical support to field supervisors and agents related to improved water use on farm.

2.Participating , developing and implementing select training programs for field supervisors, field agents and water users.

3.Assisting field agents in introducing and implementing improved farm layouts, irrigation practices, darinage improvements and other activities.

4.Assisting in developing and cheking meska profile maps with an up date each season of the cropping patterns.

5.Training field agents to determine crop water requirements, infiltration rates, advance of water on fields, and to evaluate over and under irrigations.

6.Providing data and information about impact of meska and direct outlet improvements.

7.Helping field supervisors and field agents to link closely with selected MOA services and activities such as precision land leveling, farm layouts etc. to assure that water users are aware of these services and can receive them.

8.Helping field supervisors and field agents to know how to estimate crop water requirements and working with the other technical specialists learn how to develop water scheduling system.

9.Keeping current on research finding from both MOA and MPWWR institutes related to improved on farm water use and making these findings available to water users through training and demonstration programs.

10.Taking part in training courses provided for building up professional capabilities.

11.Any other activities assigned bv the IAS director and the Main Office.

E. Field Supervisors

1.Implementing programs, plans, activities, regulations etc. assigned by the Director and technical specialists.

2.Taking part in the training of field agents with technical specialists.

3.Supervising and assisting field agents in all their activities.

4.Building and maintaining close working relationships with all IIP units and with MOA extension, cooperatives,banks etc.

5. Identifying and resolving problems facing the field agents and assiting them in organizaing and providing services to WUAs.

6. Assisting the technical specialists in the training of the field agents.

7. Assuring that WUAs are organized along the lines of the established phases and criteria and are actively involved in planning, design, implementation and operation of the improvement program activities.

8. Overseeing the development and updating of the meska profile maps and other information collection.

9. Working with field agents in holding regular planning meetings with WUAs and assisting the field agents in WUA training activities.

10. Taking part in regular training programs for professional development.

11. Any other tasks assigned by the IAS director and the technical specialists.

F. Field Agents

1. Developing a meska profile map in the entry stage of the WUA initial organization.

2. Providing WUAs with a complete knowledge of the IIP and the benefits of organization.

3. Working with farmers to formally organize, select their own leaders, meet to plan their roles and responsibilites in the IIP and are actively involved in the planning, design, implementation, operations and evaluation of meska improvements.

4. Working with farmers to develop and implement water scheduling program, program for regular operation, management and maintainence and a program for operation and maintainence for field drainage.

5. Implementing specific water deliver, WUA organization and on-farm services to water users.

6. Assures to IAS director that farmers once organized are meeting on a regular basis, understand information about IIP and their role in the IIP, the stage of development of each WUA and that water users are actively involved in the IIP program.

7.Meeting on a regular basis with WUAs to help them identify and resolve problems related to water delivery, WUAs and on farm water use and drainage.

8.Collecting and updating essential data/information as required by the IAS director.

9.Taking part in all training programs and assists in developing and implementing training programs for WUS leaders.

10.Developing and maintaining slose linkages with the MOA extension agents, cooperatives, village banks, village leaders and authorities etc. which enhance IAS and WUAs.

# IMS PARTICIPANT TRAINING REPORT

| NAME | POSITION | COMPONENT | COURSE/SUBJECT | TRAINING ENTITY | LOCATION | START DATE | END DATE | DURATION (MONTHS) | PIO/P | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| Hassan Hussein Shouman | Dep. Project Director | IIP | On Farm Water Mangement Special Program | CSU | US(CO) | 9/1/84 | 10/6/84 | 1.2 | 10305 | |
| Magdy Yacoub Youssef | Dep. General Director | IIP | On Farm Water Mangement Special Program | CSU | US(CO) | 9/1/84 | 10/6/84 | 1.2 | 10305 | |
| Samir Ibrahim Ahmed Shobir | General Director | IIP | On Farm Water Mangement Special Program | CSU | US(CO) | 9/1/84 | 10/6/84 | 1.2 | 10305 | |
| Hanaa Rasmy Fahmy | Asst. Dir. of Works | IIP | Pipeline Design & Construction Management | USBR | US(CO) | 5/3/85 | 5/31/85 | 0.9 | 10298 | |
| Fouad Fahmy Nagib Barsoum | General Director | IIP | On Farm Water Management | CSU | US(CO) | 9/5/85 | 10/3/85 | 0.9 | 40041 | EIIP |
| Mohamed El Sayed Abd El Wahab Assal | General Director | IIP | On Farm Water Management | CSU | US(CO) | 9/5/85 | 10/3/85 | 0.9 | 40041 | EIIP |
| Nagi Salah Maker | General Director | IIP MPWWR | On Farm Water Management | CSU | US(CO) | 9/5/85 | 10/3/85 | 0.9 | 40041 | EIIP |
| Taher Mohamed Ali Zidan | General Director | IIP | On Farm Water Management | CSU | US(CO) | 9/5/85 | 10/3/85 | 0.9 | 40041 | EIIP |
| Atef Mohamed El Kadar | Civil Engineer | IIP | Social & Tech. Aspects of Irrigation Organ. | CSU | US(CO) | 6/16/86 | 7/14/86 | 0.9 | 40083 | EIIP |
| Hassan Hussien Shouman | Dep. Project Director | IIP | Social & Tech. Aspects of Irrigation Organ. | CSU | US(CO) | 6/16/86 | 7/14/86 | 0.9 | 40083 | EIIP |
| Hanaa Rasmy Fahmy | Asst. Dir. of Works | IIP | Project Design (Salt River Project) | SRP | US(AZ) | 7/14/86 | 8/25/86 | 1.4 | 40088 | EIIP |
| Nadia Aziz Welson | Director of Works | IIP | Project Design (Salt River Project) | SRP | US(AZ) | 7/14/86 | 8/25/86 | 1.4 | 40088 | EIIP |
| Essam El Din Fawzy Barakat | Director of Works | IIP | Mgt & Economics of Irrigation Rehab. Projects | CSU | US(CO) | 8/11/86 | 9/8/86 | 0.9 | 40087 | EIIP |
| Ramsis Bakhoum Lotfy | General Director | IIP | Mgt & Economics of Irrigation Rehab. Projects | CSU | US(CO) | 8/11/86 | 9/8/86 | 0.9 | 40087 | EIIP |
| Ahmed Maher Ghidan | Director, Irr. Dept. | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/25/86 | 9/22/86 | 0.9 | 40100 | EIIP |
| Ahmed Moustafa Abu El Lail | Irrigation Engineer | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/25/86 | 9/22/86 | 0.9 | 40100 | EIIP |
| Ali Yehia Mohamed Ibrahim | Director of Works | IIP | Study Tour (On Farm Water Mangement) | CSU | US | 8/25/86 | 9/22/86 | 0.9 | 40100 | EIIP |
| Bahaa El Din Ibrahim Hassen | District Engineer | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/25/86 | 9/22/86 | 0.9 | 40100 | EIIP |
| El Sayed Mohamed Ahmed Hassan | Undersecretary | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/25/86 | 9/22/86 | 0.9 | 40100 | EIIP |
| Farouk Abdel Hamid Mansour | Inspector | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/25/86 | 9/22/86 | 0.9 | 40100 | EIIP |
| George Wadie Ibrahim | Inspector | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/25/86 | 9/22/86 | 0.9 | 40100 | EIIP |
| Hassan Ali Hassan Soliman | Inspector | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/25/86 | 9/22/86 | 0.9 | 40100 | EIIP |
| Hosny Mousa El Zaher Mousa | Inspector | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/25/86 | 9/22/86 | 0.9 | 40100 | EIIP |
| Ibrahim El Desouky Fattah Metawie | Irrigation Engineer | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/25/86 | 9/22/86 | 0.9 | 40100 | EIIP |
| Kamal El Din Hosny Abbas Helmy | General Director | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/25/86 | 9/22/86 | 0.9 | 40100 | EIIP |
| Magdy Mohamed Abd El Kashef | Deputy Head | - | Study Tour (On Farm Water Mangement) | CSU | US | 8/25/86 | 9/22/86 | 0.9 | 40100 | EIIP |
| Mahmoud Ibrahim Saif | Irrigation Engineer | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/25/86 | 9/22/86 | 0.9 | 40100 | EIIP |
| Mahmoud Rashad Ahmed Nassif | Irrigation Engineer | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/25/86 | 9/22/86 | 0.9 | 40100 | EIIP |
| Mohamed Abdel El Sayed | Director of Works | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/25/86 | 9/22/86 | 0.9 | 40100 | EIIP |
| Mohamed Ibrahim Abdou | Asst. Dir. of Works | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/25/86 | 9/22/86 | 0.9 | 40100 | EIIP |
| Mohamed Manmoud Ahmed El Malkh | General Director | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/25/86 | 9/22/86 | 0.9 | 40100 | EIIP |
| Nady Selim Ghoriel | Undersecretary | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/25/86 | 9/22/86 | 0.9 | 40100 | EIIP |
| Refaat Seddik Abdalla | Irrigation Engineer | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/25/86 | 9/22/86 | 0.9 | 40100 | EIIP |
| Samir Fahim Shehata | Inspector | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/25/86 | 9/22/86 | 0.9 | 40100 | EIIP |
| Vinis Girgis Hanna | Inspector | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/25/86 | 9/22/86 | 0.9 | 40100 | EIIP |
| Essa Mohamed Sayed Ahmed | General Director | IIP | PEEP-Salt River Project | SRP | US(AZ) | 4/5/87 | 5/31/87 | 1.9 | 40133 | EIIP |
| Hanna Ramsy Fahmy | Asst. Dir. of Works | IIP | Press. Comp. In Large Scale Gravity Irr. Sys. | CSU | US(CO) | 6/14/87 | 7/12/87 | 0.9 | 40156 | EIIP |
| Laila Hussein El Ruby | Civil Engineer | IIP | Press. Comp. In Large Scale Gravity Irr. Sys. | CSU | US(CO) | 6/14/87 | 7/19/87 | 1.2 | 40156 | EIIP |
| Abdel Wahab Mohamed Kenawi | Inspector | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/16/87 | 9/13/87 | 0.9 | 40163 | EIIP |
| Adel Abdel Khalek Said | General Director | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/16/87 | 9/13/87 | 0.9 | 40163 | EIIP |
| Ahmed Helmy El Sawaf | General Director | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/16/87 | 9/13/87 | 0.9 | 40163 | EIIP |
| Ahmed Mohmed Nagi Attia | Irrigation Engineer | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/16/87 | 9/13/87 | 0.9 | 40163 | EIIP |
| Ezzat Habib Boless | General Director | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/16/87 | 9/13/87 | 0.9 | 40163 | EIIP |
| Farag Mahmoud Salem Yamani | Deputy Manger | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/16/87 | 9/13/87 | 0.9 | 40163 | EIIP |
| Fath El Bab El Sayed Fath El Bab | General Director | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/16/87 | 9/13/87 | 0.9 | 40163 | EIIP |
| Madih Mohamed Khalifa | Agricultural Engineer | IIP | Study Tour (On Farm Water Mangement) | CSU | US | 8/16/87 | 9/13/87 | 0.9 | 40163 | EIIP |
| Mahmoud Mostafa Khalil El Dahshan | Irrigation Engineer | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/16/87 | 9/13/87 | 0.9 | 40163 | EIIP |
| Mohamed Adris Mohamed El Khait | General Director | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 6/16/87 | 9/13/87 | 0.9 | 40163 | EIIP |
| Mohamed El Sayed Hassan Shalan | Civil Engineer | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/16/87 | 9/13/87 | 0.9 | 40163 | EIIP |
| Mohamed Hassan Soliman | General Director | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/16/87 | 9/13/87 | 0.9 | 40163 | EIIP |
| Nabegh Abdel Mawla Kaddah | Director of Works | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/16/87 | 9/13/87 | 0.9 | 40163 | EIIP |
| Nagi Sabra Abdel Hasoob Ahmed | Irrigation Engineer | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/16/87 | 9/13/87 | .9 | 40163 | EIIP |

# IMS PARTICIPANT TRAINING REPORT

| NAME | POSITION | COMPONENT | COURSE/SUBJECT | TRAINING ENTITY | LOCATION | START DATE | END DATE | DURATION (MONTHS) | PIO/P | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| Naguib Zaki Mikheal Shetta | Civil Engineer | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/16/87 | 9/13/87 | 0.9 | 40163 | EIIP |
| Nahed Abd El Fattah Ibrahim | Irrigation Engineer | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/16/87 | 9/13/87 | 0.9 | 40163 | EIIP |
| Salah Ahmed Sayed Mostafa | Civil Engineer | IIP | Study Tour (On Farm Water Mangement) | CSU | US | 8/16/87 | 9/13/87 | 0.9 | 40163 | EIIP |
| Yasser Hussein Ahmed Lashin | Irrigation Engineer | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/16/87 | 9/13/87 | 0.9 | 40163 | EIIP |
| Yehia Abdel Aziz Saad | Deputy Director | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/16/87 | 9/13/87 | 0.9 | 40163 | EIIP |
| Youssef Sharkawy Youssef Mohamed | Irrigation Engineer | IIP | Study Tour (On Farm Water Mangement) | CSU | US | 8/16/87 | 9/13/87 | 0.9 | 40163 | EIIP |
| Zaghloul Dakrouri Ahmed Dakrouri | Undersecretary | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/16/87 | 9/13/87 | 0.9 | 40163 | EIIP |
| Ahmed Mohmed Nagi | Irrigation Engineer | IIP MPWWR | Study Tour (On Farm Water Mangement) | CSU | US | 8/16/87 | 9/13/87 | 0.9 | 40163 | EIIP |
| Essam El Din Fawzy Barakat | Director of Works | IIP | Monitoring & Evaluation of Irrigation Systems | CSU | US(CO) | 8/27/87 | 9/24/87 | 0.9 | 40167 | EIIP |
| Nadia Aziz Welson | Director of Works | IIP | Monitoring & Evaluation of Irrigation Systems | CSU | US(CO) | 8/27/87 | 9/24/87 | 0.9 | 40167 | EIIP |
| Hassan Hussien Shouman | Dep. Project Director | IIP | Mgt of Research, Extension and Tng of Irr. Sys. | CSU | US(CO) | 9/13/87 | 10/11/87 | 0.9 | 40179 | EIIP |
| Ramsis Bakhoum Lotfy | General Director | IIP | Mgt of Research, Extension and Tng of Irr. Sys. | CSU | US(CO) | 9/13/87 | 10/11/87 | 0.9 | 40179 | EIIP |
| Essam El Din Fawzy Barakat | Director of Works | IIP | Irrigation Advisory Service Mgt. Training | CSU | US(CO) | 1/6/88 | 2/17/88 | 1.4 | 40190 | EIIP |
| Ali Kamal El Din Omar Fetih | Civil Engineer | IIP | Microcomputer Maintenance and Repair | CSU | US(CO) | 4/10/88 | 5/8/88 | 0.9 | 40196 | EIIP |
| Abdalla Abdel Halim Abdel Raham | Civil Engineer | IIP | SCS's IWM Training Course and OJT | SCS | US(CO,UT) | 6/5/88 | 7/17/88 | 1.4 | 40205 | EIIP |
| Ahmed Fouad Ahmed Ismail | Civil Engineer | IIP | SCS's IWM Training Course and OJT | SCS | US(CO,UT) | 6/5/88 | 7/17/88 | 1.4 | 40205 | EIIP |
| Ahmed Hussini Mohamed Moursi | Civil Engineer | IIP | SCS's IWM Training Course and OJT | SCS | US(CO,UT) | 6/5/88 | 7/17/88 | 1.4 | 40205 | EIIP |
| Boushra Guirguis Faltas | Civil Engineer | IIP | SCS's IWM Training Course and OJT | SCS | US(CO,UT) | 6/5/88 | 7/17/88 | 1.4 | 40205 | EIIP |
| El Smoaal Ahmed Mohamed Aly | Civil Engineer | IIP | SCS's IWM Training Course and OJT | SCS | US(CO,UT) | 6/5/88 | 7/17/88 | 1.4 | 40205 | EIIP |
| Hamdy Mohamed Mohamed Hadila | Civil Engineer | IIP | SCS's IWM Training Course and OJT | SCS | US(CO,UT) | 6/5/88 | 7/17/88 | 1.4 | 40205 | EIIP |
| Reda Mahdi Mohamed Mahdi | Irrigation Engineer | IIP | SCS's IWM Training Course and OJT | SCS | US(CO,UT) | 6/5/88 | 7/17/88 | 1.4 | 40205 | EIIP |
| Salah Abdel Hakim Abu Zanah | Civil Engineer | IIP | SCS's IWM Training Course and OJT | SCS | US(CO,UT) | 6/5/88 | 7/17/88 | 1.4 | 40205 | EIIP |
| Sayed Bakr Abdel Rahman | Civil Engineer | IIP | SCS's IWM Training Course and OJT | SCS | US(CO,UT) | 6/5/88 | 7/17/88 | 1.4 | 40205 | EIIP |
| Viola Wahib Wahba | Civil Engineer | IIP | SCS's IWM Training Course and OJT | SCS | US(CO,UT) | 6/5/88 | 7/17/88 | 1.4 | 40205 | EIIP |
| El Shennawy Abdel Atty El Shennawy | Senior Economist | IIP | Proj. Analysis for Developing Economies | CSU | US(CO) | 7/15/88 | 8/12/88 | 0.9 | 40209 | EIIP |
| Abdel Atty El Samman Abdel Salem | Asst. Dir. of Works | IIP | Study Tour (On Farm Water Management) | CSU | US(CO,AZ) | 7/31/88 | 8/21/88 | 0.7 | 40210 | EIIP |
| Ali Mohamed Mohamed Mahmoud | General Director | IIP | Study Tour (On Farm Water Management) | CSU | US(CO,AZ) | 7/31/88 | 8/21/88 | 0.7 | 40210 | EIIP |
| Gamil Moustafa Shalin | Civil Engineer | IIP | Study Tour (On Farm Water Management) | CSU | US(CO,AZ) | 7/31/88 | 8/21/88 | 0.7 | 40210 | EIIP |
| Hassan Hanfi Hassan El Kholy | Asst. Director | IIP | Study Tour (On Farm Water Management) | CSU | US(CO,AZ) | 7/31/88 | 8/21/88 | 0.7 | 40210 | EIIP |
| Hassan Osman Hussein | Civil Engineer | IIP | Study Tour (On Farm Water Management) | CSU | US(CO,AZ) | 7/31/88 | 8/21/88 | 0.7 | 40210 | EIIP |
| Ismail Mohamed Isamil Abd El Dayen | General Director | IIP | Study Tour (On Farm Water Management) | CSU | US(CO,AZ) | 7/31/88 | 8/21/88 | 0.7 | 40210 | EIIP |
| Issam El Din Abdel Hamid Rafaei | Civil Engineer | IIP | Study Tour (On Farm Water Management) | CSU | US(CO,AZ) | 7/31/88 | 8/21/88 | 0.7 | 40210 | EIIP |
| Mahmoud Mohamed El Sayed Selim | Civil Engineer | IIP | Study Tour (On Farm Water Management) | CSU | US(CO,AZ) | 7/31/88 | 8/21/88 | 0.7 | 40210 | EIIP |
| Mohamed Ahmed Aly Mohamed | Irrigation Engineer | IIP | Study Tour (On Farm Water Management) | CSU | US(CO,AZ) | 7/31/88 | 8/21/88 | 0.7 | 40210 | EIIP |
| Mohamed El Sayed Moh. Ahmed | Irrigation Engineer | IIP | Study Tour (On Farm Water Management) | CSU | US(CO,AZ) | 7/31/88 | 8/21/88 | 0.7 | 40210 | EIIP |
| Mohamed Faisal Mohamed Hussein | Director of Works | IIP | Study Tour (On Farm Water Management) | CSU | US(CO,AZ) | 7/31/88 | 8/21/88 | 0.7 | 40210 | EIIP |
| Mohamed Gamal Mansour El Shafei | Director of Works | IIP | Study Tour (On Farm Water Management) | CSU | US(CO,AZ) | 7/31/88 | 8/21/88 | 0.7 | 40210 | EIIP |
| Mostafa Mohamed Ahmed Shehata | Civil Engineer | IIP | Study Tour (On Farm Water Management) | CSU | US(CO,AZ) | 7/31/88 | 8/21/88 | 0.7 | 40210 | EIIP |
| Refat Saad Zakher | General Director | IIP | Study Tour (On Farm Water Management) | CSU | US(CO,AZ) | 7/31/88 | 8/21/88 | 0.7 | 40210 | EIIP |
| Wassif Abd El Kader Youssef Ahmed | Civil Engineer | IIP | Study Tour (On Farm Water Management) | CSU | US(CO,AZ) | 7/31/88 | 8/21/88 | 0.7 | 40210 | EIIP |
| Younes El Sayed Abd El Salam Karim | General Director | IIP | Study Tour (On Farm Water Management) | CSU | US(CO,AZ) | 7/31/88 | 8/21/88 | 0.7 | 40210 | EIIP |
| Youssef Ahmed Ahmed Refai | Asst. Director | IIP | Study Tour (On Farm Water Management) | CSU | US(CO,AZ) | 7/31/88 | 8/21/88 | 0.7 | 40210 | EIIP |
| Abdel Aziz Abd El Rahman M. El Baz | General Director | IIP | Study Tour ( US Irr. Advisory Services) | CSU | US(CO) | 10/5/88 | 11/2/88 | 0.9 | 40222 | EIIP |
| Abdel El Raouf Abdel Abou El Nour | Dep. Gen. Director | IIP | Study Tour ( US Irr. Advisory Services) | CSU | US(CO) | 10/5/88 | 11/2/88 | 0.9 | 40222 | EIIP |
| Abdel Razek Abdel Fattah Abou Eino | Civil Engineer | IIP | Study Tour ( US Irr. Advisory Services) | CSU | US(CO) | 10/5/88 | 11/2/88 | 0.9 | 40222 | EIIP |
| Bayoumi Ismail Ahmed El Medani | Undersecretary | IIP MPWWR | Study Tour ( US Irr. Advisory Services) | CSU | US(CO) | 10/5/88 | 11/2/88 | 0.9 | 40222 | EIIP |
| Essam El Din Fawzy Barakat | Director of Works | IIP | Study Tour ( US Irr. Advisory Services) | CSU | US(CO) | 10/5/88 | 11/2/88 | 0.9 | 40222 | EIIP |
| Hamed Soliman Shehata Zein | Dep. Gen. Director | IIP | Study Tour ( US Irr. Advisory Services) | CSU | US(CO) | 10/5/88 | 11/2/88 | 0.9 | 40222 | EIIP |
| Hassan Gaber Ismail Nada | Undersecretary | IIP MPWWR | Study Tour ( US Irr. Advisory Services) | CSU | US(CO) | 10/5/88 | 11/2/88 | 0.9 | 40222 | EIIP |
| Hosny Ahmed Gawdat | Asst. General Dir. | IIP | Study Tour ( US Irr. Advisory Services) | CSU | US(CO) | 10/5/88 | 11/2/88 | 0.9 | 40222 | EIIP |
| Hussien Mohamed El Sayed Sakr | General Director | IIP | Study Tour ( US Irr. Advisory Services) | CSU | US(CO) | 10/5/88 | 11/2/88 | 0.9 | 40222 | EIIP |
| Kamal Abdel Moniem Moh. El Beltag | Planning Engineer | IIP | Study Tour ( US Irr. Advisory Services) | CSU | US(CO) | 10/5/88 | 11/2/88 | 0.9 | 40222 | EIIP |

# IMS PARTICIPANT TRAINING REPORT

| NAME | POSITION | COMPONENT | COURSE/SUBJECT | TRAINING ENTITY | LOCATION | START DATE | END DATE | DURATION (MONTHS) | PIO/P | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| Madih Mohamed Khalifa | Agricultural Engineer | IIP | Study Tour ( US Irr. Advisory Services) | CSU | US(CO) | 10/5/88 | 11/2/88 | 0.9 | 40222 | EIIP |
| Magdy Abd El Samei Ahmed El Gamal | Civil Engineer | IIP | Study Tour ( US Irr. Advisory Services) | CSU | US(CO) | 10/5/88 | 11/2/88 | 0.9 | 40222 | EIIP |
| Magdy Yacoub Youssef | Dep. General Director | IIP | Study Tour ( US Irr. Advisory Services) | CSU | US(CO) | 10/5/88 | 11/2/88 | 0.9 | 40222 | EIIP |
| Maher Khodry Mohamed Salame | Dep. General Director | IIP | Study Tour ( US Irr. Advisory Services) | CSU | US(CO) | 10/5/88 | 11/2/88 | 0.9 | 40222 | EIIP |
| Mahmoud Abdou El Sayed El Bauni | General Director | IIP | Study Tour ( US Irr. Advisory Services) | CSU | US(CO) | 10/5/88 | 11/2/88 | 0.9 | 40222 | EIIP |
| Mohamed Abdel Azim M. Abd Ella | Inspector | IIP | Study Tour ( US Irr. Advisory Services) | CSU | US(CO) | 10/5/88 | 11/2/88 | 0.9 | 40222 | EIIP |
| Mohamed Ezzat El Sayed Ali El Shafei | Asst. Dir. of Works | IIP | Study Tour ( US Irr. Advisory Services) | CSU | US(CO) | 10/5/88 | 11/2/88 | 0.9 | 40222 | EIIP |
| Mohamed Ibrahim Salama El Shafei | General Director | IIP | Study Tour ( US Irr. Advisory Services) | CSU | US(CO) | 10/5/88 | 11/2/88 | 0.9 | 40222 | EIIP |
| Saad Mohamed Kaid | General Director | IIP | Study Tour ( US Irr. Advisory Services) | CSU | US(CO) | 10/5/88 | 11/2/88 | 0.9 | 40222 | EIIP |
| Salah Ismail Mohamed Abd Alla | Civil Engineer | IIP | Study Tour ( US Irr. Advisory Services) | CSU | US(CO) | 10/5/88 | 11/2/88 | 0.9 | 40222 | EIIP |
| Salah Riad Abd El Rehim Beshir | Civil Engineer | IIP | Study Tour ( US Irr. Advisory Services) | CSU | US(CO) | 10/5/88 | 11/2/88 | 0.9 | 40222 | EIIP |
| Salem Sayed Ahmed Abdel Ghafar | Project Director | IIP | Study Tour ( US Irr. Advisory Services) | CSU | US(CO) | 10/5/88 | 11/2/88 | 0.9 | 40222 | EIIP |
| Tarek Abdel Aziz Ibrahim Emam | Civil Engineer | IIP | Study Tour ( US Irr. Advisory Services) | CSU | US(CO) | 10/5/88 | 11/2/88 | 0.9 | 40222 | EIIP |
| Ali Kamal El Din Omar Fetih | Civil Engineer | IIP | Diagnostic and Maintenance of Computers | CSU | US(CO) | 11/20/88 | 1/1/89 | 1.4 | 40230 | EIIP |
| Khaled Mohamed Hassan Omran | Civil Engineer | IIP | Diagnostic and Maintenance of Computers | CSU | US(CO) | 11/20/88 | 1/1/89 | 1.4 | 40230 | EIIP |
| Taher Mohamed Ali Zidan | General Director | IIP | Symposium on Irrigation Canal Lining | AWF | US(CO) | 6/18/89 | 7/9/89 | 0.7 | 10555 | EIIP |
| Ahmed El Sayed Omran | General Director | IIP | Study Tour (On Farm Irrigation Technical) | CSU | US(CO) | 10/5/89 | 11/2/89 | 0.9 | 70643 | EIIP |
| Khaled Abdel Hai Ramadan Mohamed | Civil Engineer | IIP | Irrigation System Rehabilitation | CSU | US(CO) | 11/21/89 | 1/2/90 | 1.4 | 40227 | EIIP |
| Ali Kamal El Din Omar Fetih | Civil Engineer | IIP | CAD/Primavera Computer Software Crse | CADI/MKE | US(CO,CA) | 2/3/90 | 3/17/90 | 1.4 | 70766 | |
| Khaled Hussien Bekheit | Civil Engineer | IIP | CAD/Primavera Computer Software Crse | CADI/MKE | US(CO,CA) | 2/3/90 | 3/17/90 | 1.4 | 70766 | |
| Khaled Mohamed Hassan Omran | Civil Engineer | IIP | CAD/Primavera Computer Software Crse | CADI/MKE | US(CO,CA) | 2/23/90 | 4/6/90 | 1.4 | 70770 | |
| Mona Mahmoud Abdel Meguid | Civil Engineer | IIP | CAD/Primavera Computer Software Crse | CADI/MKE | US(CO,CA) | 2/23/90 | 4/6/90 | 1.4 | 70770 | |
| Mona Shawki Abdel Rahman | Civil Engineer | IIP | CAD/Primavera Computer Software Crse | CADI/MKE | US(CO,CA) | 2/23/90 | 4/6/90 | 1.4 | 70770 | |
| Abdel Hafez Hamad Shalabi | Asst. Dir. of Works | IIP | Study Tour (On Farm Irrigation Technical) | CSU | US(CA,AZ) | 9/14/90 | 10/12/90 | 0.9 | 70807 | |
| Abdel Hafez Taha Ahmed Ghevell | Irrigation Engineer | IIP | Study Tour (On Farm Irrigation Technical) | CSU | US(CA,AZ) | 9/14/90 | 10/12/90 | 0.9 | 70807 | |
| Adel Fahim Maksemous | Asst. Dir. of Works | IIP | Study Tour (On Farm Irrigation Technical) | CSU | US(CA,AZ) | 9/14/90 | 10/12/90 | 0.9 | 70807 | |
| Ahmed Mohamed Ibrahim | Director of Works | IIP | Study Tour (On Farm Irrigation Technical) | CSU | US(CA,AZ) | 9/14/90 | 10/12/90 | 0.9 | 70807 | |
| Ali Abdel Meguid Menoufi | Irrigation Engineer | IIP | Study Tour (On Farm Irrigation Technical) | CSU | US(CA,AZ) | 9/14/90 | 10/12/90 | 0.9 | 70807 | |
| Ali El Tohami Ahmed Kashaba | Director of Works | IIP | Study Tour (On Farm Irrigation Technical) | CSU | US(CA,AZ) | 9/14/90 | 10/12/90 | 0.9 | 70807 | |
| Asrar Mowafi Ahmed Hanafi | Asst. Dir. of Works | IIP | Study Tour (On Farm Irrigation Technical) | CSU | US(CA,AZ) | 9/14/90 | 10/12/90 | 0.9 | 70807 | |
| Fawzy Mohamed Shehata | Director of Works | IIP | Study Tour (On Farm Irrigation Technical) | CSU | US(CA,AZ) | 9/14/90 | 10/12/90 | 0.9 | 70807 | |
| Ibrahim Soliman El Gamacy | Asst. Dir. of Works | IIP | Study Tour (On Farm Irrigation Technical) | CSU | US(CA,AZ) | 9/14/90 | 10/12/90 | 0.9 | 70807 | |
| Magdy Mahmoud Hanafi | Irrigation Engineer | IIP | Study Tour (On Farm Irrigation Technical) | CSU | US(CA,AZ) | 9/14/90 | 10/12/90 | 0.9 | 70807 | |
| Mahmoud Ahmed Anter Sayed | Civil Engineer | IIP | Study Tour (On Farm Irrigation Technical) | CSU | US(CA,AZ) | 9/14/90 | 10/12/90 | 0.9 | 70807 | |
| Mohamed Abdel Khalik Selim Beltagy | Asst. Dir. of Works | IIP | Study Tour (On Farm Irrigation Technical) | CSU | US(CA,AZ) | 9/14/90 | 10/12/90 | 0.9 | 70807 | |
| Mohamed Abou Bakr El Sayed Aly | Civil Engineer | IIP | Study Tour (On Farm Irrigation Technical) | CSU | US(CA,AZ) | 9/14/90 | 10/12/90 | 0.9 | 70807 | |
| Mohamed Mohamed El Shaeedy | Director of Works | IIP | Study Tour (On Farm Irrigation Technical) | CSU | US(CA,AZ) | 9/14/90 | 10/12/90 | 0.9 | 70807 | |
| Mohamed Reda El Bendary | Director of Works | IIP | Study Tour (On Farm Irrigation Technical) | CSU | US(CA,AZ) | 9/14/90 | 10/12/90 | 0.9 | 70807 | |
| Mohsen Mansour El Sharkawy | Asst. Dir. of Works | IIP | Study Tour (On Farm Irrigation Technical) | CSU | US(CA,AZ) | 9/14/90 | 10/12/90 | 0.9 | 70807 | |
| Mostafa Mahmoud Abou El Enein | Director of Works | IIP | Study Tour (On Farm Irrigation Technical) | CSU | US(CA,AZ) | 9/14/90 | 10/12/90 | 0.9 | 70807 | |
| Samir Sami Ayad Maksimous | Director of Works | IIP | Study Tour (On Farm Irrigation Technical) | CSU | US(CA,AZ) | 9/14/90 | 10/12/90 | 0.9 | 70807 | |
| Sayed Mohamed Mashady | Director of Works | IIP | Study Tour (On Farm Irrigation Technical) | CSU | US(CA,AZ) | 9/14/90 | 10/12/90 | 0.9 | 70807 | |
| Ali Kamal El Din Omar Fetih | Civil Engineer | IIP | Computer Assisted Design (CAD) & LAN | CADI | US(CO) | 2/14/91 | 3/28/91 | 1.4 | 70837 | |
| Khaled Mohamed Hassan Omran | Civil Engineer | IIP | Computer Assisted Design (CAD) & LAN | CADI | US(CO) | 2/14/91 | 3/28/91 | 1.4 | 70837 | |
| El Shennawy Abdel Atty El Shennawy | Senior Economist | IIP | Comp. Model for Project Eval. & Analysis | CSU/USU | US(CO,UT) | 5/11/91 | 6/22/91 | 1.4 | 70865 | |
| Ashraf Hamdy Mohamed El Taher | Civil Engineer | IIP | Design & Mgt. of Local Irr. Organizations | CSU | US(CO) | 6/14/91 | 7/12/91 | 0.9 | 70874 | |
| Essam El Din Fawzy Barakat | Director of Works | IIP | Design & Mgt. of Local Irr. Organizations | CSU | US(CO) | 6/14/91 | 7/12/91 | 0.9 | 70874 | |
| Hany Omar Abdel Maboud Deebes | Civil Engineer | IIP | Design & Mgt. of Local Irr. Organizations | CSU | US(CO) | 6/14/91 | 7/12/91 | 0.9 | 70874 | |
| Hassan Hussien Shouman | Dep. Project Director | IIP | Design & Mgt. of Local Irr. Organizations | CSU | US(CO) | 6/14/91 | 7/12/91 | 0.9 | 70874 | |
| Khaled M. Rashad Mahmoud Abou | Civil Engineer | IIP | Design & Mgt. of Local Irr. Organizations | CSU | US(CO) | 6/14/91 | 7/12/91 | 0.9 | 70874 | |
| Salem Mohamed Mohamed Salem | Civil Engineer | IIP | Design & Mgt. of Local Irr. Organizations | CSU | US(CO) | 6/14/91 | 7/12/91 | 0.9 | 70874 | |
| Atef Mohamed El Kashef | Director of Works | IIP | Irr. Scheduling and Design Orientation | USU/USBR | US(UT,CO) | 7/5/91 | 8/2/91 | 0.9 | 70873 | |

CID/CSU

MKE/LBI

# IMS PARTICIPANT TRAINING REPORT

| NAME | POSITION | COMPONENT | COURSE/SUBJECT | TRAINING ENTITY | LOCATION | START DATE | END DATE | DURATION (MONTHS) | PIO/P | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| Azza Abdel Hamid Abdel Aziz | IAS Engineer | IIP | Irr. Scheduling and Design Orientation | USU/USBR | US(UT,CO) | 7/5/91 | 8/2/91 | 0.9 | 70873 | |
| Khalid Hussein Bekheit | Design Engineer | IIP | Irr. Scheduling and Design Orientation | USU/USBR | US(UT,CO) | 7/5/91 | 8/2/91 | 0.9 | 70873 | |
| Nadia Aziz Welson | Director of Works | IIP | Irr. Scheduling and Design Orientation | USU/USBR | US(UT,CO) | 7/5/91 | 8/2/91 | 0.9 | 70873 | |
| Ramsis Bakhoum Lotfy | General Director | IIP | Modern Irrigation System Management | CSU | US(CO) | 8/8/91 | 9/5/91 | 0.9 | 70883 | |
| Salem Sayed Ahmed Abdel Ghafar | Project Director | IIP | Modern Irrigation System Management | CSU | US(CO) | 8/8/91 | 9/5/91 | 0.9 | 70883 | |
| Abdalla Abdel Halim Abdel Raham | Civil Engineer | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 8/17/91 | 9/7/91 | 0.7 | 70891 | |
| Abdel Fattah Abd El Salam El Akhrass | Director of Works | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 8/17/91 | 9/7/91 | 0.7 | 70891 | |
| Ahmed Abdel Mageed M. Abdel Mageed | Irrigation Engineer | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 8/17/91 | 9/7/91 | 0.7 | 70891 | |
| Ahmed El Sayed Ahmed Khalil | Irrigation Engineer | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 8/17/91 | 9/7/91 | 0.7 | 70891 | |
| Ali Morsy Mohamed Bat | General Director | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 8/17/91 | 9/7/91 | 0.7 | 70891 | |
| Ehab Abdek Rahman Habib | Civil Engineer | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 8/17/91 | 9/7/91 | 0.7 | 70891 | |
| Emad El Aaied El Awady Abd El Daiem | Civil Engineer | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 8/17/91 | 9/7/91 | 0.7 | 70891 | |
| Essa Mohamed Sayed Ahmed | General Director | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 8/17/91 | 9/7/91 | 0.7 | 70891 | |
| Fouad Fahmy Nagib Barsoum | General Director | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 8/17/91 | 9/7/91 | 0.7 | 70891 | |
| Gamal Abd El Fatah Aly El Baz | Civil Engineer | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 8/17/91 | 9/7/91 | 0.7 | 70891 | NON-RETURN |
| Hamdy Shawky Mostafa El Zekety | Civil Engineer | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 8/17/91 | 9/7/91 | 0.7 | 70891 | |
| Heshmat Mohamed Nabil | Irrigation Engineer | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 8/17/91 | 9/7/91 | 0.7 | 70891 | |
| Iman Ibrahim El Massry | Planning Engineer | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 8/17/91 | 9/7/91 | 0.7 | 70891 | |
| Mohamed Abdel Aziz Abd El Latif | General Director | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 8/17/91 | 9/7/91 | 0.7 | 70891 | |
| Mohamed El Sayed Abd El Wahab Assal | General Director | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 8/17/91 | 9/7/91 | 0.7 | 70891 | |
| Mohamed Osama Ahmed Khalil | Civil Engineer | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 8/17/91 | 9/7/91 | 0.7 | 70891 | |
| Nabil Fawzi Nashed | General Director | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 8/17/91 | 9/7/91 | 0.7 | 70891 | |
| Reda Mahdi Mohamed Mahdi | Irrigation Engineer | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 8/17/91 | 9/7/91 | 0.7 | 70891 | |
| Sidhom Wahba Eassa | District Engineer | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 8/17/91 | 9/7/91 | 0.7 | 70891 | |
| Wadie Botrous Mikael | General Director | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 8/17/91 | 9/7/91 | 0.7 | 70891 | |
| Abdel Moez Abd El Fattah M. Sayed | Civil Engineer | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 11/30/91 | 12/21/91 | 0.7 | 70907 | |
| Ahmed El Sayed Omran | General Director | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 11/30/91 | 12/21/91 | 0.7 | 70907 | |
| Alaa El Din Ibrahim Hussein Khalil | District Engineer | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 11/30/91 | 12/21/91 | 0.7 | 70907 | |
| Hamdy Ibrahim Mahefouz | Civil Engineer | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 11/30/91 | 12/21/91 | 0.7 | 70907 | |
| Hassan Abbas Mahmoud Teib | Civil Engineer | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 11/30/91 | 12/21/91 | 0.7 | 70907 | |
| Heidr M. El Sayed El Samanoudy | Civil Engineer | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 11/30/91 | 12/21/91 | 0.7 | 70907 | |
| Ibrahim Malek Tannas | General Director | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 11/30/91 | 12/21/91 | 0.7 | 70907 | |
| Magdy Abd El Moniem Amin Ahmed | Civil Engineer | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 11/30/91 | 12/21/91 | 0.7 | 70907 | |
| Magdy Mahmoud Mohamed Hassan | District Engineer | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 11/30/91 | 12/21/91 | 0.7 | 70907 | |
| Mohamed Abdel Rahman Abou El Soud | Civil Engineer | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 11/30/91 | 12/21/91 | 0.7 | 70907 | |
| Mohamed Dardir Abd El Rahim | Civil Engineer | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 11/30/91 | 12/21/91 | 0.7 | 70907 | |
| Mohamed Kamal Mohamed Kamel | Civil Engineer | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 11/30/91 | 12/21/91 | 0.7 | 70907 | |
| Morocos Mossad Sourial | Civil Engineer | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 11/30/91 | 12/21/91 | 0.7 | 70907 | |
| Samir Ibrahim Ahmed Shobir | General Director | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 11/30/91 | 12/21/91 | 0.7 | 70907 | |
| Samy Abd El Moneim H. El Shaboury | District Engineer | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 11/30/91 | 12/21/91 | 0.7 | 70907 | |
| Sarwat Ebeid Alla N. Ebeid Alla | General Director | IIP | Study Tour (Irr. Systems Planning, O&M) | USBR | US(CA,AZ) | 11/30/91 | 12/21/91 | 0.7 | 70907 | |
| Ali Kamal El Din Omar Fetih | Civil Engineer | IIP | Advanced Computer Net Work O&M | CSU | US(CO) | 2/24/92 | 3/30/92 | 1.2 | 70917 | |
| Gamal Ismail Shakor | Civil Engineer | IIP | Advanced Computer Net Work O&M | CSU | US(CO) | 2/24/92 | 3/30/92 | 1.2 | 70917 | |
| Mohamed El Said Moh. Hassan | Civil Engineer | IIP | Advanced Computer Net Work O&M | CSU | US(CO) | 2/24/92 | 3/30/92 | 1.2 | 70917 | |
| Abdel Haq Hassan Khater | Director of Works | IIP | Study Tour (Irrigation Projects &WUA) | USBR | US(AZ, CA) | 5/9/92 | 5/23/92 | 0.5 | 70927 | |
| Abdel Sadek Abd Wanis | Civil Engineer | IIP | Study Tour (Irrigation Projects &WUA) | USBR | US(AZ, CA) | 5/9/92 | 5/23/92 | 0.5 | 70927 | |
| Ahmed Housein Abd El Halee | Economist | IIP | Study Tour (Irrigation Projects &WUA) | USBR | US(AZ, CA) | 5/9/92 | 5/23/92 | 0.5 | 70927 | |
| Ahmed Mohamed Abd El Ham | Civil Engineer | IIP | Study Tour (Irrigation Projects &WUA) | USBR | US(AZ, CA) | 5/9/92 | 5/23/92 | 0.5 | 70927 | |
| Ahmed Shaaban Abd El Mota | Civil Engineer | IIP | Study Tour (Irrigation Projects &WUA) | USBR | US(AZ, CA) | 5/9/92 | 5/23/92 | 0.5 | 70927 | |
| Ayman Mohamed El Hadad | Civil Engineer | IIP | Study Tour (Irrigation Projects &WUA) | USBR | US(AZ, CA) | 5/9/92 | 5/23/92 | 0.5 | 70927 | |
| El Shahat Abd El Latif | Director of Works | IIP | Study Tour (Irrigation Projects &WUA) | USBR | US(AZ, CA) | 5/9/92 | 5/23/92 | 0.5 | 70927 | |
| Farouk Mohamed Kamol Sayed | Undersecretary | IIP MPWWR | Study Tour (Irrigation Projects &WUA) | USBR | US(AZ, CA) | 5/9/92 | 5/23/92 | 0.5 | 70927 | |

# IMS PARTICIPANT TRAINING REPORT

| NAME | POSITION | COMPONENT | COURSE/SUBJECT | TRAINING ENTITY | LOCATION | START DATE | END DATE | DURATION (MONTHS) | PIO/P | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| Magdy Mohamed Abd El Kashef | General Director | IIP | Study Tour (Irrigation Projects &WUA) | USBR | US(AZ, CA) | 5/9/92 | 5/23/92 | 0.5 | 70927 | |
| Maher Khodry Mohamed Salame | Deputy Director | IIP | Study Tour (Irrigation Projects &WUA) | USBR | US(AZ, CA) | 5/9/92 | 5/23/92 | 0.5 | 70927 | |
| Moawad Ahmed Soliman | Undersecretary | IIP MPWWR | Study Tour (Irrigation Projects &WUA) | USBR | US(AZ, CA) | 5/9/92 | 5/23/92 | 0.5 | 70927 | |
| Mohamed Hassan Abd El Kar | Deputy Director | IIP | Study Tour (Irrigation Projects &WUA) | USBR | US(AZ, CA) | 5/9/92 | 5/23/92 | 0.5 | 70927 | |
| Mohamed Mohamed El Besta | Biologist | IIP | Study Tour (Irrigation Projects &WUA) | USBR | US(AZ, CA) | 5/9/92 | 5/23/92 | 0.5 | 70927 | |
| Mohamed Samih Mohamed | Asst. Dir. of Works | IIP | Study Tour (Irrigation Projects &WUA) | USBR | US(AZ, CA) | 5/9/92 | 5/23/92 | 0.5 | 70927 | |
| Nabil Mohamed Hussien Soliman | Director of Works | IIP | Study Tour (Irrigation Projects &WUA) | USBR | US(AZ, CA) | 5/9/92 | 5/23/92 | 0.5 | 70927 | |
| Nosshy Shaker Mekhaiel | Deputy Director | IIP | Study Tour (Irrigation Projects &WUA) | USBR | US(AZ, CA) | 5/9/92 | 5/23/92 | 0.5 | 70927 | |
| Raafat Zaglool Abd El Hame | Civil Engineer | IIP | Study Tour (Irrigation Projects &WUA) | USBR | US(AZ, CA) | 5/9/92 | 5/23/92 | 0.5 | 70927 | |
| Safwat Monir Mahdy | Civil Engineer | IIP | Study Tour (Irrigation Projects &WUA) | USBR | US(AZ, CA) | 5/9/92 | 5/23/92 | 0.5 | 70927 | |
| Sameh Mokhtar Abd El Halim | Civil Engineer | IIP | Study Tour (Irrigation Projects &WUA) | USBR | US(AZ, CA) | 5/9/92 | 5/23/92 | 0.5 | 70927 | NON-RETURN |
| Abdel Haq Hassan Khater | Director of Works | IIP | Study Tour (Irrigation Projects &WUA) | USBR | US(AZ, CA) | 5/9/92 | 5/23/92 | 0.5 | 70927 | |
| Abdalla Mabrouk Douma | Asst. Director | IIP | Develop & Sustain Private WUAs | CSU | US, PHILIP | 7/27/92 | 8/31/92 | 1.2 | 70944 | |
| Abdel Atty El Samman Abdel Salem | IAS Manager | IIP | Develop & Sustain Private WUAs | CSU | US, PHILIP | 7/27/92 | 8/31/92 | 1.2 | 70944 | |
| Azza Abdel Hamid Abdel Aziz | IAS Engineer | IIP | Develop & Sustain Private WUAs | CSU | US, PHILIP | 7/27/92 | 8/31/92 | 1.2 | 70944 | |
| El Said Abdel Salam El Khouly | Agricultural Engineer | IIP | Develop & Sustain Private WUAs | CSU | US, PHILIP | 7/27/92 | 8/31/92 | 1.2 | 70944 | |
| Essam El Din Fawzy Barakat | Director of IAS | IIP | Develop & Sustain Private WUAs | CSU | US, PHILIP | 7/27/92 | 8/31/92 | 1.2 | 70944 | |
| Gamal Abdel Hamid Metwalli | IAS Engineer | IIP | Develop & Sustain Private WUAs | CSU | US, PHILIP | 7/27/92 | 8/31/92 | 1.2 | 70944 | |
| Khattab Ismail Khattab El Hassawy | IAS Director | IIP | Develop & Sustain Private WUAs | CSU | US, PHILIP | 7/27/92 | 8/31/92 | 1.2 | 70944 | |
| Madih Mohamed Khalifa | Agricultural Engineer | IIP | Develop & Sustain Private WUAs | CSU | US, PHILIP | 7/27/92 | 8/31/92 | 1.2 | 70944 | |
| Mahmoud Mohamed Abdel Naby | Agricultural Engineer | IIP | Develop & Sustain Private WUAs | CSU | US, PHILIP | 7/27/92 | 8/31/92 | 1.2 | 70944 | |
| Mamdouh Ali Metwalli | IAS Asst. Director | IIP | Develop & Sustain Private WUAs | CSU | US, PHILIP | 7/27/92 | 8/31/92 | 1.2 | 70944 | |
| Mohamed Helal Abdel Karim | IAS Engineer | IIP | Develop & Sustain Private WUAs | CSU | US, PHILIP | 7/27/92 | 8/31/92 | 1.2 | 70944 | |
| Naiem Abdel Messeh Khalil Goubrial | IAS Director | IIP | Develop & Sustain Private WUAs | CSU | US, PHILIP | 7/27/92 | 8/31/92 | 1.2 | 70944 | |
| Ramsis Bakhoum Lotfy | General Director | IIP | Develop & Sustain Private WUAs | CSU | US, PHILIP | 7/27/92 | 8/31/92 | 1.2 | 70944 | |
| Salah Awad Mohamed El Sayed | IAS Manager Deputy | IIP | Develop & Sustain Private WUAs | CSU | US, PHILIP | 7/27/92 | 8/31/92 | 1.2 | 70944 | |
| Salem Mohamed M. S. Shouhan | IAS Engineer | IIP | Develop & Sustain Private WUAs | CSU | US, PHILIP | 7/27/92 | 8/31/92 | 1.2 | 70944 | |
| Sayed Mahmoud Meshady | IAS Director | IIP | Develop & Sustain Private WUAs | CSU | US, PHILIP | 7/27/92 | 8/31/92 | 1.2 | 70944 | |
| Abdel Fattah Taha | Design Engineer | IIP | Soil & Water Conservation & Management | USU | US(UT,CO,TX) | 8/16/92 | 9/20/92 | 1.2 | 70954 | |
| Ali Morsy Mohamed Bat | General Director | IIP | Soil & Water Conservation & Management | USU | US(UT,CO,TX) | 8/16/92 | 9/20/92 | 1.2 | 70954 | |
| Ali Yehia Mohamed Ibrahim | Director of Works | IIP | Soil & Water Conservation & Management | USU | US(UT,CO,TX) | 8/16/92 | 9/20/92 | 1.2 | 70954 | |
| Ashraf Gamal Hanna Ban | Design Engineer | IIP | Soil & Water Conservation & Management | USU | US(UT,CO,TX) | 8/16/92 | 9/20/92 | 1.2 | 70954 | |
| Ashraf Hamdy Mohamed El Taher | Civil Engineer | IIP | Soil & Water Conservation & Management | USU | US(UT,CO,TX) | 8/16/92 | 9/20/92 | 1.2 | 70954 | NON-RETURN |
| Atef Mohamed Abdel Kad | Director of Works | IIP | Soil & Water Conservation & Management | USU | US(UT,CO,TX) | 8/16/92 | 9/20/92 | 1.2 | 70954 | |
| Ihab Abdel Rahman Habib | Design Engineer | IIP | Soil & Water Conservation & Management | USU | US(UT,CO,TX) | 8/16/92 | 9/20/92 | 1.2 | 70954 | |
| Khaled Mohamed Ibrahim | Design Engineer | IIP | Soil & Water Conservation & Management | USU | US(UT,CO,TX) | 8/16/92 | 9/20/92 | 1.2 | 70954 | |
| Khalid Mohamed Rashad | Civil Engineer | IIP | Soil & Water Conservation & Management | USU | US(UT,CO,TX) | 8/16/92 | 9/20/92 | 1.2 | 70954 | |
| Tarek Abdel Hamid Mohamed | Design Engineer | IIP | Soil & Water Conservation & Management | USU | US(UT,CO,TX) | 8/16/92 | 9/20/92 | 1.2 | 70954 | |
| Abdel Rahman Mohamed Shalaby | General Director | IIP MPWWR | High Level Official Int. Study Tour | CSU | SPAIN & PHILI | 10/11/92 | 10/25/92 | 0.5 | 88616 | |
| El Sayed Mohamed Ahmed Hassan | Head, Improv. Sector | IIP MPWWR | High Level Official Int. Study Tour | CSU | SPAIN & PHILI | 10/11/92 | 10/25/92 | 0.5 | 88616 | |
| Hassan Hussein Shouman | Project Director | IIP | High Level Official Int. Study Tour | CSU | SPAIN & PHILI | 10/11/92 | 10/25/92 | 0.5 | 88616 | |
| Khalil Ibrahim Omar | Chairman, Irr.. Dept. | IIP MPWWR | High Level Official Int. Study Tour | CSU | SPAIN & PHILI | 10/11/92 | 10/25/92 | 0.5 | 88616 | |
| Mohamed El Amir Osman | General Director | IIP | High Level Official Int. Study Tour | CSU | SPAIN & PHILI | 10/11/92 | 10/25/92 | 0.5 | 88616 | |
| Sayed Mohamed Shariet | Undersecretary | IIP MPWWR | High Level Official Int. Study Tour | CSU | SPAIN & PHILI | 10/11/92 | 10/25/92 | 0.5 | 88616 | |
| Taher Mohamed Ali Zidan | General Director | IIP | High Level Official Int. Study Tour | CSU | SPAIN & PHILI | 10/11/92 | 10/25/92 | 0.5 | 88616 | |
| Zaghloul Dakrouri Ahmed Dakrouri | Undersecretary | IIP MPWWR | High Level Official Int. Study Tour | CSU | SPAIN & PHILI | 10/11/92 | 10/25/92 | 0.5 | 83616 | |
| Ali Kamal El Din Omar Fetih | Civil Engineer | IIP | Modeling, Reg. & Monitoring of Irr. Systems | CIM | US(CO,AZ) | 1/29/93 | 2/26/93 | 0.9 | 88678 | |
| William Zaki Hanna Gadalla | Civil Engineer | IIP | Modeling, Reg. & Monitoring of Irr. Systems | CIM | US(CO,AZ) | 1/29/93 | 2/26/93 | 0.9 | 88678 | |
| El Shennawy Abdel Atty El Shennawy | Senior Economist | IIP | SPSS Software and Data Analysis for M&E | CSU | US(CO) | 4/2/93 | 5/1/93 | 1.0 | 88712 | |
| Gamal El Din Mohamed Ayad Ibrahim | Senior Economist | IIP | SPSS Software and Data Analysis for M&E | CSU | US(CO) | 4/2/93 | 5/1/93 | 1.0 | 88712 | |
| Abdel Atty El Shenawy | Economist | IIP | Monitoring And Evaluation Program | CSU | US, (CO) | 4/2/93 | 5/9/93 | 1.2 | 70944 | |

# IMS PARTICIPANT TRAINING REPORT

| NAME | POSITION | COMPONENT | COURSE/SUBJECT | TRAINING ENTITY | LOCATION | START DATE | END DATE | DURATION (MONTHS) | PIO/P | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|

GRAND TOTAL OF PARTICIPANTS = 259

GRAND TOTAL MONTHS = 234.5

# IIP Off-Shore Training Schedule, July 1993 - June 1994

| AM No. / Program Title | No. | Position | Qrtr | Dur mo. | Dates Start | Dates End | Institution | Q1 No. | Q1 US$ | Q2 No. | Q2 US$ | Q3 No. | Q3 US$ | Q4 No | Q4 US$ | Totals No. | Totals US$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Project Management & Administration (PMA)** | | | | | | | | | | | | | | | | | |
| Computer App for Design/Mngmnt of Micro Irr Systems | 8 | IIP Staff | Q2 | 1.00 | Oct-93 | Dec-93 | AWF/CSU | | | 8 | 76,000 | | | | | 8 | 76,000 |
| Study Tour: Irr Projects & Water User Association | 8 | IIP Staff | Q3 | 0.75 | Jan-94 | Mar-94 | AWF | | | | | 8 | 35,000 | | | 8 | 35,000 |
| PMA Subtotal | 16 | | | | | | | 0 | 0 | 8 | 76,000 | 8 | 35,000 | 0 | 0 | 16 | 111,000 |
| **Construction/Equipment (CON)** | | | | | | | | | | | | | | | | | |
| Construction Quality Control | 8 | IIP Staff | Q4 | 0.75 | Apr-94 | Jun-94 | TBD | | | | | | | 8 | 42,000 | 8 | 42,000 |
| CON Subtotal | 8 | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 42,000 | 8 | 42,000 |
| **Delivery/Mesqa Systems Design (DES)** | | | | | | | | | | | | | | | | | |
| Modeling, Reg & Mon of Lined/Unlined Irr Water Del Sys | 15 | IIP Gen Dir | Q2 | 1.25 | Oct-93 | Dec-93 | CSU | | | 15 | 37,000 | | | | | 15 | 37,000 |
| DES Subtotal | 15 | | | | | | | 0 | 0 | 15 | 37,000 | 0 | 0 | 0 | 0 | 15 | 37,000 |
| **Feasibility Studies (FST)** | | | | | | | | | | | | | | | | | |
| Diagnostic Analysis method for Eval. & Irr. Sys. Impr. | 15 | IIP Staff | Q4 | 1.00 | Apr-94 | Jun-94 | | | | | | | | 15 | 104,000 | 15 | 104,000 |
| FST Subtotal | 15 | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 104,000 | 15 | 104,000 |
| **Irrigation Advisory Service (IAS/WUA)** | | | | | | | | | | | | | | | | | |
| Senior Official Tour to Selected Countries | 8 | MPWWR Staff | Q2 | 0.75 | Oct-93 | Dec-93 | TBD | | | 8 | 45,000 | | | | | 8 | 45,000 |
| Dev Use & Eval of AV Programs/Materials | 2 ~~4~~ | IAS Dir/Eng | Q3 | 1.00 | Jan-94 | Mar-94 | Cornell | | | | | 4 | 28,000 | | | 4 | 28,000 |
| IAS Subtotal | 12 | | | | | | | 0 | 0 | 8 | 45,000 | 4 | 28,000 | 0 | 0 | 12 | 73,000 |
| **Specialized Studies - M. Sc. Programs (SPS)** | | | | | | | | | | | | | | | | | |
| M S Degree: on farm Water Management | 1 | M. Hassan | 1-4 | 12.00 | Jul-93 | Jun-94 | USA | 1 | 7,500 | | 7,500 | | 7,500 | | 7,500 | 1 | 30,000 |
| M S. Degree: Systems Analysis and Micro Systems | 1 | E. Barakat | 1-4 | 20.00 | Aug-93 | Jun-94 | USA | 1 | 5,000 | | 7,500 | | 7,500 | | 7,500 | 1 | 27,500 |
| ~~M S. Degree: WUA Management/Evaluation~~ | 1 | A. Haddad | 1-4 | 20.00 | Aug-93 | Jun-94 | USA | 1 | 5,000 | | 7,500 | | 7,500 | | 7,500 | 1 | 27,500 |
| M S. Degree in IS & WUA Involvement | 3 | TBD | 1-4 | 20.00 | Jan-94 | Jan-94 | USA | 3 | | | | | 22,500 | | 22,500 | 3 | 45,000 |
| SPS Subtotal | 6 | | | | | | | 6 | 17,500 | 0 | 22,500 | 0 | 45,000 | 0 | 45,000 | 6 | 130,000 |
| Totals | 72 | | | | | | | 6 | 17,500 | 31 | 180,500 | 12 | 108,000 | 23 | 191,000 | 72 | 497,000 |

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# IIP Off-Shore Training Schedule, July 1994 - June 1995

| | AM No. Program Title | No. | Position | Qrtr | Dur mo. | Dates Start | Dates End | Institution | Q1 No | Q1 US$ | Q2 No | Q2 US$ | Q3 No. | Q3 US$ | Q4 No. | Q4 US$ | Totals No. | To[illegible] U[illegible] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | **Project Management & Administration (PMA)** | | | | | | | | | | | | | | | | | |
| | Study Tour: Irr Projects & Water User Association | 8 | IIP Staff | Q3 | 0 75 | Jan-95 | Jan-95 | AWF | | | | | 8 | 35,000 | | | 8 | [illegible] |
| | PMA Subtotal | 8 | | | | | | | 0 | 0 | 0 | 0 | 8 | 35,000 | 0 | 0 | 8 | [illegible] |
| B | **Construction/Equipment (CON)** | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 0 | |
| | CON Subtotal | 0 | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| C. | **Delivery/Mesqa Systems Design (DES)** | | | | | | | | | | | | | | | | | |
| | DES Subtotal | 0 | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| D | **Feasibility Studies (FST)** | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | 0 | | 0 | | 0 | | 0 | |
| | FST Subtotal | 0 | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| E. | **Irrigation Advisory Service (IAS/WUA)** | | | | | | | | | | | | | | | | | |
| | Design/Methods of Improved Water Control, Dist & Use | 8 | IAS Dir/Eng | Q1 | 1.25 | Jul-94 | Sep-94 | CSU | 8 | 68,000 | | | | | | | 8 | [illegible] |
| | Dev and Monitoring Irr Schedules for Micro Irr Systems | 8 | IAS Dir/Eng | Q2 | 1 00 | Oct-94 | Dec-94 | CSU | | | 8 | 55,000 | | | | | 8 | [illegible] |
| | Princ. Pract & Roles of Water Users & Water Suppliers | 15 | IAS Dir/Eng | Q3 | 1 50 | Jan 95 | Mar-95 | CSU | | | | | 15 | 150,000 | | | 15 | 1[illegible] |
| | IAS Subtotal | 31 | | | | | | | 8 | 68,000 | 8 | 55,000 | 15 | 150,000 | 0 | 0 | 31 | 27 |
| F | **Specialized Studies - M. Sc. Programs (SPS)** | | | | | | | | | | | | | | | | | |
| | M S Degree: on farm Water Management | 1 | M Hassan | 1-4 | 12 00 | Jul-94 | Jun-95 | USA | 1 | 7,500 | | 7,500 | | 7,500 | | 7,500 | 1 | [illegible] |
| | M S Degree Systems Analysis and Micro Systems | 1 | E. Barakat | 1-4 | 20 00 | Jul-94 | Jun-95 | USA | 1 | 7,500 | | 7,500 | | 7,500 | | 7,500 | 1 | [illegible] |
| | M S Degree WUA Management/Evaluation | 1 | A. Hadad | 1-4 | 20 00 | Jul 94 | Jun 95 | USA | 1 | 7,500 | | 7,500 | | 7,500 | | 7,500 | 1 | [illegible] |
| | M S Degree in IS & WUA Involvement | 3 | TBD | 1-4 | 20 00 | Jul 94 | Jun 95 | USA | 3 | 7,500 | | 7,500 | | 7,500 | | 7,500 | 3 | [illegible] |
| | SPS Subtotal | 6 | | | | | | | 6 | 30,000 | 0 | 30,000 | 0 | 30,000 | 0 | 30,000 | 6 | 1[illegible] |
| | Totals | 45 | | | | | | | 14 | 98,000 | 8 | 85,000 | 23 | 215,000 | 0 | 30,000 | 45 | 4[illegible] |

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# IIP In-Country Training Schedule, July 1993 - June 1994

| Program Title | No. | Position | Qrtr | Dur mo. | Dates Start | Dates End | Institution | Q1 No. | Q1 LE | Q2 No. | Q2 LE | Q3 No. | Q3 LE | Q4 No. | Q4 LE | Totals No. | Totals LE EXP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A. Project Management & Administration (PMA) | | | | | | | | | | | | | | | | 0 | 0 |
| Computer Software Applications (directorates) | 120 | IIP Staff | 1-4 | 3.00 | Jul-93 | Jun-94 | Local Inst. | 30 | 16,500 | 30 | 16,500 | 30 | 16,500 | 30 | 16,500 | 1'0 | 66,000 |
| Microcomputer Maintenance | 30 | IIP Engineers | 1, 3 | 0.25 | Jul 93 | Jun-94 | IIP | 15 | 10,000 | | | 15 | 10,000 | | | 30 | 20,000 |
| English Language Training | 120 | IIP Staff | 1-4 | 3.00 | Jul 93 | Jun-94 | Local Inst. | 30 | 16,500 | 30 | 16,500 | 30 | 16,500 | 30 | 16,500 | 120 | 66,000 |
| Principles of Management | 10 | IIP Staff | 1 | 0.25 | Jul-93 | Jun-94 | MPWWR TC | 5 | 0 | | | 5 | 0 | | | 10 | 0 |
| Offshore Training Impact Seminar | 80 | IIP Staff | 1 | 2 days | Sep-93 | Sep-93 | IIP T.A. Team | 80 | 8,000 | | | | | | | 80 | 8,000 |
| Introduction to Computers | 10 | IIP Staff | 1 | 0.25 | Jul-93 | Jun-94 | MPWWR TC | 5 | 0 | | | 5 | 0 | | | 10 | 0 |
| Quattro Pro | 10 | IIP Staff | 1 | 0.25 | Jul-93 | Jun-94 | MPWVR TC | | | 5 | 0 | | | 5 | 0 | 10 | 0 |
| AUTOCAD | 10 | IIP Staff | 2 | 0.50 | Jul-93 | Jun-94 | MPWWR TC | | | 5 | 0 | | | 5 | 0 | 10 | 0 |
| | | | | | | | | | | | | | | | | 0 | 0 |
| Subtotals | 390 | | | | | | | 165 | 51,000 | 70 | 33,000 | 85 | 43,000 | 70 | 33,000 | 390 | 160,000 |
| B. Construction/Equipment (CON) | | | | | | | | | | | | | | | | 0 | 0 |
| Materials of Construction: Testing & QC | 5 | IAS Eng/Tech | 1 | 0.25 | Oct-93 | Dec-93 | MPWWR TC | | 0 | 5 | ' | | | | | 5 | 0 |
| Motorcycle Maintenance and Repair | 12 | IIP Tech | 1 | 0.25 | Sep-93 | Sep-93 | Local Inst | 12 | 12,000 | | | | | | | 12 | 12,000 |
| Use of Elect Land Levelling Equipment | 15 | IIP Staff | 2 | 0.25 | Oct-93 | Dec-93 | IIP T.A. Team | | | 15 | 9,000 | | | | | 15 | 9,000 |
| Water Mgmt Equip Operation & Maint. | 30 | IIP Staff | 3 | 0.25 | Jan-93 | Jun-94 | IIP T.A. Team | | | 15 | 9,000 | | | 15 | 9,000 | 30 | 18,000 |
| | | | | | | | | | | | | | | | | 0 | 0 |
| Subtotals | 62 | | | | | | | 12 | 12,000 | 35 | 18,000 | 0 | 0 | 15 | 9,000 | 62 | 39,000 |
| C. Delivery/Mesqa Systems Design (DES) | | | | | | | | | | | | | | | | 0 | 0 |
| Design of Micro Irrigation Systems | 15 | IIP Staff | 2 | 0.50 | Oct-93 | Dec-93 | IIP T.A. Team | | | 15 | 16,000 | | | | | 15 | 16,000 |
| | | | | | | | | | | | | | | | | 0 | 0 |
| Subtotals | 15 | | | | | | | 0 | 0 | 15 | 16,000 | 0 | 0 | 0 | 0 | 15 | 16,000 |
| D. Feasibility Studies (FST) | | | | | | | | | | | | | | | | 0 | 0 |
| Feasibility Study Training Design | 30 | IIP Staff | 2 | 0.50 | Oct-93 | Dec-93 | IIP T.A. Team | | | 30 | 32,000 | | | | | 30 | 32,000 |
| Subtotals | 30 | | | | | | | 0 | 0 | 30 | 32,000 | 0 | 0 | 0 | 0 | 30 | 32,000 |
| E. Irrigation Advisory Service (IAS) | | | | | | | | | | | | | | | | 0 | 0 |
| On-Farm Water Management | 30 | IAS Engineers | 1-4 | 0.50 | Jul-93 | Dec-93 | IIP Staff | 15 | 16,000 | 15 | 16,000 | | | | | 30 | 32,000 |
| Dev Schedules & Monitor Improved Mesqas | 30 | IAS Engineers | 1-4 | 0.50 | Jul-93 | Dec-93 | IIP Staff | 15 | 16,000 | 15 | 16,000 | | | | | 30 | 32,000 |
| Dev Schedules & Monitor Improved Mesqas | 200 | IAS F Agents | 1-4 | 0.50 | Jan-94 | Apr-94 | IIP Staff | | | 100 | 68,500 | 100 | 68,500 | | | 200 | 137,000 |
| Land Leveling, Farm La[illegible] and Imp Irr Practices | 30 | IAS Engineers | 1-4 | 3 days | May-94 | Jun-94 | IIP Staff | | | | | 15 | 4,500 | 15 | 4,500 | 30 | 9,000 |
| Workshops Developing [illegible] JA Federation Program | 30 | IAS Staff | 1-4 | 3 days | May-94 | Jun-94 | IIP Staff | | | | | 15 | 4,500 | 15 | 4,500 | 30 | 9,000 |
| IAS Subtotal | 320 | | | | | | | 30 | 32,000 | 130 | 100,500 | 130 | 77,500 | 30 | 9,000 | 320 | 219,000 |
| Water User Associations (WUA's) | | | | | | | | | | | | | | | | 0 | 0 |
| Minia University Workshop on IIP Benefits | 75 | Comm. Leader | 1 | 3 days | Sep 93 | Sep-93 | IIP Staff | 75 | 27,000 | | | | | | | 75 | 27,000 |
| Irr Sch & Dev Roles & Rules | 500 | WUA Leaders | 1-4 | 2 days | Jul-93 | Jun-94 | IIP Staff | 125 | 3,500 | 125 | 3,500 | 125 | 3,500 | 125 | 3,500 | 500 | 14,000 |
| Dev Scheduling, Record Keeping, Bank Accounts | 500 | WUA Leaders | 1-4 | 2 days | Jul-93 | Jun-94 | IIP Staff | 125 | 3,500 | 125 | 3,500 | 125 | 3,500 | 125 | 3,500 | 500 | 14,000 |
| Land Leveling, Farm Layout and Imp Irr Practices | 500 | WUA Leaders | 1-4 | 1 day | Jul 93 | Jun-94 | IIP Staff | 125 | 1,500 | 125 | 1,500 | 125 | 1,500 | 125 | 1,500 | 500 | 6,000 |
| Operation and Maintenance of Improved Mesqas | 500 | WUA Leaders | 1-4 | 2 days | Jul-93 | Jun-94 | IIP Staff | 125 | 3,500 | 125 | 3,500 | 125 | 3,500 | 125 | 3,500 | 500 | 14,000 |
| Structured Obs. Tours to other Areas | 100 | WUA Leaders | 1-4 | 1 day | Jul-93 | Jun-94 | IIP Staff | 25 | 300 | 25 | 300 | 25 | 300 | 25 | 300 | 100 | 1,200 |
| WUA Subtotal | 2,175 | | | | | | | 600 | 39,300 | 525 | 12,300 | 525 | 12,300 | 525 | 12,300 | 2,175 | 76,200 |
| Totals | 2,992 | | | | | | | 807 | 134,300 | 805 | 211,800 | 740 | 132,800 | 640 | 63,300 | 2,992 | 542,200 |

| | Q1 | Q2 | Q3 | Q4 | Totals |
|---|---|---|---|---|---|
| Subtotal IIP Participants | 207 | 280 | 215 | 115 | 817 |
| Subtotal WUA Members | 600 | 525 | 525 | 525 | 2,175 |
| Total IIP Part./WUA Memb | 807 | 805 | 740 | 640 | 2,992 |

Updated 9 August 1993
File: ICT93-4.WQ1

# IIP Off-Shore FT800 Budget, Estimated Expenditures through Life of Project (in LE)

| No | AM No. | Program Title | Expended thr 30 Jun 92 | Expended in 92/93 | Est. Exp. 93/94 | Est. Exp. 94/95 | TOTAL LE EXP |
|---|---|---|---|---|---|---|---|
| A. | | Project Management & Administration (PMA) | | | | | |
| | 51 | SPSS Training (1 pax) | 4,265 | | | | 4,265 |
| | 55 | Modern Irr System Mgmt (2 pax) | 19,200 | | | | 19,200 |
| | 63 | Irrigation Systems Study Tour (20 pax) | 102,800 | | | | 102,800 |
| | 70 | Irrigation Systems Study Tour (17 pax) | 71,321 | | | | 71,321 |
| | 66 | Computer LAN & Peripherals (2 pax) | 15,150 | | | | 15,150 |
| | 79 | Irrigation Systems Study Tour (19 pax) | 97,850 | | | | 97,850 |
| | 87 | MPWWR High Level Official Study Tour (8 Pax) | | 136,378 | | | 136,378 |
| | 91 | Advanced SPSS Training (2 Pax) | | 11,100 | | | 11,100 |
| | | Computer Applications for Des/Mngt Irr Sys (8 pax) | | | 64,000 | | 64,000 |
| | | Observation/Study Tour (8 pax) | | | 64,000 | | 64,000 |
| | | Observation/Study Tour (8 pax) | | | | 64,000 | 64,000 |
| | | | | | | | 0 |
| | | PMA Subtotal | 310,586 | 147,478 | 128,000 | 64,000 | 650,064 |
| B. | | Construction/Equipment (CON) | | | | | |
| | | Automatic Gate Negotiations (1 pax - AMCS) | | 13,087 | | | 13,087 |
| | | Automatic Gate Negotiations (2 pax - AMCS) | | | 22,180 | | 22,180 |
| | | Construction Quality Control (8 pax) | | | 64,000 | | 64,000 |
| | | | | | | | 0 |
| | | CON Subtotal | 0 | 13,087 | 86,180 | 0 | 99,267 |
| C. | | Delivery/Mesqa Systems Design (DES) | | | | | |
| | 54 | Main Systems Scheduling (4 pax) | 9,600 | | | | 9,600 |
| | 56 | Design & Mgmt of Local Irr Systems (6 pax) | 26,550 | | | | 26,550 |
| | 104 | Modeling, Monitoring of Irr Systems (2 pax) | | 15,400 | | | 15,400 |
| | | Mod, Reg & Mon of Lined/Unlined Irr Del Sys (15 pax) | | | 120,000 | | 120,000 |
| | | DES Subtotal | 36,150 | 15,400 | 120,000 | 0 | 171,550 |
| D. | | Feasibility Studies (FST) | | | | | |
| | 93 | Water & Soil Conservation Mgmt (10 pax) | | 61,671 | | | 61,671 |
| | | Diagnostic Analysis Method for Eval of Irr Sy. (15 pax) | | | 120,000 | | 120,000 |
| | | FST Subtotal | 0 | 61,671 | 120,000 | 0 | 181,671 |
| E. | | Irrigation Advisory Service (IAS) | | | | | |
| | 86 | Developm & Sustain WUA (16 pax) | | 199,726 | | | 199,726 |
| | | Senior Official Tour to Selected Countries (8 pax) | | | 120,000 | | 120,000 |
| | | Design/Methods Imp Water Control (8 pax) | | | | 64,000 | 64,000 |
| | | Dev and Monitoring Irr Sch (8 pax) | | | | 64,000 | 64,000 |
| | | AV Dev, Use and Eval (4 pax) | | | 32,000 | | 32,000 |
| | | Princ., Pract. & Roles of Water Users/Supp (15 pax) | | | | 120,000 | 120,000 |
| | | IAS Subtotal | 0 | 199,726 | 152,000 | 248,000 | 599,726 |
| F. | | Specialized Studies - M. Sc. Programs (SPS) | | | | | |
| | 89 | M.S. Hydraulics(1 pax - M. Hassan) | | 4,533 | | | 4,533 |
| | | M.S. On-Farm Water Man (1 pax - E. Barakat) | | . | 4,780 | | 4,780 |
| | | M.S. WUA Management/Eval (1 pax - A. Hadaad) | | | 5,000 | | 5,000 |
| | | M.S. in Irr Man and WUA Mngt (3 pax) | | | 15,000 | | 15,000 |
| | | SPS Subtotal | 0 | 4,533 | 24,780 | 0 | 29,313 |
| | | Totals | 346,736 | 441,895 | 630,960 | 312,000 | 1,731,591 |

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Expenditures through June 1993 are actual; expenditures for later dates ar

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# IIP In-Country Training Schedule, July 1994 - June 1995

| Program Title | No. | Position | Qrtr | Dur mo. | Dates Start | Dates End | Institution | Q1 No. | Q1 LE | Q2 No. | Q2 LE | Q3 No. | Q3 LE | Q4 No. | Q4 LE | Totals No. | Totals LE EXP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **roject Management & Administration (PMA)** | | | | | | | | | | | | | | | | 0 | 0 |
| Computer Software Applications (directorates) | 120 | IIP Staff | 1-4 | 3.00 | Jul-94 | Jun-95 | Local Inst. | 30 | 16,500 | 30 | 16,500 | 30 | 16,500 | 30 | 16,500 | 120 | 66,000 |
| Microcomputer Maintenance | 30 | IIP Engineers | 1, 3 | 0.25 | Jul-94 | Jun-95 | IIP | 15 | 10,000 | | | 15 | 10,000 | | | 30 | 20,000 |
| English Language Training | 120 | IIP Staff | 1-4 | 3.00 | Jul-94 | Jun-95 | Local Inst. | 30 | 16,500 | 30 | 16,500 | 30 | 16,500 | 30 | 16,500 | 120 | 66,000 |
| Principles of Management | 10 | IIP Staff | 1 | 0.25 | Jul-94 | Jun-95 | MPWWR T | 5 | 0 | | | 5 | 0 | | | 10 | 0 |
| Introduction to Computers | 10 | IIP Staff | 1 | 0.25 | Jul-94 | Jun-95 | MPWWR TC | 5 | 0 | | | 5 | 0 | | | 10 | 0 |
| Quattro Pro | 10 | IIP Staff | 1 | 0.25 | Jul-94 | Jun-95 | MPWWR TC | | | 5 | 0 | | | 5 | 0 | 10 | 0 |
| AUTOCAD | 10 | IIP Staff | 2 | 0.50 | Jul-94 | Jun-95 | MPWWR TC | | | 5 | 0 | | | 5 | 0 | 10 | 0 |
| Subtotals | 310 | | | | | | | | | | | | | | | 0 | 0 |
| **onstruction/Equipment (CON)** | | | | | | | | 85 | 43,000 | 70 | 33,000 | 85 | 43,000 | 70 | 33,000 | 310 | 152,000 |
| | | | | | | | | | | | | | | | | 0 | 0 |
| Materials of Construction: Testing & QC | 5 | IAS Eng/Tech | 1 | 0.25 | Jul-94 | Dec-94 | MPWWR TC | | 0 | '5 | | | | | | 5 | 0 |
| Water Mgmt Equip Operation & Maint. | 30 | IIP Staff | 3 | 0.25 | Jan-95 | Jun-95 | IIP T.A. Team | | | 15 | 9,000 | | | 15 | 9,000 | 30 | 18,000 |
| Subtotals | 35 | | | | | | | | | | | | | | | 0 | 0 |
| **elivery/Mesqa Systems Design (DES)** | | | | | | | | 0 | 0 | 20 | 9,000 | 0 | 0 | 15 | 9,000 | 35 | 18,000 |
| | | | | | | | | | | | | | | | | 0 | 0 |
| | | | | | | | | | | | | | | | | 0 | 0 |
| Subtotals | 0 | | | | | | | | | | | | | | | 0 | 0 |
| **easibility Studies (FST)** | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | | | 0 | 0 |
| Subtotals | 0 | | | | | | | | | | | | | | | | |
| **rigation Advisory Service (IAS)** | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | | | | | 0 | 0 |
| International Workshop - IIP Contribution Only | N.A. | N.A. | 3 | 0.25 | Jan-95 | Mar-95 | IIP/IIMI | | | | | NA | 170,000 | | | 0 | 170,000 |
| Land Leveling, Farm Layout and Imp Irr Practice | 30 | IAS Engineers | 1-4 | 3 days | Jul-94 | Jun-95 | IIP Staff | 15 | 4,500 | 15 | 4,500 | | | | | 30 | 9,000 |
| Workshops Developing WUA Federation Progra | 30 | IAS Staff | 1-4 | 3 days | Jul-94 | Jun-95 | IIP Staff | | | | | 15 | 4,500 | 15 | 4,500 | 30 | 9,000 |
| IAS Subtotal | 60 | | | | | | | | | | | | | | | | |
| **/ater User Associations (WUA's)** | | | | | | | | 15 | 4,500 | 15 | 4,500 | 15 | 174,500 | 15 | 4,500 | 60 | 188,000 |
| | | | | | | | | | | | | | | | | 0 | 0 |
| Irr Sch & Dev Roles & Rules | 500 | WUA Leaders | 1-4 | 2 days | Jun-94 | Jun-95 | IIP Staff | 125 | 3,500 | 125 | 3,500 | 125 | 3,500 | 125 | 3,500 | 500 | 14,000 |
| Dev Scheduling, Record Keeping, Bank Account | 720 | WUA Leaders | 1-4 | 2 days | Jun-94 | Jun-95 | IIP Staff | 180 | 5,000 | 180 | 5,000 | 180 | 5,000 | 180 | 5,000 | 720 | 20,000 |
| Land Leveling, Farm Layout and Imp Irr Practice | 720 | WUA Leaders | 1-4 | 1 day | Jun-94 | Jun-95 | IIP Staff | 180 | 5,000 | 180 | 5,000 | 180 | 5,000 | 180 | 5,000 | 720 | 20,000 |
| Operation and Maintenance of Improved Mesqa | 720 | WUA Leaders | 1-4 | 2 days | Jun-94 | Jun-95 | IIP Staff | 180 | 5,000 | 180 | 5,000 | 180 | 5,000 | 180 | 5,000 | 720 | 20,000 |
| Structured Obs. Tours to other Areas | 48 | WUA Leaders | 1-4 | 1 day | Jun-94 | Jun-95 | IIP Staff | 12 | 300 | 12 | 300 | 12 | 300 | 12 | 300 | 48 | 1,200 |
| WUA Subtotal | 2,708 | | | | | | | 677 | 18,800 | 677 | 18,800 | 677 | 18,800 | 677 | 18,800 | 2,708 | 75,200 |
| Totals | 3,113 | | | | | | | 777 | 66,300 | 782 | 65,300 | 777 | 236,300 | 777 | 65,300 | 3,113 | 433,200 |

| | Q1 | Q2 | Q3 | Q4 | Totals |
|---|---|---|---|---|---|
| Subtotal IIP Participants | 100 | 105 | 100 | 100 | 405 |
| Subtotal WUA Members | 677 | 677 | 677 | 677 | 2,708 |
| Total IIP Part./WUA Mem | 777 | 782 | 777 | 777 | 3,113 |

pdated 9 August 1993
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# IIP In-Country Training Schedule, July to September 21, 1995

| | Program Title | No. | Position | Qrtr | Dur mo. | Dates Start | Dates End | Institution | LE |
|---|---|---|---|---|---|---|---|---|---|
| A. | **Project Management & Administration (PMA)** | | | | | | | | |
| | Computer Software Applications (directorates) | 60 | IIP Staff | 1 | 2.00 | Jul-95 | Sep-95 | Local Inst. | 32,000 |
| | Introduction to Computers | 5 | IIP Staff | 1 | 0.25 | Jul-95 | Sep-95 | MPWWR TC | |
| | Quattro Pro | 5 | IIP Staff | 1 | 0.25 | Jul-95 | Sep-95 | MPWWR TC | 0 |
| | AUTOCAD | 5 | IIP Staff | 1 | 0.50 | Jul-95 | Sep-95 | MPWWR TC | 0 |
| | Subtotals | 75 | | | | | | | 32,000 |
| B. | **Construction/Equipment (CON)** | | | | | | | | |
| | Subtotals | | | | | | | | |
| C. | **Delivery/Mesqa Systems Design (DES)** | | | | | | | | |
| | Subtotals | 0 | | | | | | | 0 |
| D. | **Feasibility Studies (FST)** | | | | | | | | |
| | Subtotals | 0 | | | | | | | 0 |
| E. | **Irrigation Advisory Service (IAS)** | | | | | | | | |
| | Workshops Developing WUA Federation Progra | 15 | IAS Staff | 1 | 3 days | Jul-95 | Sep-95 | IIP Staff | 5,000 |
| | IAS Subtotal | 15 | | | | | | | 5,000 |
| | **Water User Associations (WUA's)** | | | | | | | | |
| | Irr Sch & Dev Roles & Rules | 250 | WUA Leaders | 1 | 2 days | Jul-95 | Sep-95 | IIP Staff | 7,000 |
| | Dev Scheduling, Record Keeping, Bank Account | 250 | WUA Leaders | 1 | 2 days | Jul-95 | Sep-95 | IIP Staff | 7,000 |
| | Land Leveling, Farm Layout and Imp Irr Practice | 250 | WUA Leaders | 1 | 1 day | Jul-95 | Sep-95 | IIP Staff | 3,000 |
| | Operation and Maintenance of Improved Mesqa | 250 | WUA Leaders | 1 | 2 days | Jul-95 | Sep-95 | IIP Staff | 7,000 |
| | Structured Obs. Tours to other Areas | 25 | WUA Leaders | 1 | 1 day | Jul-95 | Sep-95 | IIP Staff | 300 |
| | WUA Subtotal | 1,025 | | | | | | | 24,300 |
| | Totals | 1,115 | | | | | | | 61,300 |

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| | |
|---|---|
| 90 | Subtotal IIP Participants |
| 1,025 | Subtotal WUA Members |
| 1,115 | Total IIP Participants and WUA Members |

# ANNEX 7

## IAS Effectiveness

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ANNEX 7
Irrigation Advisory Service Effectiveness

## A. Introduction

The purpose of this annex is to provide detailed findings pertaining to the evaluation team's charge to "assess the effectiveness of the Irrigation Advisory Service (IAS) in organizing operational Water Users Associations (WUAs), and providing water management technical assistance to the farmers". Specific areas which are to be addressed include an appraisal of an earlier evaluation on the IAS, the effectiveness of the IAS in working with the WUAs, and the realistic role of the IAS in irrigation water management. A general discussion of what the IAS is will begin this annex in order to provide a common frame of reference for the evaluation. After that orientation, the three major points of the evaluation will be examined.

## B. The IAS

### 1. The Purpose of the IAS

The mission of the IAS is to facilitate and assist private water users to establish, maintain, and manage their own sustainable water user associations for improving irrigation performance. The IAS and private water users are partners in fulfilling three major objectives which are:

- building, maintaining and controlling their own WUAs;
- improving water delivery at the mesqa level; and
- improving the efficiency of water use. (1:2)

The IAS/WUA program was established by the MPWWR Decree Number 53 in 1989 under the Irrigation Improvement Project (IIP).

### 2. Rationale for IAS Being in Ministry of Public Works and Water Resources (MPWWR)

One of the critical questions that has been asked ever since the initiation of the concept of the IAS, is why should there be a new organization within the MPWWR. The basic rationale for the IAS as an organizational unit within the Ministry is based on the following considerations.



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- o Water suppliers and water users need to be organizationally linked to assure that improved water control services are made available on a systematic and timely basis.

- o The mesqa is an important hydrologic unit of the irrigation system and different from the village or administrative unit used by the MOA and other organizations.

- o The IAS works with WUAs or groups or water users and not with individual farmers such as the MOA agricultural extension system.

- o The new knowledge and skills required for introducing new mesqa technologies and water control services do not exist in any other organization in Egypt.

- o Experience in many countries where successful WUAs exist show that the agency supplying the water should be responsible directly to water users in the delivery, allocation, and scheduling of irrigation as well as in resolution of water disputes, improvement programs, maintenance of systems and return flow or drainage issues.

This rationale comes from the project, but it does reflect the thinking of the initial proponents of the idea from the Egypt Water Use and Management Project (EWUP). Experience thus far in Egypt demonstrates that no other organization, including the extension service, has the capability to perform the above mentioned purposes of the IAS. To achieve the objectives of IIP, an organization had to be developed to ensure that farmer participation could be organized so as to most effectively take advantage of the irrigation system improvements. That organization is the IAS.

## C. The Previous IAS Evaluation

### 1. Introduction

The idea of the IAS was initially conceived, as previously stated, in EWUP. Fulfilling that idea began with the Regional Irrigation Improvement Project (RIIP) in 1986. During the RIIP years the idea of the IAS was taken one step further by conceptualizing how the organization should be designed. The actual introduction of IAS as a tangible organizational entity began in 1989. After three years of operation, an internal evaluation by Dr. Robby Laitos was commissioned to assess the status of the new organization. As part of this present evaluation effort, we have been asked to see if (1) that 1992 evaluation of the IAS and WUAs was a useful exercise in identifying means of developing a more effective IAS and sustainable WUAs, and (2) which of the recommendations from that effort are key and should be pushed to implementation.



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In order to more effectively assess the 1992 evaluation here in this annex, the major findings of that evaluation are delineated below. The purposes of that evaluation were to evaluate the effectiveness of the IAS strategy; assess IAS staffing; evaluate WUAs to determine if they are making adequate progress; assess past and planned training; and assess facilities, logistics, and management. Informally, the evaluator was to look at what had been learned thus far in implementing an IAS : was IAS on the right track, were the WUAs real and viable, what was the reality in the field at that time, and what was the level of knowledge about the IAS in the MPWWR and USAID ?

2. The Evaluation Results

The results of the evaluation were divided into three general categories : IAS external activities and relationships; IAS activities and relationships with IIP; and IAS internal activities and relationships. The findings are summarized below.

a. External Activities and Relationships

(1) IAS and MPWWR

- Ministry officials state that they support IAS and will continue to do so even after IIP.

- Clear impression is that IAS directly contributes to saving land, saving water, and saving money (refers to IIP and PACER reports).

- Attitude of wariness about IAS in MPWWR.

- Confusion and uncertainty about level of commitment and support to IAS, regarding staffing, budgets, training support, policies.

- Confusion exists over key policy and programmatic issues facing IAS: cost recovery, legalization of WUAs, IAS future, IAS staffing, implementation of continuous flow.

- Farmers feel that government irrigation officials are listening to them and taking them seriously.

- Recommendation: MPWWR should consider establishing IAS as a permanent section within the MPWWR under the Irrigation Department.

(2) IAS and Cost Recovery and Legalization of WUAs

- IAS should have control over its own budget.

- IAS field staff are beginning to develop rough implementation rules for O&M and pump costs. Farmers would be fully responsible for normal O&M costs. What is unclear is who will be responsible for major or emergency repair on the new mesqas.

- There is no clear mesqa level cost recovery policy for mesqa construction costs.

- Procedures for legalizing WUAs remain unclear.

- IIP should concentrate on completing the demonstration mesqas, thus transforming IIP into a "demand driven" project.

- Involve mid-level and field MPWWR officials in designing a cost recovery policy.

(3) IAS and Improved System Performance

- IAS's contribution to improved system performance need to be clearly delineated and communicated throughout IIP and MPWWR.

(4) IAS and USAID

- o USAID should consider an adjustment to IIP to assure continuing support for IAS after 1995.

- o USAID should assist MPWWR in instituting and continue the on-going bureaucratic innovation and change.

b. IAS and IIP

(1) Staff and Budget

- o Consider filling the empty IAS staff positions in the main office and directorates.

- o Mid and higher level IAS staff people should be both knowledgeable and sympathetic about IAS's work.

- o Don't define IAS staff roles in isolation. Involve MPWWR and IIP staff in developing the appropriate roles and responsibilities.

- o IAS needs to control its own budget.

(2) IAS and Administration

- o IAS staff needs maximum flexibility to attain the project's goals. Delegate more responsibility to IAS directors.

(3) IAS and Training

- o IIP should consider revising the IAS training program, adding additional funds and filling the IAS Director of Information/Training position.

- Institutionalize a formal, well-managed Training Needs Analysis within IIP and MPWWR to ensure that training is directly linked to work performance.

- IAS needs to consider broadening its training participants to include other IIP staff, MPWWR staff, and contractors.

- IAS should develop smaller, more mobile training packages, that could be applied at different locations at different times.

- IAS should consider support for academic study abroad.

(4) <u>IAS and Farmer Participation</u>

- Effective farmer involvement does exist at many IIP sites, but it is still somewhat haphazard and its effectiveness varies from place to place.

- Farmers do seem to be fully involved in the layout of the new mesqas and the location of the valves and turnouts.

- Develop a flow-chart of key activities and relationships between IIP, IAS, farmers, and contractors.

(5) <u>IAS and Technical Assistance</u>

- The project should seriously consider expanding the TA staff.

c. <u>IAS an Internal Activities and Relationships</u>

(1) <u>IAS Strategy</u>

- IAS should define for itself a very clear and mutually shared "vision" of what it is and what is its preferred future.



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- o IAS should also ask itself if it is more an enabling, facilitating, supporting institution, or an implementing institution.

- o IAS should institute monthly or bi-monthly IAS Director meetings with the Cairo staff, rotating from one directorate to another.

- o IAS's overall strategy and approach need to give the ability to quickly respond to changed conditions.

(2) <u>IAS and Hardware Management</u>

- o The demonstration mesqas are very important to IAS and should be given top priority, including assigning one or two field agents and an IAS engineer full tie to these mesqas.

- o IAS should continue and expand the visits of farmers from other directorates and command areas to see the demonstration mesqas.

(3) <u>IAS and Software Management:WUA Organizing Process</u>

- o The IAS organizers have had difficulty sustaining the WUAs because they cannot answer the most persistent farmer questions: "When will the project start? Who will pay for it".

- o The IAS should also continue and expand their laudable effort to build linkages with other rural organizations. Where this has been attempted, it has strengthened the WUA immeasurably.



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- The IAS organizers should also beware of turning the WUA into a complaint forum, whose only purpose is to berate government officials.

- IAS and IIP should consider starting in two or three mesqas per command area, and concentrate IAS and IIP staff there.

- Develop a flow chart of activities and responsibilities of farmers, IAS staff, IIP staff, and contractors.

- Revise selection criteria for field agents, stressing the need for them to live in the village in the command area.

(4) IAS and Software Management:WUA Strategy

- IAS should consider different organizational approaches, but WUAs should not be coerced into accepting any model (federal, unitary, one organization).

- Consider establishing committees within WUAs.

(5) IAS and Software Management: WUA Sustainability and Effectiveness

- Some of the WUAs have been organized to improve the O&M on their old mesqas. Meetings and discussions have reduced conflicts and aided problem-solving and water scheduling along the old mesqas.

- Many WUAs need strengthening. IAS should consider re-vitalizing the existing WUAs before massively moving into new areas.

- The WUAs will need continued support from IAS in terms of water management and WUA federation.

- IAS should ensure that a workable share system is at the heart of every WUA.

(6) IAS and Software Management:O&M

- o Train WUAs in O&M in demonstration mesqas and where construction will soon be completed.

- o IAS should help the WUAs form their own O&M rules along the improved mesqas.

- o IAS should consider how it will assist WUAs in maintenance of improved mesqas, particularly the underground pipes in Upper Egypt where spare parts are rare.

3. Comments on the Evaluation Results

The evaluation was indeed an extensive effort. In analyzing this study, we saw three critical issues into which the numerous findings evolved. First, the report focused on how the IAS fits into the Ministry. The thrust of the comments seemed to be directed to make the IAS a permanent entity within the Ministry, specifically within the Irrigation Department. Issues of resource commitment, staffing patterns, budget control, etc. were just symptoms of an overall problem of the IAS not being a viable, identified entity in the MPWWR. The concern that we have is that while the identified problems do exist, the 1992 evaluation seems to view the IAS as functionally independent from IIP. Especially, the recommendation of having the IAS a part of the Irrigation Department ignores the possibility of IIP being an authority and having the IAS work with the rehabilitated command areas within that authority. The issue of organizational viability is more comprehensively discussed in Annex 6, but to view the IAS independent of IIP and command area rehabilitation is not appropriate. Where the IAS and IIP should be located is an issue which needs extensive analysis and should not be lightly touched on as it was in the 1992 evaluation.

A second major overall issue addressed by the evaluation is the notion of an IAS "vision". The report correctly points out that there must be a clear and mutually shared perception by all involved as to what the IAS is and where it is going. This notion is further elaborated when it commented about the organization being an enabling and facilitating entity versus one that is an implementing entity. We found that there is still a lack of a coherent understanding about the fundamental mission of IAS within its ranks, not to mention from other organizations. The IAS purposes mentioned above specifically state that it is to be an organization that facilitates change among WUAs. That means that the IAS helps the farmers to more effectively organize themselves, that it helps the farmers to more effectively use water by showing farmers new techniques from which they can choose, and that it helps the farmers to more effectively work with other organizations (such as the MOA extension, the district engineer, etc.) by allowing the WUAs to build the linkages themselves. The IAS does not organize farmers, does not implement new procedures, and does not solve farmer problems with various government agencies. An implementing organization takes charge and performs functions that the farmers should be learning to do by themselves. Enabling organizations teach farmers to do things for themselves. There is confusion in the IAS as to which role it should play. That confusion extends to engineers and field agents alike in all of the project areas. This is a very critical issue which will dictate how the IAS performs its daily tasks. This is an issue which still needs to addressed.

The third and final major issue brought up concerns itself with the IAS and the WUAs. In essence, the report stated that farmer involvement was haphazard and the effectiveness was varied. Also, there is a need for continual support to strengthen the WUAs by the IAS. Many of the comments are couched in the environment of the still gnawing pump problem and the uncertain cost recovery issue. However, we found that the comments are very germain today and they are not being adequately addressed by the project. A more detailed discussion of this issue is to follow.

To summarize, the 1992 IAS evaluation brought to light many known problems. What it did do is provide some systematic framework from which the problems could be addressed. The IAS is making attempts to confront the numerous recommendations with varying degrees of activity. Appendix 1 identifies what the project is doing. But of most importance, the evaluation addresses three critical points which have tremendous policy implications. Those points are, again, the organizational status of the IAS within IIP and the Ministry, the vision of how the IAS will operate, and the role of the IAS with the development of the WUAs. The centrality of these issues are lost in the myriad of recommendations in the report, but their importance cannot be understated and nor must they be ignored.

## D. The Effectiveness of the IAS In Working With the WUAs

### 1. Introduction

The evaluation team was asked to appraise the work with the WUAs by looking at four issues. First, see how extensive the farmer input has been in the planning, design, and construction of mesqa improvements. Second, examine how effective IIP has been in assisting WUAs to move into the operational phase. Third, assess how well developed mesqa operational and maintenance plans are and are they being put into use by the WUAs. Fourth, see if the farmers have been provided training in conflict resolution. In order to answer these questions the concept of WUAs will first be defined to set the parameters of what is to be evaluated. The discussion of the WUAs will include the purpose



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and tasks of the organizations, and the working methodology of how the WUAs were developed. From this background, we can then see how the work with the WUAs has been implemented.

## 2. The Purpose and Tasks of the WUAs

A water users association is a private organization owned and controlled by members for their benefits in improving delivery of water and the use of water for increased agricultural production. The specific tasks of the WUAs are as follows:

- participating actively in planning, designing, and implementing improved mesqa systems;
- operating, maintaining, and managing the mesqa systems;
- developing and implementing operational plans for irrigation scheduling, purchasing, operating and maintaining WUA pumps and developing and implementing a regular mesqa maintenance plan;
- improving water delivery and water removal on mesqas and field drains;
- improving water use management through improved irrigation scheduling and other irrigation practices;
- developing roles and responsibilities for WUA council members and local rules for resolving water-related conflicts;
- developing and maintaining close coordination with organizations for essential services such as bank loans, equipment, land levelling, agricultural extension service;
- developing and maintaining good two-way communication with WUA members, participating organizations and with district engineers (water suppliers);
- mobilizing and managing finances for pumps, equipment, and mesqa system maintenance;
- federation of WUAs to branch canal level and close cooperation with district engineers in operation and protection of canal facilities.

As can be seen, the responsibilities of the WUAs are extensive and many are new to the farmers. The project instituted a seven phase program for the IIP to develop WUAs in the rehabilitation command areas. The phases and activities of each phase are delineated below.

3. Process in Forming WUAs

a. PHASE 1 : ENTRY PHASE

- Introductions and obtaining assistance from local leaders
- Initial IIP information collection about the area
- Preliminary mesqa profile
- Building trust and friendship
- Identifying initial mesqa problems and improvement needs

b. PHASE 2 : ORGANIZATION PHASE

- Introduction to IIP/IAS Concepts and Benefits of WUA
- Explaining WUA requirements and determining willingness of mesqa members to establish a WUA
- Visit to demonstration mesqa site
- Election of mesqa and marwa leaders
- Deciding WUA roles and responsibilities
- Reviewing alternative mesqa improvements
- Developing the detailed mesqa profile map
- WUA identification and approval of marwa outlets

- o Develop initial mesqa improvement strategy
- o Understanding the WUA charter (rules of the WUA)
- o WUA organizational membership meeting formalizing the WUA

c. PHASE 3 : PREPARATIONS FOR IMPROVEMENT

- o Developing WUA work plan for mesqa improvement
- o Rapid appraisal preparation, implementation, and discussion
- o Assess effectiveness and efficiency of water delivery by measuring water losses
- o Write up and discuss with WUA rapid appraisal results
- o WUA council mesqa walk through with IAS and mesqa design staff to identify and locate improvements for custom fit design
- o Mesqa planning and design and WUA final approval of the mesqa design with IIP engineers

d. PHASE 4 : PARTICIPATION IN IMPROVEMENTS

- o Planning the role of WUAs in the implementation process
- o Reviewing and understanding the contractor's work plan
- o Facilitating the work of the IIP construction engineer
- o Plan for obtaining the WUA pump(s)

- o Review and establish all roles and responsibilities of mesqa leaders and personnel

- o Training of mesqa council members in WUA management, making a WUA budget, water scheduling, pump operations, mesqa and pump maintenance

- o Decision on type and size of pump, purchase of pump and pump maintenance plan

- o Developing an improved mesqa operations and maintenance plan

- o Inspection of completed improved system with IIP construction engineer and transfer to WUA management control

e. PHASE 5 : REGULAR WUA OPERATIONS PHASE (On-going)

- o Election or selection of committees or individuals for specific activities

- o Special training required

- o Implement and monitor operation plan and rules

- o Implement and monitor maintenance and rules

- o Regular monitoring of water delivery/continuous flow

- o Water use improvement, training and demonstrations

- o Monitoring and improving the return flow

- o WUA communications and conflict resolution management plan

- o WUA linkages with organizations in the area

- o WUA annual/bi-annual assembly of all members and whoever else required

- o Ongoing council member special training

f. PHASE 6 : WUA FEDERATION ALONG BRANCH CANAL

- o Determine need, purpose and role of federation
- o To be added after branch canal workshop

g. PHASE 7 : MONITORING AND EVALUATION

- o Regular WUA monitoring and evaluation needs
- o Regular M&E of sample demonstration mesqas and farms
- o Water management monitoring and evaluation
- o Internal program evaluations
- o External program evaluations
- o Quality construction control
- o Training evaluation

The status of WUAs development in each of the project sites is presented in Table 7-1.

Table 7-1: Phases of WUA Organization

| | | Esna | Minya | Beni Suef | Zagazig | Tanta | Damanhou r |
|---|---|---|---|---|---|---|---|
| Phase I | Mesqas<br>Feddans | 104<br>7645 | 750<br>21,515 | 114<br>6542 | 272<br>25,608 | 235<br>20,140 | 51<br>11,500 |
| Phase II | Mesqas<br>Feddans | 73<br>5816 | 464<br>17,215 | 114<br>6542 | 272<br>25,608 | 235<br>20,140 | 51<br>11,500 |
| Phase III | Mesqas<br>Feddans | 69<br>5616 | 330<br>16,815 | 114<br>6542 | 272<br>25,608 | 180<br>14,008 | 51<br>11,500 |
| Phase IV | Mesqas<br>Feddans | 6<br>675 | 68<br>4330 | 60<br>3400 | 95<br>7407 | 95<br>6175 | 31<br>4200 |
| Phase V | Mesqas<br>Feddans | 2<br>75 | 50<br>2002 | 29<br>1480 | 4<br>175 | 10<br>500 | 12<br>550 |

4. Comments

The IIP has overall done a commendable job in beginning the process of developing WUAs. The number of mesqas reaching Phase V is essentially a function of the progress of the rehabilitation work. Mesqas that have WUAs in the Phase V category must meet the following conditions in terms of WUA leaders and members making common decisions about:

- o mesqa operations- including forming a mesqa water delivery schedule;
- o pump and mesqa maintenance;
- o financial management for both immediate and long term sustainability; and
- o regular monthly meetings to make operation and maintenance decisions, account for past month's activities, and plan for the coming month.

The project attempts to keep track of mesqa operation by conducting a rapid appraisal study. Appendix 2 is a copy of a report from the data gathered from these rapid appraisal studies. The studies focus on the reliability of the new technologies introduced, how the mesqas are managed in terms of pre-defined tasks, and the status of the financial stability of the WUAs. The reports are restricted to Phase V operational mesqas.

Both the rapid appraisal studies and the evaluation team's own observations show that the process of building WUAs is still in an embryonic stage. This is not to be unexpected. Before answering the questions presented to the evaluation team, the context of the development of the WUAs must be clarified. As can be seen from the tasks of the WUAs, the responsibilities of the organizations are extensive. The phases established to build farmer organizations to meet the expected responsibilities is a rationale and realistic approach. But as one looks at the phases, the first four are essentially preparatory to the "operational" phase. The operational Phase V is, as identified by the Project, on-going. The mesqas identified as operational are so in only a rudimentary way.

Observations by the evaluation team throughout the project areas show that the mesqa leadership is still basically a non-management force except in a very few mesqas. Decisions on irrigation scheduling still follow a procedure that the farmers have used before the improved mesqas were introduced. On one mesqa in Esna, the WUA leader showed us a carefully developed scheduling plan. However, on further questioning, that plan is easily changed to meet the daily demands of the farmers. Similar procedures were found in all the areas. Just as reported in the Rapid Appraisal study, we found farmers irrigating from the Branch Canal with the mesqa pump. We also found one marwa gate in which the corresponding marwa was covered and not in use three years after the mesqa was built. We again saw a farmers in all areas irrigating into improved mesqas with their own pumps. These observations are not meant to say that the effort has failed, but only to point out the fragility of process at this point in time.

In order to put the work into proper perspective, the effort that has been conducted should be described as farmer mobilization. The organization of the farmers gives one the notion that essential organizational attributes of decision-making, coordination of effort, establishment of communication lines, authority structures, etc. have been settled to some effectual standard. This is not the case with the WUAs. Again, this is not to ignore nor to criticize the substantial effort that has been accomplished thus far. What needs to be understood is that the WUAs are only beginning to understand their responsibilities, and therefore should be judged accordingly.

Therefore, to answer the question about the effectiveness of IIP in assisting WUAs to move into the operational stage and all that it means in terms of plans, activities, and internal cooperation among farmers; the project has been effective given the circumstances surrounding the physical improvements. The farmers have given input into the planning, design, and construction of the improved mesqas. The farmers have not had their choice in every area, but for the most part they have been granted that opportunity. The operation and maintenance plans may have been developed, but their operation is suspect. Conflict resolution principles have been taught to IIP, but their is no evidence that they have been diffused to the project sites. The farmers have participated in the improvement work to a degree that has never been done in the past.

However, concern is warranted regarding the "on-going" nature of developing Phase V associations into truly functioning organizations. Efforts are now being focused on establishing bank accounts and financing the pumps. But WUAs are more than this. We observed one farmer irrigating with his own private pump even though he helps support the mesqa pump because he needed to irrigate at that particular time. This is an example of other observations where the discipline of irrigating among the water users has not changed with the introduction of the new improved mesqas. Now, the point of all this, is that if there is to be an established delivery schedule that is more stringent than the farmers' existing scheduling patterns in order to better use continuous flow; additional actions by the project need to be set up with the farmers to ensure that the associations meet one of their central responsibilities. Consistent efforts to do this have not been forthcoming at this time. On the other hand, if existing scheduling practices are appropriate, then the question can be raised as to what are the realistic purposes of the WUA and how should they be organized. This is only one area of inquiry for a prototype project to examine regarding the nature of the WUA.

This prototype project should establish a monitoring mechanism to evaluate what is the most effective way to develop a functioning farmer organization and what are the consequences of such an organization in the rural sector. Such findings can help future work in developing WUAs in other parts of the country or understanding what might be the best approach organizationally to establish effective water delivery programs. There does not seem to be a systematic approach to look at the process of organizing WUAs in order to prepare for further application throughout the nation. The rapid appraisal approach performs a limited monitoring function, but it does not deal with how the WUAs function. There is no priority in conducting such work because there is no Egyptian social scientist on the project to deal with this issue. Based on present conditions, numerous WUAs will evolve "haphazardly" on a trial-and-error basis without patterns being identified so as to guide future efforts. This is a major failing for a pilot project whose activities depend on establishing effective WUAs in order to ensure more efficient water delivery.

## E. The Realistic Role of the IAS In Irrigation Water Management

Based on field observations, discussions, and written documents, the realistic role of the IAS should focus on the organization of the WUAs and helping in water delivery scheduling. Without further training, the IAS personnel in general does not have the knowledge and expertise to teach the farmers on-farm water management techniques. General training can be given to the IAS in on-farm water management. However, on-farm improvements include much more than water management. Water management, although critical, is not sufficient for achieving yield potentials; and therefore it is preferable to have agricultural extension workers who have expertise in all of the dimensions of crop husbandry also advising on on-farm water management. The agricultural extension service needs to be included in on-farm improvement work.

Trying to develop a meaningful cooperative relationship between the MPWWR and the Ministry of Agriculture has been a formidable task. Neither party has been dedicated to put aside "turf" considerations for the overall good of the country. Yet, at the local level; contact has been made between the IAS and the extension service to solve specific problems on farmers fields. The IAS must understand that they do not have all of the answers to improve yields and that more efficient water management is only one part of the picture. Local efforts to bring together the farmer, the IAS, and extension to provide the necessary expertise to improve yields must be encouraged. Maybe one of these days, the two Ministries at the national level will put aside their petty differences and constructively work together.

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1. IIP. Revised IAS Strategy for Sustainable Private Water Users Associations. August,1992.

2. Laitos, Robby. Internal Review and Assessment of IIP's Irrigation Advisory Service. July,1992.




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APPENDIX 7-1

# SUMMARY OF RECOMMENDATIONS

## INTERNAL REVIEW AND ASSESSMENT OF IIP'S IRRIGATION ADVISORY SERVICE

### I. IAS AND EXTERNAL ACTIVITIES AND RELATIONSHIPS

| RECOMMENDATION | ACTION TO BE TAKEN | PERSON RESPONSIBLE | ACTION DEADLINE |
|---|---|---|---|
| IAS should clearly identify how IAS will benefit MPWWR<br><br>MPWWR should consider clearly publishing and communicating its support of IAS to all MPWWR sectors. | **-Annual IIP field day**<br>**-Hold field visit for special groups**<br>**-Build support for continuous flow policy**<br>**-Create professional brochurres**<br>**-Major Innovations of IAS and Ministry**<br>**-How IAS & WUAs Benefit the Ministry** | IAS | Held and on-going<br><br>Brochures Developed<br><br>Paper Prepared |
| MPWWR should consider making tangible commitments to IAS. | **-Assign Additional staff**<br>**-Provide legal base**<br>**-Clarify cost Recovery** | MPWWR | Details on This Recom. Responses being Reviewed |
| MPWWR should consider formalizing IAS by making a permanent section within MPWWR, but with its own budget. | **-Follow MPWWR's actions on making IIP a separate authority & provide helpful information** | | Authority accepted as a goal |
| IAS's contributions to improved system performance need to be clearly delineated and communicated throughout IIP and MPWWR. Define and document. | **-Document these items:**<br>**-improved m. operation**<br>**-savings of water/land**<br>**-reduced conflict with Irrigation dept.**<br>**-increased productivity**<br>**-improved communic'n** | IAS | Provided in a paper |
| Make IIP "demand-driven" via the demonstration meskas, and meska-level cost recovery should follow much easier. | **-Hold field days**<br>**-Distribute publicity materials**<br>**-Document changes**<br>**-Complete proposal** | IAS | Held and on-going<br>IAS Linkage Program paper Developed |

| RECOMMENDATION | ACTION TO BE TAKEN | PERSON RESPONSIBLE | ACTION DEADLINE |
|---|---|---|---|
| MPWWR should answer the question - is there going to be a meska-level cost recovery policy in the next 6 - 12 months? Loudly communicate the answer. | | MPWWR | process |
| Involve mid-level and field MPWWR officials in designing a cost recovery policy. | | MPWWR | Pacer is involving in CR Study |
| MPWWR should decide how to address the issues of meska-level cost recovery and should consider using its influence to pass existing legislation to legalize WUAs. | **-Approve "Statement": "What to Tell WUAs"**<br>**-Accelerate Cost Recovery Program of O&M**<br>**-Accelerate WUA pump purchase program** | MPWWR | IAS has prepared statement for farmers. based on agreed principles |
| Consider the drainage authority cost recovery model for MPWWR. | | MPWWR | See Pacer study |
| Share very openly the meska costs of construction with the WUAs. | | IAS | on-going based on MPWWR principles |
| Be very clear who collects the money and where the money will go after collection. | | MPWWR | NA |
| Be careful of allowing farmers to avoid paying until they call the project a "success," and avoid too long (i.e., five years) a period of time before collections begin. | | | NA |

| RECOMMENDATIONS | ACTION TO BE TAKEN | PERSON RESPONSIBLE | ACTION DEADLINE |
|---|---|---|---|
| Institute a study tour of countries that have already implemented cost recovery programs. | **-In process** | IIP/ MPWWR | Tour completed |
| | | | |
| USAID should assist MPWWR in instituting and continuing their on-going bureaucratic innovation and change through: (a) policy dialogue and analysis, and (b) a social learning process. | **-Arrange MPWWR exposure opportunities such as tours** **-Write brief papers:** - Seminars, workshops | USAID | IAS has [illegible] [illegible] [illegible] and prepared much information to USAID - IAS participate in workshops |
| USAID should ensure that all IIP/IAS field staff are aware of the flexibility built into USAID rules. | | USAID | NA |
| USAID should continue to assist IAS through an adjustment in IIP that assures continuity after 1995. | **-Write a "think piece" on "How USAID can continue to Assure IAS's continuity after 1995"** | USAID | But IAS [illegible] |

## IV. IAS AND IIP

| RECOMMENDATION | ACTION TO BE TAKEN | PERSON RESPONSIBLE | ACTION DEADLINE |
|---|---|---|---|
| Consider filling the empty IAS staff positions in the main office and directorates. | | IIP Director/ MPWWR | Some Done |
| Mid- and higher-level IIP staff people should be both knowledgeable and sympathetic about IAS's work. | | | Involving some in IAS Training<br>IAS participate in some of their Training - use Meeting etc for Distrib. of Literature |
| Don't define IAS staff roles in isolation. Involve MPWWR and IIP staff in developing the appropriate roles and responsibilities for IAS staff. | | IIP | Team approach being used |
| MGT STYLE | | | |
| Implement a participative management style, where higher level, project staff meet regularly with IAS staff in short, structured meetings to solve problems.<br><br>In addition to implementing effective "farmer participation" in IIP, ensure that "bureaucratic participation" also takes place, allowing IAS staff maximum flexibility to attain the project's goals. | **-Do regular dir'ate level action planning**<br>**-Conduct regular, weekly IAS staff meetings**<br>**-Hold an "Orientation & Training" event for General Dir's (3-5 day)**<br><br>**-Involve Dist. Eng., Inspectors, Irr.Gen. dir., and Under-Secretaries**<br>**-Hold joint staff meetg's**<br>**-Hold an IAS field day for IIP sections**<br>**-Hold an IIP field day for the Advisory Com., WRC, USAID, others...** | IIP/IAS | Action planning being [illegible]<br>IAS holds staff Meeting and s[illegible] at joint staff<br>Proposal for Dev. by IAS<br>IAS participates Actively in IIP joint staff Meetings, work etc.<br>Field days held on many [illegible] Sudiyea etc |

| RECOMMENDATION | ACTION TO BE TAKEN | PERSON RESPONSIBLE | ACTION DEADLINE |
|---|---|---|---|
| Revise the IAS training program to consider additional funding, and fill all training positions. | | IAS | Developed proposal and [illegible] assessment |
| | | | |
| Institutionalize and continually conduct a full TNA within IAS. | | IAS | Assessment Done |
| Develop smaller, more flexible training packages, and conduct these training packages at different locations at different times, depending on the local directorates's progress. | **-Make new assessment of IAS program & tng. needs**<br>**-Get Dir. of Form'n** | | Done at Recent Tour Minya Trip [illegible] |
| Continue the IAS/Design seminars and develop a similar IAS/Construction seminar. | | IIP/IAS | IAS has participated on [illegible] Design and implem of 4 of these |
| | | | |
| Continue the broadening of IAS training participants to include MPWWR and IIP staff, as well as contractors. | **-Involve Dist Eng., Inspectors and Gen.Dir's/Und.Sec.** | IAS | Being done for DIST. ENG. and some INSpectors |
| Continue and expand site visits for WUA members and IAS staff, particularly field agents. | | | Being done at [illegible] Fayoum, Zagazig |
| Consider support for academic study abroad. | | | |
| | | | |
| Develop a flow-chart of key activities and relationships between IIP, IAS, farmers, and contractors. | | IAS | Guide Developed |

nissim [illegible]

| ECOMMENDATION | ACTION TO BE TAKEN | PERSON RESPONSIBLE | ACTION DEADLINE |
|---|---|---|---|
| elegate more esponsibility to IAS irectors.<br><br>evelop a separate llocated IAS budget and ive IAS control over their udget. | -See Essam; make the case if needed | IAS Dept Gen. Dir.<br><br>RIP | Being done as a policy<br><br>NA |
| | | | |
| xtend the present IAS TA taff and consider at least ne additional IAS TA staff nember for Lower Egypt.<br><br>Consider additional short-erm TA for IAS. | -Explore options<br>-Designate a counter-part for Ed<br>-Restructure TA work | IAS Dep. Gen Dir. | Proposal for Developed<br><br>Done " |

## III. IAS AND INTERNAL ACTIVITIES AND RELATIONSHIPS

| RECOMMENDATION | ACTION TO BE TAKEN | PERSON RESPONSIBLE | ACTION DEADLINE |
|---|---|---|---|
| IAS should develop a clear, mutually shared vision of IAS with MPWWR, IIP, and IAS staff. Announce the vision clearly, simply, and loudly.<br><br>IAS should define whether it wants to be an enabling institution, or an implementing institution. | **-Strategy statement is in process; complete**<br>**-Brochurrures are being create test and complete** | IAS | Completed in Arabic being used & Distributed<br><br>IAS agrees that it is Both |
| IAS strategy should be flexible enough to respond to unique situations, e.g., Bahig, el Gharak. | **-Clarify a process for documenting lessons learned** | IAS | Developed papers prepared |
| IAS should institute monthly or bi-monthly rotating IAS Director meetings. | | IAS | Done by ... Twice ... by Two Directorals |
| Concentrate maximum effort on demonstration meskas, including additional staff.<br><br>Expect mistakes on the demonstration meskas but (1) rectify them immediately, and (2) learn from the mistakes.<br><br>Continue and expand farmer visits to demonstration meskas. | | IAS<br><br>IAS | IAS in Training planning & Field visits<br>Lessons These are documented and used in Training<br><br>yes and on-going |

| RECOMMENDATION | ACTION TO BE TAKEN | PERSON RESPONSIBLE | ACTION DEADLINE |
|---|---|---|---|
| Slightly revise the WUA organizing process to stress (a) community organizing principles, and (b) managing a share system. Revise Phases 1-3 of the organizing process. | **-Review and make modifications**<br>**-Note criteria: usefulness, participatory, ownership, logic**<br>**-look at Phase 5 at the type of things to do** | IAS | Revision [illegible] in IAS Strategy (see IAS Strategy paper (1992)) |
| IAS and WUAs should consider different organizational approaches, but WUAs should not be coerced into accepting any model. | | IAS | Being done in practice i.e. Beni Sueif etc — Bahig [illegible] |
| Consider starting in two or three meskas per command area and concentrate IAS staff there. | **-Not appropriate** | | |
| Develop a flow-chart of activities and responsibilities of farmers, IAS staff, IIP staff, and contractors. | **-Develop a grid** | IAS | Grid Developed |
| | | | |
| Don't make promises. | | IAS | A firm policy |
| | | | |
| Consider improvement in the present contracting procedures. | **-Write lessons learned.** | IIP/IAS | -Lesson paper<br>-Reassessment [illegible]<br>-Turnover [illegible] new reg. procedure |
| | | | |
| Revise selection criteria for field agents, stressing the need for them to live in the village in the command area. | **-Make a proposal for farmer field agents**<br>**-Many WUAs need strengthening**<br>**-Make a plan for assessment** | IAS | Proposal that future FA come from area |

| RECOMMENDATION | ACTION TO BE TAKEN | PERSON RESPONSIBLE | ACTION DEADLINE |
|---|---|---|---|
| IAS should help the WUAs form their own rules along the improved meskas. | **-Strengthen WUAs, especially Demon'n mesqas** | IAS | Roles and Rules are being dev. with IAS assistance |
| IAS should consider how it will assist WUAs in maintenance of improved meskas, particularly the underground pipes in Upper Egypt where spare parts are rare. | **-Develop a repair plan** | | ESSOA's proposal |
| | | | |
| Many WUAs still need strengthening. IAS should consider re-vitalizing the existing WUAs before massively moving into new areas. | **-Develop a WUA assessment plan** | IAS | Rapid Appraisal Method being used |
| The WUAs will need continued support from IAS in terms of water management and WUA federations. | **-Hold w/s with Dist. eng's, inspectors, key WUA ldrs & work out what is needed** | IAS | OFWM services being introduced in Fayoum. Federation workshop proposed |
| Consider establishing committees within WUAs. | | IAS | Already Exist |
| | | | |
| Train WUAs in O&M in demonstration meskas and where construction will soon be completed. | **-Are doing it** | IAS | On-going and some of these for Field Training |
| | | | |
| IAS should ensure that a workable share system is at the heart of every WUA. | | IAS | plan to work on this with Future WUA Federation etc |

APPENDIX 7-2

# *QUARTERLY RAPID APPRAISAL REPORT ON STATUS OF FULLY OPERATIONAL MESAQS*


BY

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DR. ED SHINN, CONSULTANT


May, 1993

## IAS REPORTS ON RAPID APPRAISALS

**PURPOSE:** The purpose of the rapid appraisal is to engage WUA leaders in the monitoring and evaluation of their rehabilitated mesqa system in order to improve present management practices in mesqa operations, maintenance, finance, and organizational maintenance. The Rapid Appraisal is done in the field, with WUA leaders, at the end of each month.

The purpose of this first Rapid Appraisal Report is to present and summarize findings for 33 activated mesqas for the Month of May, 1993. The report also provides recommendations for improving WUA management. These reports will be presented on a quarterly basis. Table 1 shows when the 33 reporting mesqas were first activated.

An activated mesqa is one in which members have organized their behavior around one or more WUA managed pumps to improve mesqa water control. **A mesqa is not considered to be "activated" until WUA leaders and members have made common decisions about**

- **-mesqa operations--including forming a mesqa water delivery schedule,**
- **-pump and mesqa maintenance**
- **-financial management for both immediate and long term sustainability**
- **-regular monthly meetings to make O and M decisions, account for the past months activities and plan for the coming month.**

There are seven sections in the report:

I. Adequacy of water supply
II. Pump and Mesqa Operations
III. WUA Financial Management
IV. Pump and Mesqa Maintenance
V. WUA organization management
VI. Identification of Priority Problems
VII. Perceived benefits of the new system

## I. ADEQUACY OF WATER SUPPLY

Four questions were asked of mesqa leaders to estimate the adequacy of the water supply delivered to the marwa outlets:

- -How reliable was continuous flow during the past month?
- -What percent of time was the mesqa water supply adequate?
- -What percent of time did the mesqa tail section receive an adequate supply of water?
- -How adequate was the mesqa delivery channel?

**Continuous Flow.** Only one command area of the five reporting--Herz Numaniya--has activated a continuous flow regime. All others command areas report they do not have continuous flow at this time. Beni Ebied has a modified schedule--7 days on followed by 7 days off--that will continue until canal rehabilitation is complete.

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**TABLE 1**

| TIME PERIOD WHEN WUAs WERE ACTIVATED, BY DIRECTORATE | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **YEAR** | 1990 | | | | 1991 | | | | 1992 | | | | 1993 | TOTAL |
| **QUARTER** | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | |
| **HERZ-NUMANIYA** Minia | | 1 | | 6 | 6 | | | 4 | | | | 1 | | 18 |
| **BENI EBIED** Minia | | | | | | | | | | 2 | | 1 | 1 | 4 |
| **QIMAN ARUS** B.Suef | | | | | | | | | | 1 | 1 | | 2 | 4 |
| **QAHWAGI** Tanta | | | | | | | | | | | | | 5 | 5 |
| **SAIDIYA** Zagazig | | | | | | | | | | | | 1 | 1 | 2 |

Figure 1 shows the response of mesqa leaders in the four reporting UCAs about the percent of days the water supply was reported to be adequate. Herz Numaniya reported that for 18 mesqas there was an average of 80% adequacy, followed by Qahwagi (70%), Zagazig (66%), and Beni Ebied (48%).

Continuous flow--or a modified version during construction--is essential to achieve project aims. However, the implementation of continuous flow must be carefully and systematically negotiated with the irrigation department with the cooperation of the general director, undersecretary of irrigation, and often the first undersecretary of the MPWWR. Careful daily recordings of canal levels at both the head and tail of the command area can be very useful in providing essential information for decision makers to consider in the implementation of continuous flow.

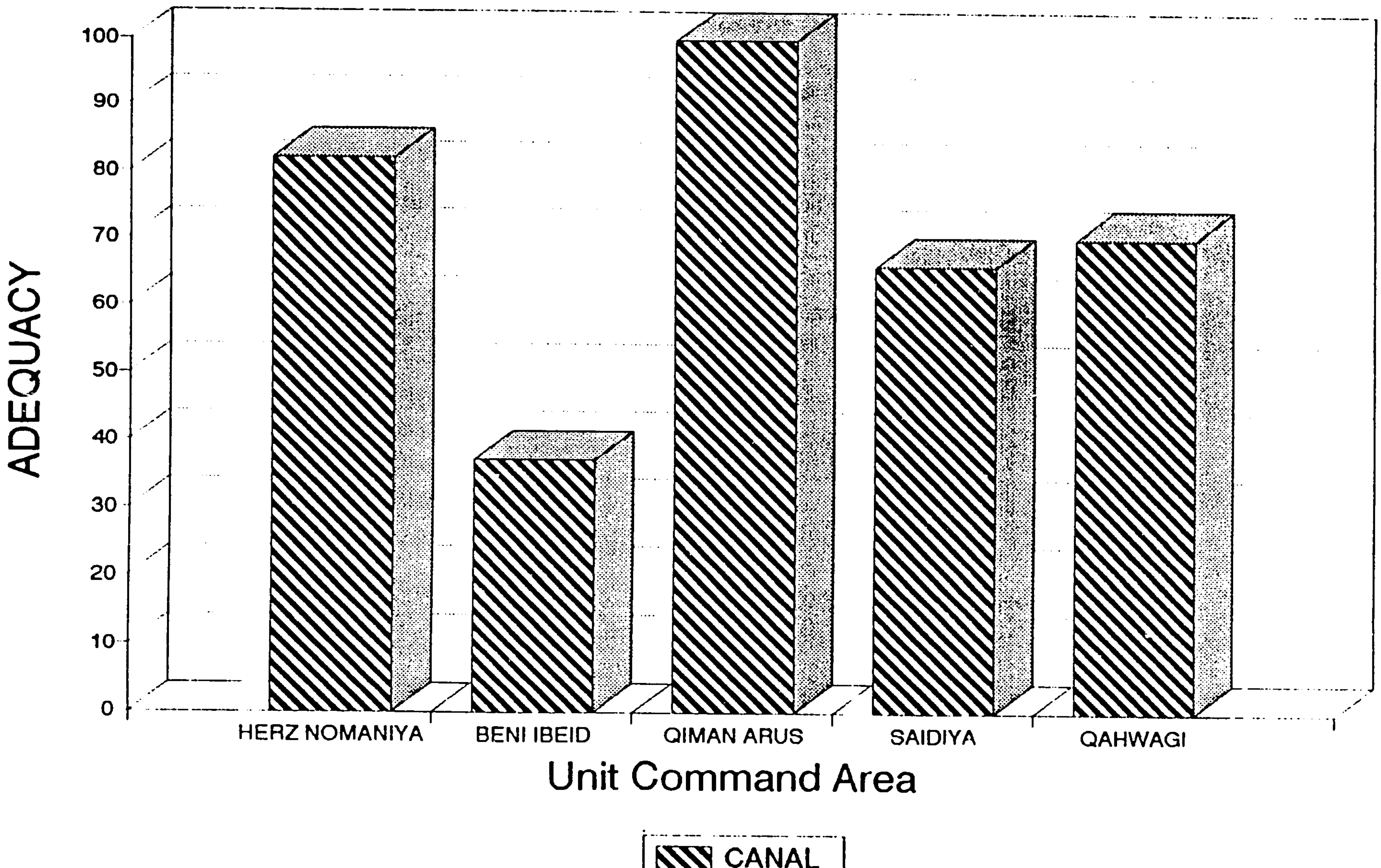
**Mesqa Water Supply.** When WUA leaders were asked what percent of time the water supply was adequate for the month of May, 1993, an average of 79 percent reported the supply was adequate (see Figure 2). However, there was a wide range from 48% to 100%, indicating wide differences in accessing sufficient supplies. Beni Ebied reported that they had only had five days on with 10 days off; they asked their General Director to at least provide a 7 day on--7 day off, and preferably, a 10 day on--five day off. It was finally decided at the end of the month that a 7 day on/off schedule would apply beginning in June, 1993. Consultations with the General Director and Undersecretary of Irrigation in the presence of the Inspector responsible for the Beni Ebied area confirmed this decision.

**Head-Tail differences.** Figure 2 shows that the differences in the adequacy of the water supply to tail and head sections of the mesqa were almost eliminated. Four out of five project areas reported no head-tail differences. Herz-Numaniya reported slight average differences for 18 mesqas, due to the fact that some contracting work was still needed to complete more than half of these mesqas. Prior to IIP improvements, the adequacy of water supply in many command areas showed large differences between head and tail sections of mesqas. These now appear to be very little or so small they cannot be identified.

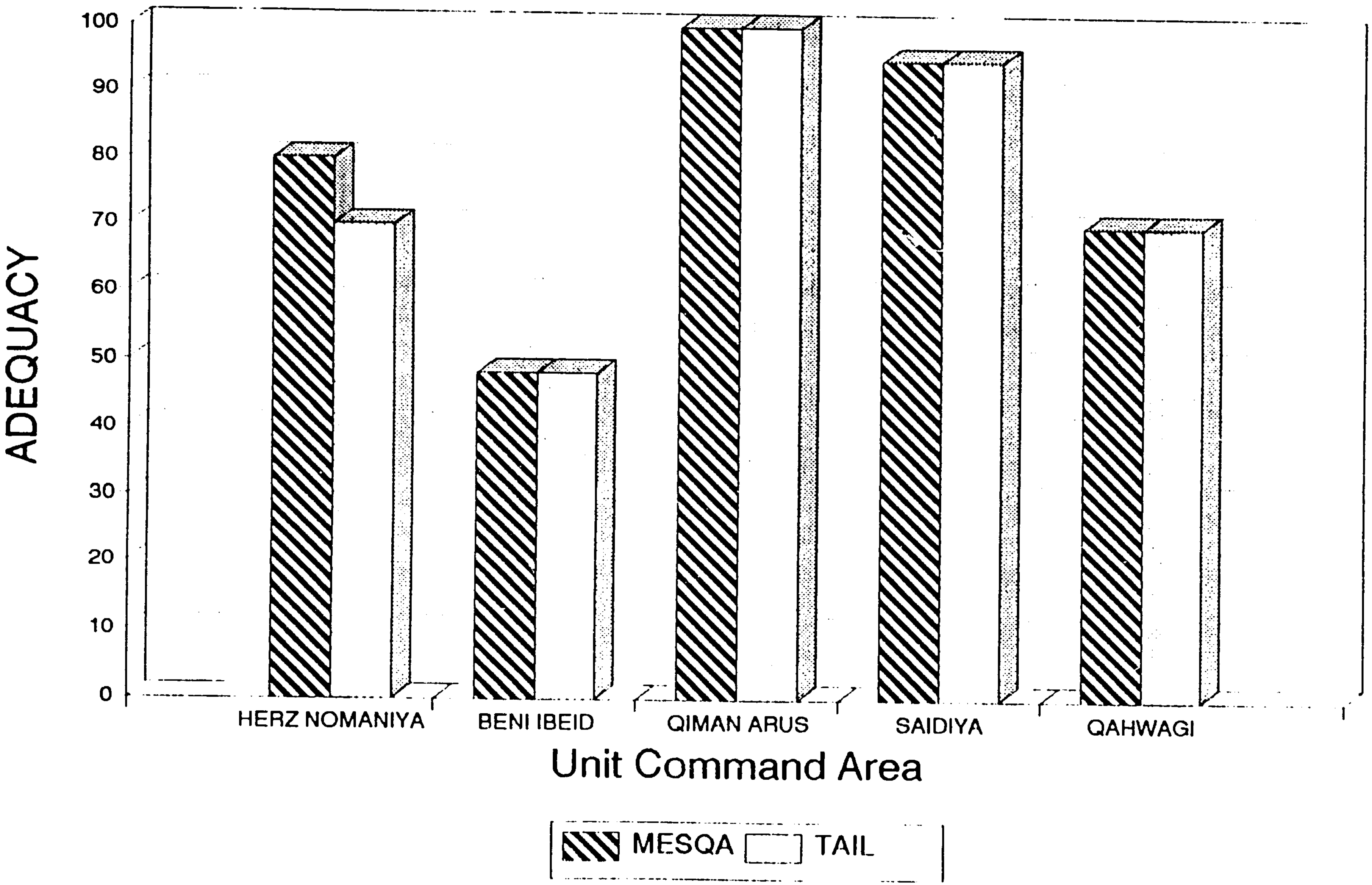
**Adequacy of Mesqa Delivery Channel.** This question was directed only to raised mesqa WUA leaders. Of the four directorates having activated raised mesqas (Zagazig has no functioning raised mesqas), Table 2 shows that half reported serious problems with leaking raised-lined mesqas, and one directorate reported serious problems with leaky gates. It is commonly noted in mesqa walkthroughs that farmers have used large quantities of mud to seal the marwa gates to prevent excessive leaking.

The most common reason for mesqa leakage is that mud is deposited around marwa gates and in the mesqa channel downstream of a marwa gate. Mud checks are built up downstream of the marwa gate--where there is no check structure--to divert the water into the marwa

## Figure 1
## Adequacy of Canal Water Supply



# Figure 2
# Adequacy of Mesqa Water Delivery



outlet. And mud is placed around the marwa gate opening to minimize leakage. Then seeds sprout and plants begin to grow in the mesqa channel--most often at the cement seal between the two J-sections. In a short time, roots penetrate through to the earth. The plant is removed, the roots shrivel, and there is a fresh opening for seepage. Cracks also appear through expansion and contraction, contributing to minor leakage. However, the greatest loss of water appears to be in leaky marwa gates. If this problem is solved along with mesqa check or diversion

**TABLE 2**

**ADEQUACY OF THE RAISED MESQA DELIVERY CHANNEL**
in percent of mesqas per command area

| **Directorate** | **Minia** | | | **Zagazig** | **Tanta** |
|---|---|---|---|---|---|
| **Command Area** | **Herz Numaniya** | **Beni Ebeid** | **Qiman Arus** | **Saidiya** | **Qahwagi** |
| Number of Cases | 18 | 4 | 4 | 2 | 5 |
| No Marwa Gate Leakage (in percent of mesqas) | 33% | 100 | 100 | na | 100 |
| No mesqa leakage from bottom and sides | 33% | 100 | 100 | na | 33 |

structures, much of the problem of leaky mesqas would disappear. The el Minia Directorate has one design, presently being installed, for almost leak proof marwa gates, and can be shared with other directorates. Another gate which could be tried is the "pucca nacca" gate proven to be highly successful in South Asia.

**Recommendations**

1. **Promote Continuous Flow with Irrigation Officials.** Experience has indicated that a continuous flow regime for the IIP is not fully understood or accepted at the directorate level. A long range strategy for gaining irrigation department concurrence with IIP aims and continuous flow needs is needed.
2. **Report Canal Water Delivery Records.** Daily recordings of water deliveries to the head and tail mesqas should be put into a monthly graphic report at the end of each month by the IAS Water Delivery Specialist to share with irrigation officials of each IIP Directorate and central office staff. This should show actual levels of water delivery compared with design levels.
3. **Review Adequacy of Marwa Gates and Mesqa Check Structures.** IAS and Mesqa Design need to review designs and procedures for diverting and controlling water in the mesqa channel to avoid premature deterioration of raised mesqas.

## II. PUMP AND MESQA OPERATIONS

**Water Delivery Scheduling.** Farmer leaders were asked about the percent of time they were able to maintain mesqa water delivery scheduling. Table 3 shows that 3 of 5 command areas responded that their were able to maintain their mesqa water delivery schedule more than 70% of the time, with Beni Ebied (4 WUAs) reporting an average 83%. Two command areas did not respond to the question, indicating that the WUA's--for whatever reason--did not have an operational water delivery schedule for the month of May. For example, for most of this month, WUAs in Qiman el Arus were completing the harvest and doing land preparation for summer season crops. WUAs in Qahwagi indicated that they did not operate out of a mesqa delivery schedule and used their pumps whenever they needed to irrigate.

In response to the question about their ability to adjust to interruptions in continuous flow, four of five sites did not respond, indicating that continuous flow had not yet been activated. However, 18 mesqas on the Herz-Numaniya command area indicated that when continuous flow was interrupted, they were able to maintain their agreed upon water delivery schedule only half of the time. This puts considerable strain on the WUA organization and diminishes its capacity to manage an equitable distribution of water to its membership.

**TABLE 3**

**WATER DELIVERY SCHEDULING ABILITY**
in percent of time and averages per command area
N = 33

| **Directorate** | **Minia** | | | **Zagazig** | **Tanta** |
|---|---|---|---|---|---|
| **Command Area** | **Herz Numaniya** | **Beni Ebeid** | **Qiman Arus** | **Saidiya** | **Qahwagi** |
| Number of Cases | 18 | 4 | 4 | 2 | 5 |
| Ability to maintain irrigation scheduling (percent of time) | 74% | 83% | na | 73 | na |
| Ability to adjust water delivery schedule to interruptions in CF (percent of time) | 54 | na | na | na | na |

NA: there were no responses to this question because Continuous Flow is not yet activated

**Recommendations:**

1. **Modify RA Questionnaire.** In future rapid appraisals the question about interruptions in continuous flow be altered to "interruptions in canal water supply."
2. **Clarify Mesqa Water Delivery Constraints.** In all project sites, the reasons for interruptions in the agreed upon mesqa water delivery schedule should be reported; and reasons for not building a water delivery schedule should be noted.

## III. WUA FINANCIAL MANAGEMENT

**Sustainable WUAs.** The capacity to set up and manage an effective financial system may well be the most important factor in having a sustainable WUA for the long term. If a mesqa has the financial capacity to handle major problem(s) and still maintain a reserve, it is sustainable. For example, after eight to ten thousand hours of operation, a Deutz pump will need to be rebored and overhauled, at a cost of L.E.800-1000. Major damage to a raised or pipe mesqa could cost up to L.E. 500. If these were to happen simultaneously the maximum demand on the WUA would be approximately L.E.1500. A mesqa with one pump should have L.E. 1750-2000 pounds in reserve deposited in the bank; a two pump mesqa should have an additional L.E.1000. Several demonstration mesqas operating for just one year have accumulated just under LE 1500 as of May 31, 1993. They are well on their way to having a sustainable WUA, able to handle any emergency.

Setting up and learning how to manage a WUA financial system is a process that will take a water users organization 12 to 18 months to learn and master. Appendix 1 describes the main areas of management practice to be learned by a WUA to operate their financial system; it includes a series of questions that can help WUA staff assist the mesqa council or finance committee in getting their system into operation.

**Financial Management Capability.** Several key questions were used to help mesqa leaders assess their WUA financial management capability. Table 4 shows that 4 of 5 command areas report that WUA members have a good understanding of procedures for collecting pump fees. However, in Qahwagi, as multiple pumps are used, WUA members pay pump owners directly, rather than the WUA. In Qiman Arus two WUAs are just being activated which accounts for some of their lack of understanding (33%).

TABLE 4

| WUA FINANCIAL MANAGEMENT CAPABILITY by averages for mesqas, in percent. N = 33 | | | | | |
|---|---|---|---|---|---|
| **Directorate** | **Minia** | | | **Zagazig** | **Tanta** |
| **Command Area** | **Herz Numaniya** | **Beni Ebeid** | **Qiman Arus** | **Saidiya** | **Qahwagi** |
| Number of Cases | 18 | 4 | 4 | 2 | 5 |
| Procedures to collect pump fees are under-stood by all members | 94% | 93% | 33% | 95% | 100% |
| Bookkeeping /banking procedures understood by percent of members | 88 | 97 | 0* | 95 | 0* |
| Openness of records to membership (yes = 1; No = 0) | 100 | 100 | 0* | 50 | 0* |
| WUA Member know-ledge of procedures to handle misuse of funds | 100 | 50 | 0* | 100 | 0* |

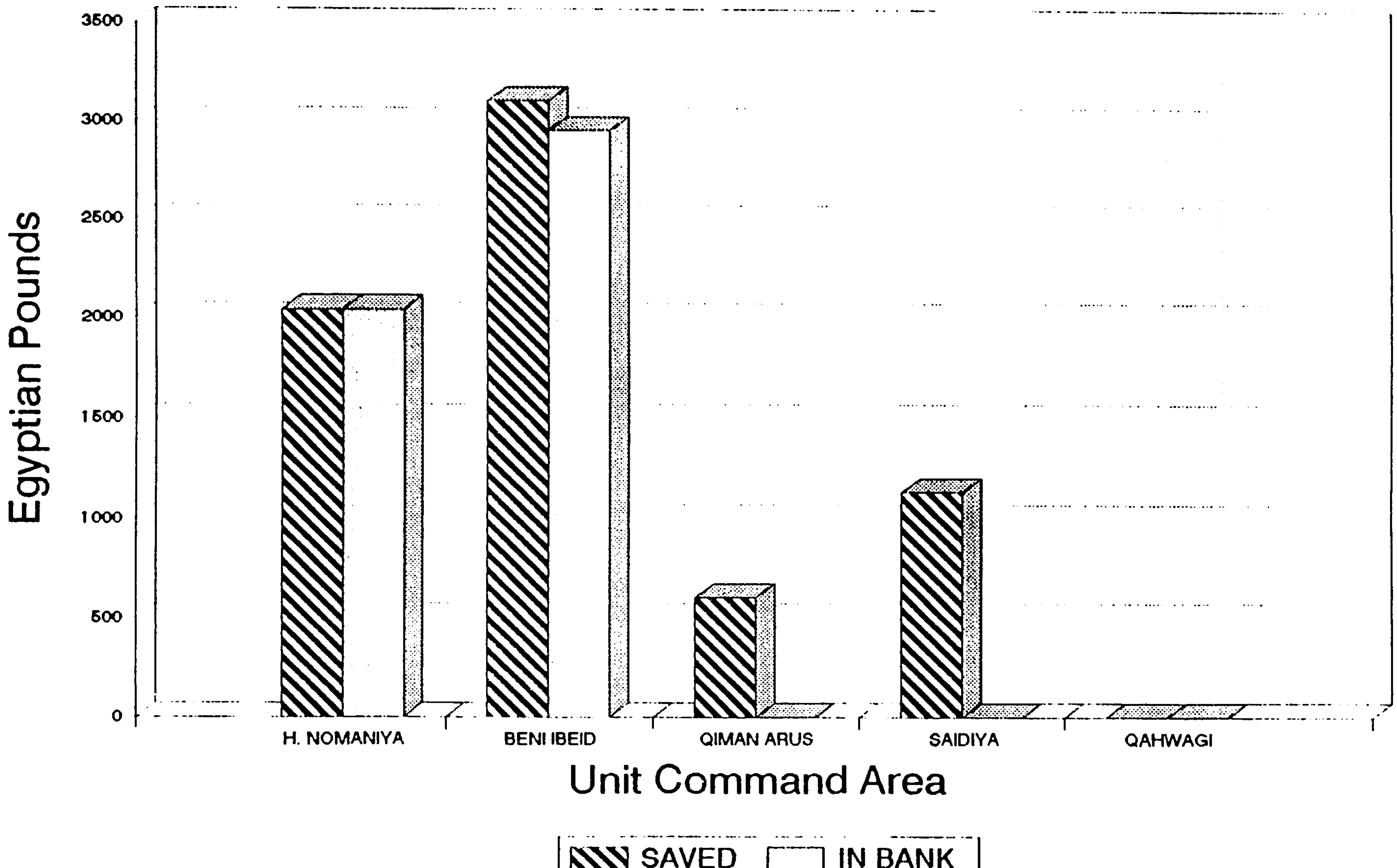
*no bank account opened as of May 31, 1993

With regard to bookkeeping and banking procedures, three of five mesqas report an average of 9 out of 10 WUA members are clear about these procedures. It is noted that Qiman Arus and Qahwagi have not yet opened bank accounts. This lack of bank accounts is closely associated with their reports of no understanding of financial procedures, lack of financial records and member knowledge of procedures to handle the misuse of funds.

**WUA Bank Balance.** The bank balance is viewed as a key indicator of the sustainability of a WUA. A sample WUA budget estimates that approximately 40% of each fee collected will go to building security funds that insure proper maintenance and replacement of the pump, and regular maintenance and repair of the mesqa. It is strongly recommended by the IAS to WUAs that this portion of the fee be immediately set aside as security funds for deposit in the bank. One study (Hivdt, 1992) reports that 85 out of 86 marwa leaders in the Herz-Numaniya command area were aware of the exact amount of money their WUA had deposited in the bank.

Figure 3 shows the total amount of money collected for security funds for activated mesqas in the five commands, and how much was

# Figure 3 - Total WUA Bank Deposits By Unit Command Area

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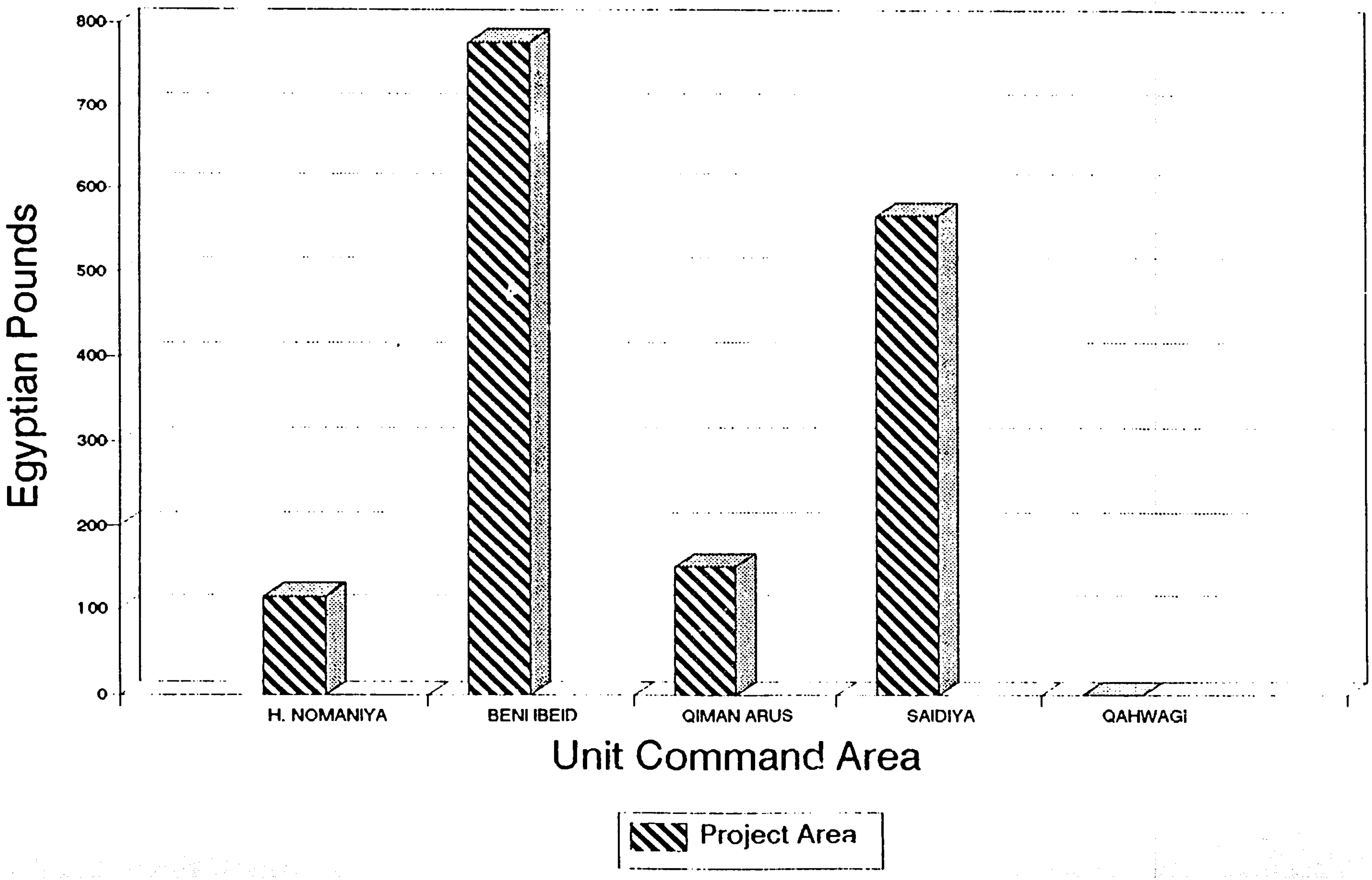
deposited in the Bank. And Figure 4 shows the Average WUA balance for each command area. Beni Ebied and Saidiya--both operating less than one year--have excellent beginnings, and have a savings rate of approximately 40% of total receipts. Saidiya is presently making arrangements with local village banks for arranging bank accounts for activated WUAs. Herz-Numaniya is depositing only ten percent of its total receipts in security funds; however, the IAS is now developing a strategy for all 20 activated mesqas to increase bank deposits for security funds.
Qiman Arus has begun efforts to establish good financial procedures but has been hindered by an unreliable canal water supply; considerable work is needed with WUA leaders and financial recorders to establish an operating financial system for activated mesqas. Qahwagi, which has very limited management experience of pumps by WUA councils, has yet to implement a financial management program for activated mesqas.

In summary, of the 33 activated mesqas reporting, a total of L.E. 6881 has been collected for security funds and L.E.5000 has been deposited in WUA bank accounts. As of May 31, 21 of 33 activated mesqas had opened a WUA bank account. Two command areas are proceeding to build financial systems that can sustain their WUAs into the future; one command area is revising its strategy towards sustainability; and two commands need to take basic steps in helping WUAs develop viable financial systems.

**Recommendations**

1. **Stabilize Canal Water Delivery Schedules.** If canal water delivery is not dependable and there are excessive shortages, any attempt to assist WUAs in developing viable financial systems will be very difficult. The financial component of WUA organizational development is greatly assisted by insuring as much as possible an adequate and reliable canal water supply.
2. **Hold WUA financial Consultations.** Appendix 1 provides a way to help WUA councils and leaders to think through and decide about their financial system. It can and should be used to do WUA financial consultations with each mesqa as soon as possible.
3. **Open WUA Bank Accounts.** Findings up to this point indicate that the decision to open a bank account by a WUA is an essential step in establishing an effective management system. IAS staff will need to prepare the way with clear agreements with local banks, and then accompany WUA leaders and recorders to the bank to open an account and make their first deposit.
4. **Monitor Financial Activities.** In the start up period daily assistance is recommended to assist WUA recorders and other responsible persons to make daily records of all fees collected, record mesqa water deliveries, record daily expenses of fuel, oil and other expenses, and make weekly and monthly reports of income and expenses for review by the WUA council at its monthly meeting. This "monitoring" will require considerable on the job training to help good procedures to be learned and adopted.

# Figure 4 - Average WUA Balance in L.E. Per Command Area

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## IV. PUMP AND MESQA MAINTENANCE

**Sustainability and Maintenance.** If WUA organizations are to be sustained, regular pump and mesqa maintenance is required. Before activating a mesqa, it is advisable that a plan for pump and mesqa maintenance be discussed and agreed upon by each mesqa council. During the three day WUA leader training course prior to mesqa activation, this is discussed and planning is begun. It is also advisable that pump operators be fully oriented to the particular maintenance program for the WUA pump prior to its use. Several pumps have been seriously damaged within several days use because proper training was thought to be unnecessary.

It is the job of the IAS to see that orientation to pump and mesqa maintenance is carefully discussed with the WUA and that a plan and procedures for implementing that plan are created, learned and adopted. Experience has shown that water users are very willing to develop a plan and implementation procedures if they understand why it is needed, receive practical training, have access to spare parts, and are convinced that the security of their organization depends on quality maintenance.

**Mesqa Maintenance Capacity.** This question was only asked of Herz-Numaniya mesqas. It will be asked of all mesqas for the month of July. Herz-Numaniya mesqa leaders on 18 mesqas were asked what percent of the time they were able to obtain spare parts. Their answer was somewhat disturbing in that they responded that they were able to do so on an average of only 27 percent of the time. This indicates a serious limitation at present in the organizational capacity to attend to mesqa maintenance needs, particularly for raised mesqas.

In section VI of this report, it is interesting to note that across the project the number one concern or problem of mesqa leaders at this point in time is maintenance of their newly constructed mesqas and WUA organizational pumps.

**Pump Maintenance Capacity.** Figure 5 shows WUA leader responses about their capacity to maintain and repair their organizationally managed pumpsets. Although most project sites say that they are able to maintain and repair their pumpsets all the time, mesqa leaders from Herz-Numaniya--the longest operating UCA having 18 activated mesqas--report they are able to do so only 80 percent of the time.

Their ability to acquire spare parts for pumps is the same; Beni Ebied WUAs activated in the first half of 1992 report they are able to acquire spare parts for their organization pump only 75% of the time. This may be a function of distance from the supplier, the Helwan company located in Shoubra. Nevertheless, if there is to be a reliable, timely and responsive maintenance system, especially for minor repairs and adjustments, some changes will be needed.

**WUA Regular Maintenance Tasks: Raised Mesqas.** There is considerable difference between maintenance procedures for raised and pipeline mesqas. Maintenance of raised mesqas is much more demanding and requires daily work to prevent deterioration. Banks without grass quickly loose their shape due to human and animal traffic. Farmers adjacent to the banks often try to increase their land area by removing soil from the banks. Maintaining design specifications for raised mesqa earthworks is essential to the sustainability of the mesqa. In many instances, when the earthworks have worn down more than 3 centimeters, J-sections have broken because they have lost the protection of supporting earthwork. Without good compaction during construction followed by a WUA program for transplanting grass to maintain design specifications of mesqa earthwork, raised mesqas are in danger of rapid deterioration.

Table 4 shows WUA leader responses to regular maintenance activities. The <u>mesqa walkthrough</u> is the key activity that should be done weekly for raised mesqas to detect deterioration and make minor repairs. Only 1 project site reports doing regular walkthroughs. However, Herz-Numaniya reports that regular inspections are made an average 72 percent of the time. There is less effort expended to regularly maintain <u>compaction when needed</u>. However 3 of 4 projects responding report regularly repairing leaks in J-sections, and almost all do regular pump maintenance. The most problematic area is <u>planting grass on mesqa banks</u>. This is reported to be done only "sometimes" by mesqa WUA leaders. The activity of transplanting grass to cover mesqa earthworks is perhaps the most important activity towards insuring sustainability of a raised-lined mesqa.

**WUA Regular Maintenance Tasks: Pipeline Mesqas.** Buried pipeline mesqas require less maintenance than raised mesqas. The only problem of on-going maintenance is leaking alfalfa valves in some places. This is due to damage or deterioration of the rubber seals that are designed to prevent leakage. Other possible problems are damage to the alfalfa valve and leakage of buried pipelines. These are major problems and would require repairs that mesqa members are not yet trained to do; nor do they have the spare parts essential for major repairs in case there are leaks in the buried PVC pipe.

Table 5 shows that mesqa leaders report fairly regular efforts at inspecting their system through <u>mesqa walkthroughs</u>. <u>Regular pump maintenance</u> is reported to be regularly done. But the capacity to repair or replace leaky alfalfa values is reported to be low, probably do to absence of spare rubber seals.

## Figure 5- WUA Capacity to Maintain Pump By Percent, In Averages For UCA

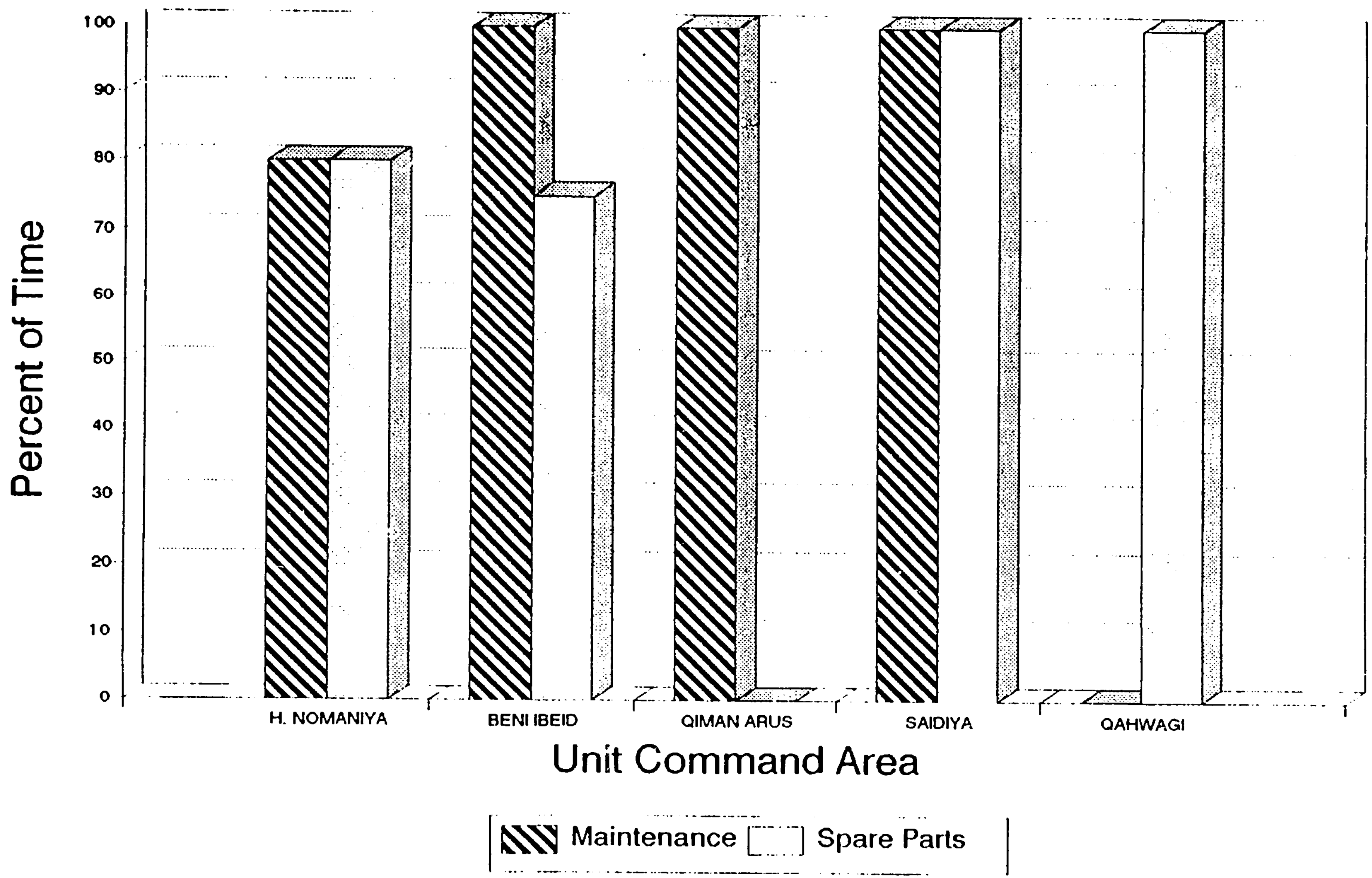


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TABLE 5

| | REGULAR MAINTENANCE TASKS PERFORMED BY ACTIVATED MESQAS, REPORTED IN PERCENTAGES | | | | | |
|---|---|---|---|---|---|---|
| | **Directorate** | **Minia** | | | **Zagazig** | **Tanta** |
| | **Command Area** | **Herz Numaniya** | **Beni Ebeid** | **Qiman Arus** | **Saidiya** | **Qahwagi** |
| | Number of Cases | RLM = 18 PIPE= 0 | RLM = 1 PIPE= 3 | RLM = 2 PIPE= 2 | RLM = 0 PIPE= 2 | RLM = 3 PIPE= 2 |
| **RAISED LINED MESQAS** | MESQA WALK THROUGH | Y S N<br>72 28 0 | Y S N<br>0 100 0 | Y S N<br>50 50 0 | Y S N<br>NA - - | Y S N<br>100 0 0 |
| | COMPAC-TION WHEN NEEDED | 39 44 17 | 0 50 50 | 50 50 0 | NA - - | 100 0 0 |
| | REPAIR LEAKS IN J-SECT. | 6 22 72 | 100 0 0 | 100 0 0 | NA - - | 100 0 0 |
| | REGULAR PUMP MAINT. | 94 6 0 | 100 0 0 | 100 0 0 | NA - - | BY OWNERS |
| | PLANT GRASS ON M. BANKS | 17 78 5 | 0 100 0 | 0 100 0 | NA - - | 0 100 0 |
| **BURIED PIPELINE MESQA** | MESQA WALK THROUGH | 67 33 0 | 0 100 0 | 100 0 0 | NA - - | 50 50 0 |
| | REGULAR PUMP MAIN. | NA - - | 100 0 0 | 100 0 0 | 100 0 0 | 50 50 0 |
| | LEAKY ALFALFA VALVES | NA | 0 0 100 | 0 100 0 | 50 50 0 | 0 0 100 |

**Recommendations**

1. **Unit Command Area Pump Maintenance Training.** It is recommended that several mechanically proficient pump operators be selected by mesqa leaders from UCA branch canals to attend a two week special training course at the Helwan Co. at Shoubra on how to do minor repairs and regular maintenance to service command area pumps. The

Helwan Co has offered to do this training free of charge; the IIP would be responsible for providing transportation, room and board expenses. Selected field agents and technical professional staff would also receive training simultaneously. This would build local capacity at the private and public sector levels to secure regular and timely pump maintenance services. Three command areas are now ready for such training.

2. **WUA Maintenance Training.** Selected persons responsible for pump and mesqa maintenance activities from each WUA need to be trained in how to service and maintain their system. A special, very practical, 2 day course needs to be put together by IAS staff that adequately trains mesqa maintenance committee members and pump operators in essential pump and mesqa maintenance tasks. It has been previously recommended that the pump operator--as the only paid WUA employee for most mesqas--have as part of his job description daily mesqa maintenance tasks (e.g. transplanting grass). Major maintenance tasks would be the responsibility of the mesqa council and its maintenance committee.

3. **Spare Parts Availability.** Presently, there is no provision for spare parts for completed mesqas. It is recommended that construction management consider include the provision of spare parts in all present and future contracts. If this is not feasible other proposals for making spares available to WUA for purchase need to be put forward for immediate consideration and action.

## V. WUA ORGANIZATION MANAGEMENT

Each of the above areas requires a strong management component which includes definition of roles, responsibilities, rules, and procedures of operation. There are other vital management tasks that require the attention of mesqa leaders that are essential to WUA operations.

**Recording each irrigation.** In order to manage and control water, it is important to know who irrigates, when the irrigates takes place, how much land is irrigated and how long the irrigation takes. Table 6 shows that all project sites except one report that all irrigations are recorded. This information is not only useful to the WUA for understanding its water use pattern and how to improve it, but also to the IAS and the IIP for purposes of on-farm water management monitoring and evaluation.

**Holding Formal Monthly WUA Meetings.** One of the most important organizational features of a sustainable WUA is the regular monthly meeting. At this meeting the WUA council (and any members wanting to attend) receives reports about mesqa operations, maintenance and finance, accounts for its use of water, time and money, identifies key issues that need discussion, and makes decisions about its water delivery schedule for the coming month, needed maintenance expenditures, and other matters. IAS staff members work with the mesqa leader and other council members to make preparations for the meeting. Three project sites report that all mesqas hold regular meetings. However two of five UCAs report that only half of the mesqas held regular meetings in May. Future reports will show what percentage of council members actually participated in the monthly meeting.

TABLE 6

| WUA ORGANIZATIONAL PERFORMANCE in percent per directorate | | | | | |
|---|---|---|---|---|---|
| **Directorate** | **Minia** | | | **Zagazig** | **Tanta** |
| **Command Area** | **Herz Numaniya** | **Beni Ebeid** | **Qiman Arus** | **Saidiya** | **Qahwagi** |
| Number of Cases | 18 | 4 | 4 | 2 | 5 |
| percent of mesqas where each irrigation was recorded | 100 | 100 | 100 | 100 | 20 |
| Percent of mesqas holding formal WUA council meetings the past month | 100 | 100 | 50 | 100 | 60 |
| Average number of council members attending WUA council meeting | 7 | 8 | NA | NA | NA |
| Percent of WUA members that understand the cost recovery program | 100 | 0 | 100 | 85 | 95 |

**Adequacy of Fee Collection.** The council is responsible to not only review its income and expenditures, but also to review the adequacy of their budget, especially with regard to building their security funds, depositing them in a bank account, and making monthly reports about the accumulation of funds in the bank. Table 4 shows that half of the mesqas responding report that their fee collection practices are not adequate and need some improvement. However all commands responding report that pump fees are for the most part collected on time.

**Understanding Cost Recovery.** From the responses from WUA leaders about understanding the cost recovery program, good progress has been made in most directorates. All directorates reporting, except one, reported that there was a clear understanding by WUA members about the IIP policy on cost recovery or cost sharing.

**Recommendations**

1. **Preparation for WUA Monthly Meeting.** IAS staff need to pay very careful attention to assist WUAs in the preparation and conduct of their monthly meeting. A brief report by the field agent about WUA actions taken and significant decisions made need to be given to the technical professional staff member or IAS director. Special attention needs to be paid to the financial report, particularly in preparing a clear presentation for the council meeting.

2. **Opening Bank Accounts.** Until a bank account is opened and procedures for handling deposits are clear, WUAs will in all probability continue to report problems with the adequacy of fee collection. When security funds are regularly deposited in the bank, WUAs tend to report few problems with fee collection activities. Clear accountability for all income and expenses is essential for a sustainable WUA.

## VI. IDENTIFICATION OF PRIORITY PROBLEMS

The priority problems identified by WUA leaders for the month of May are as follows:

1. Lack of capacity to maintain mesqa and pump
2. Inadequate canal water supply
3. Non/mal participation by some members of the mesqa
4. Mesqa construction is incomplete.

**Maintenance Capacity.** 15 of 33 mesqas or 45 percent identified some maintenance problem as a priority issue. Following are the specific areas:

- -Leakage of Marwa gates or mesqa (5)
- -Mesqa needs repairs; J sections damaged (4)
- -Proper mesqa maintenance procedures (2)
- -How to repair a broken pipeline section (1)
- -Difficult to get pump repairs (2)
- -Maintenance of the canal (1)

As noted earlier, Raised mesqa problems (11) constitute over 70% of the maintenance issues noted above. One-third of all mesqas and 46% of all activated Raised mesqas identify maintenance as a major problem.

**Inadequate Canal Water Supply.** 6 of 33 mesqas in three project sites (Beni Ebied, Qiman Arus, Saidiya) identified scarcity of water due to no continuous flow as the major problem. This was not identified as a problem for any mesqa in the Herz-Numaniya UCA (with 18 of 33 activated mesqas). The only directorate where canal water supply was not mentioned as a problem was Tanta. Half of the mesqas in Beni Ebied and Qiman Arus, and all of the activated mesqas in Saidiya mentioned the lack of continuous flow as the main reason behind an inadequate canal water supply.
Therefore, it is perceived by three of five reporting project sites as the leading problem for the month of May.

**Non or Mal Participation by WUA Members.** 12 of 33 mesqas identified non-participation or anti-participatory behavior on the part of WUA members as a major problem. However, all of these responses were in the Herz-Numaniya (9) and Beni Ebied (3) UCAs. Use of direct irrigation or other sources of irrigation was identified by 10 mesqas as a major problem. When potential members of a WUA opt out and directly irrigate from the branch canal with their own pumps, they not only act illegally according to irrigation law, but the deprive the WUA from an important source of financial support. WUA members do not know how to cope with this problem, but are very clear that it subjects the organization to undue stress and friction.

The other problem is lack of control over mesqa alfalfa valves, exclusively noted by 3 of 4 mesqas in Beni Ebied. Water users turn on the alfalfa value when it is not their turn and take water "illegally" without paying. This is commonly known as the "free rider" problem. All of us would like to get something free without paying for it. If an organization cannot control "free riders" it soon looses the support of its members, as many try to get free water. The IAS responded to this problem by using the solution pioneered by the Zagazig Directorate of making a simple locking device easily installed on an alfalfa valve. They are presently being installed on all pipeline mesqas in the Beni Ebied UCA. If a marwa member takes water illegally, a lock can be put on that marwa by the mesqa leader so that it can only be opened during its turn. If there is no free riding behavior, the alfalfa valve does not need to be locked.

**Mesqa Construction is not Complete.** Four mesqas, all in Herz-Numaniya, identified incomplete mesqa construction as a major problem to be solved. The old contractor left many mesqas incomplete. The new contractor will begin within a month and will be instructed early in his work to complete these mesqas.

**Other Identified problems.** Three mesqas out of four in Beni Ebied identified late crop damage payments as a lingering problem. One mesqa in Saidiya had some difficulty with the cost recovery policy, and another mesqa mentioned internal conflict over financial records.

**Recommendations.** Recommendations made previously in earlier sections address many of these problems. The one key problem that is apt to appear more frequently is controlling the behavior of illegally withdrawing canal water by private pumps. This problem will need to be addressed at the project level, and solutions crafted in the near future.

## VII. PERCEIVED BENEFITS OF THE IIP

Figures 6-8 show cost savings to farmers of the new system. Figure 9 shows time savings.

**Cost of Irrigation reduced 46 percent.** For all commands, the cost of irrigation for activated mesqas before the project averaged L.E.9.2. After the project the price has fallen to an average of L.E. 5.0, with an average saving to WUA members of L.E. 4.2. Figure 6 shows a wide variation of before mesqa costs from LE 4-14, and "after" costs ranging from LE 2.5 to 6.

Figure 7 translates these before and after costs for newly activated mesqas into LE saved per year, which varies from LE 176 in Beni Ebied to LE 60 in Tanta. This assumes that there are approximately 22 irrigations for each feddan for areas not growing rice, and 40 or more for rice growing areas. As more mesqas are added to this report in the coming months, a more accurate picture will appear. However, it is important to note up to this point, an average savings of LE 107.2 is projected over the period of a year in pumping costs.

**Cost of Maintenance reduced 89 percent.** Mesqa maintenance costs for all activated mesqas in a directorates reporting averaged LE 10.6 per feddan before improvements. After the installation of improvements Directorates reported an average 1.2 per year for mesqa maintenance expenses. Although it is very early to know actual maintenance costs, the oldest operating mesqas report less that one Egyptian pound per feddan per year.

**Total savings of LE 116.6 per feddan per year.** The combined total of savings from pumping costs and mesqa maintenance costs average LE 116.6 per feddan per year. The range is from LE 199 for Beni Ebied to LE 70 for Qahwagi.

**Time required to irrigate one feddan reduced one-third.** The average time required to irrigate one feddan before improvement was 4.1 hours, and after improvement, 2.8 hours, for a total average savings in time of 1.3 hours.

## CONCLUSION

This is the first formal rapid appraisal of activated mesqas. Its intent is two-fold: to enable mesqas councils to monitor and assess their own system in order to improve operation and maintenance; and to train the IAS in a method of analysis and evaluation to strengthen WUA performance. The rapid appraisal will also keep the IIP sensitive to the needs of WUAs during this important phase of activating all aspects of the organization.

Figure 6. Cost of Irrigation in LE/Feddan Per Crop

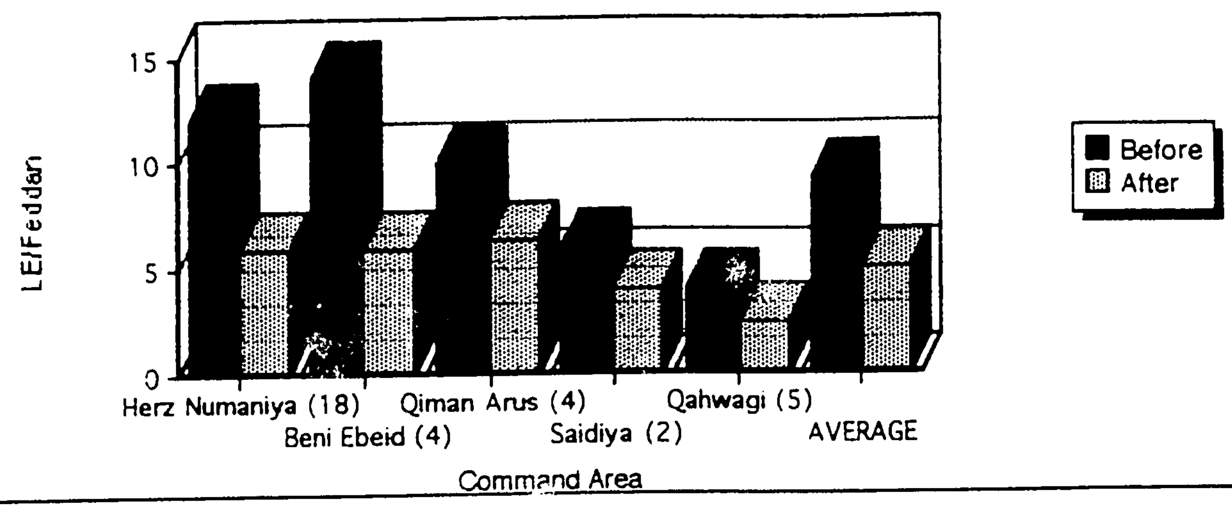



Figure 7. Average Saved/Feddan in One Year

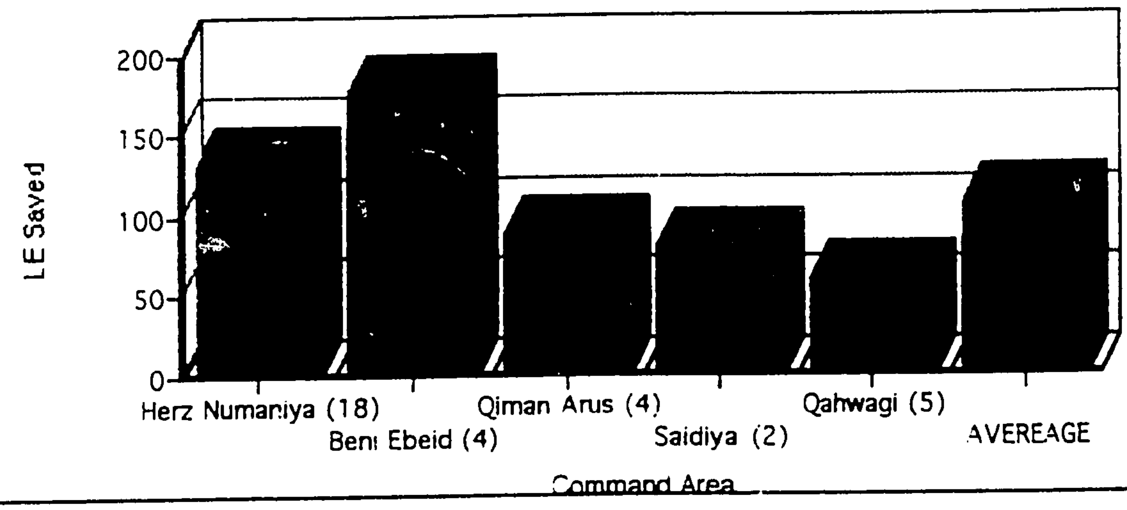
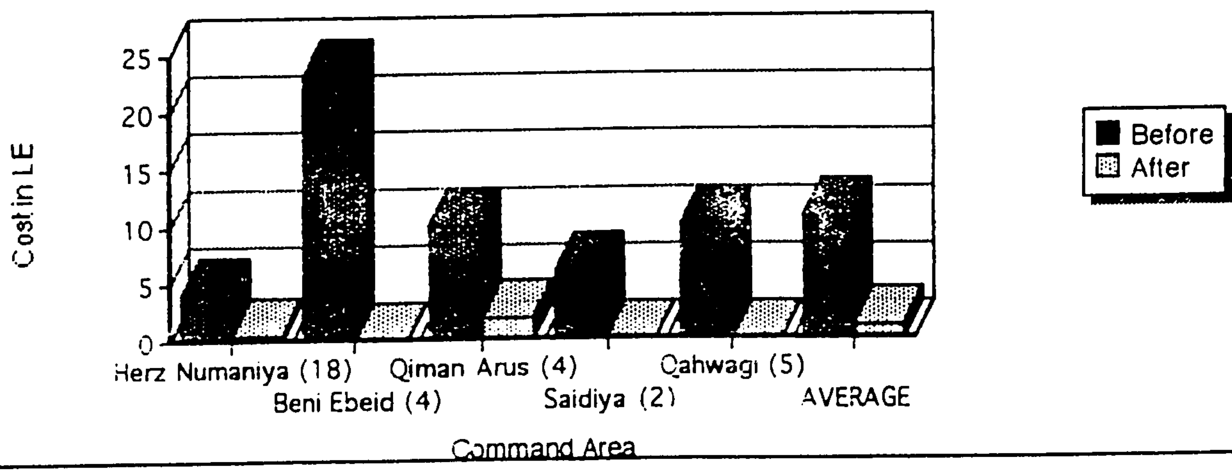



Figure 8. Annual Cost of Mesqa Maintenance Per Feddan

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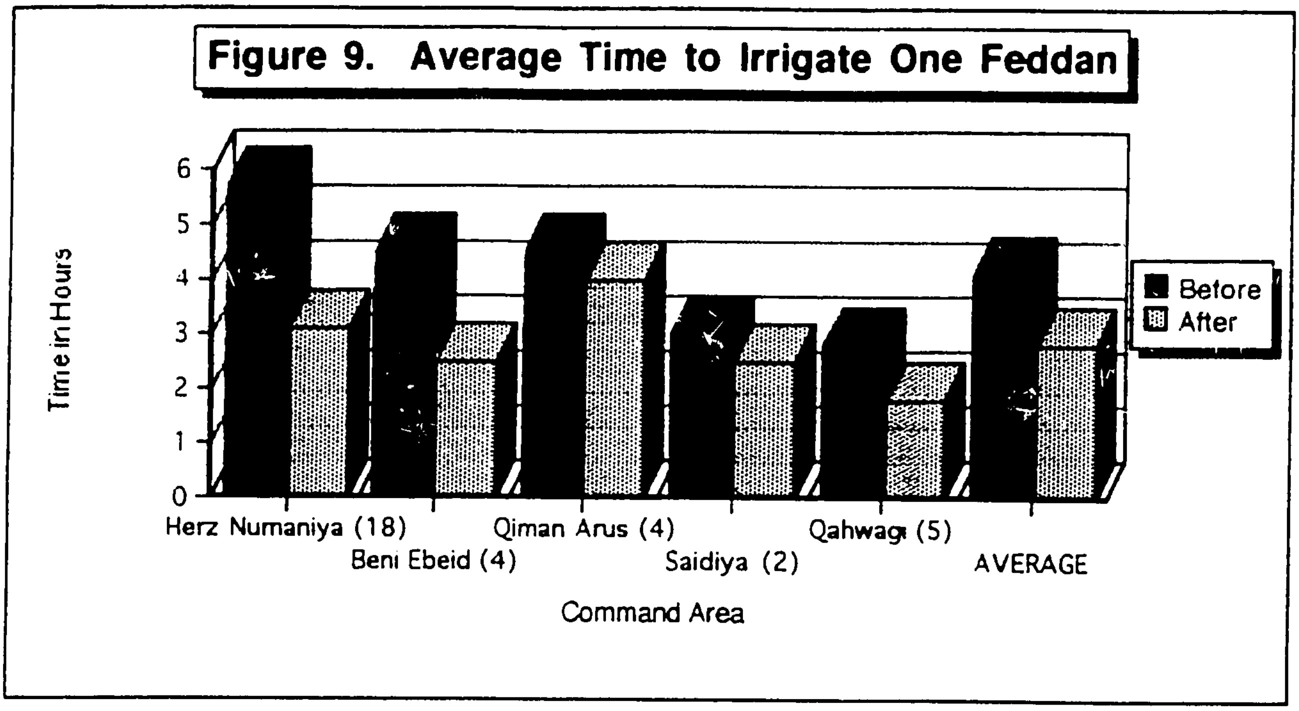
Figure 9. Average Time to Irrigate One Feddan
Time in Hours
0
1
2
3
4
5
6
Before
After
Herz Numaniya (18)
Beni Ebeid (4)
Qiman Arus (4)
Saidiya (2)
Qahwag (5)
AVERAGE
Command Area

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## MESQA FINANCIAL CONSULTATION

These questions are to be used with the mesqa finance committee (mesqa leader, mesqa recorder, mesqa pump operator, and perhaps one other mesqa member or leader who is honest). These questions are asked to help the mesqa financial leadership to think through their financial management system and improve it. Later, a format for the consultation will be suggested, including how to make decisions to improve the financial management system.

| AREA OF MANAGEMENT PRACTICE | QUESTIONS TO BE ANSWERED |
|---|---|
| 1. **Receipt book** | -Do they have a receipt book and is every water order recorded? |
| 2. **Collection of Fees** | -What are the procedures?<br>-Who collects the money?<br>-What happens to the money after it is collected?<br>**-Are security funds immediately set aside for depositing in the bank?**<br>-Is the time for irrigation arranged when water is ordered? |
| 3. **Ordering Procedures** (at the mesqa) | -Does the pump operator receive the receipt from each member?<br>-Does the Pump Operator record the time each irrigation begins on the receipt?<br>-Does the pump operator record the time each irrigation ends on the receipt?<br>-Does the pump operator return the receipt to the mesqa recorder? If so, When? If not, why not?<br>-What does the mesqa recorder to with the receipt? |
| 4. **Record Keeping of Irrigation Time** | -Is a daily record of all irrigations kept that includes the name of each irrigator, the time the irrigation began & ended? |
| 5. **Daily Financial Balance** | -Who makes the daily financial rpt?<br>-What procedures are followed in making the report? |
| 6. **Weekly/monthly financial Balance** | -Is a weekly and monthly financial report made? By whom? What are the procedures followed? |
| 7. **Bank Deposit Procedures** | -When is money deposited?<br>-Who deposits it?<br>-Who is authorized to make with-drawals? and for what reasons? Who approves withdrawals? |
| 8. **Reporting Procedures at the Monthly Meeting** | -Who makes the financial report <u>before</u> the monthly meeting to insure it is accurate? What procedures are followed in making the report? |

# ANNEX 8

## Monitoring and Evaluation System

# ANNEX 8

## Adequacy of IIP's Monitoring and Evaluation Systems

The monitoring program has two separate components, (i) socio-economic and (ii) water management. The socio-economic component will be based on a sample of 90 farms across seven project command areas. The number of sample farms in each command area was decided on the basis of the yield variability observed during the 1991 IIP farm survey. Twenty four control farms have been selected across the same project command areas (see Table 8-1). The sample is divided between farms at the head and tail ends of the mesqas. A before project survey has been completed for all of the sample farms. These same farms will be surveyed annually for five years to determine the flow of project benefits. This is consistent with the five-year time period projected to be required for the full projects benefits to be realized. For the first two years, yield increases will be based on farmers estimates. Beginning in the third year crop cuttings will be taken.

### TABLE 8-1

### MONITORING SAMPLE SIZE BY LOCATION FOR IIP

| COMMAND AREA | NO. OF MESQA | NO OF SAMPLE FARM | SAMPLE SIZE | |
|---|---|---|---|---|
| | | | FARMS | CONTROL |
| BALAGTER | 4S + 1C | 14 + 4C | 14 | 4 |
| QAHWAGI | 4S + 1C | 12 + 4C | 12 | 4 |
| SAIDIYA | 4S + 1C | 12 + 4c | 12 | 4 |
| QIMAN AL AROUS | 2S + 1C | 4 + 2C | 4 | 2 |
| BENI EBIED | 4S + 2C | 8 + 4C | 8 | 4 |
| ABBADI | 6S + 1C | 24 + 2c | 24 | 2 |
| KHOR EL SAHEL | 4S + 1C | 16 + 4C | 6 | 4 |
| TOTAL | 29S + 8C | 90 + 24C | 90 | 24 |

This evaluation views the monitoring program as critical for two reasons, (i) to establish the absolute benefits received by the farmers as a basis for expanding the program into new regions, and (ii) to provide a basis for a cost sharing program that may be associated with this project. (see Section V, Progress in Cost Sharing Program)

The planned monitoring and evaluation program shows considerable insight and creativity. However, for extracting the lessons learned from IIP to provide guidance for future projects, the program is minimal. For example the sample size is not sufficiently large or differentiated (especially with regards to inputs other than water e.g. fertilizer, plant protection, varieties and for agricultural prices and physical situations within individual commands) to answer many of the questions relevant to the usefulness of the IIP as a prototype project.

The monitoring program for irrigation system performance is operated independently of the socioeconomic monitoring except that measurements are taken along the same mesqas and farmer fields that are included in the socioeconomic survey. There appears to be a strong training program for creating the capacity among the IAS engineers to carry out the monitoring tasks. The monitoring and evaluation is not claimed to be sufficient for determining water savings as in a scientific experiment. Instead it is designed to document if water delivery and timeliness will improved as a result of the project and to create an awareness of water management among IAS staff.

There is no evaluation program to determine benefits or costs identified by the farmers but not recognized by the project managers. Based on informal focus group meetings with farmers at the sites visited, there is considerable enthusiasm for the IIP project. There are clearly expectations that there will be cost savings and by some, that there will be yield increases. These expectations have been created by IIP staff, farmers in other project areas, and, especially, for cost reduction from pumping through farmers' experience. However there is some evidence that risk reduction, reduction in between year variability, and the high opportunity cost for supervisory labor may be significant in explaining farmers enthusiasm for the project. Also, this enthusiasm is not universal with some farmers noting that the benefits being claimed come from other activities. These potential benefits, and perhaps others should be identified as they are relevant for project expansion and for cost sharing considerations.

There is no environmental monitoring program. Continuous flow has the potential to reduce the incidence of bilharzia, increase mosquito borne diseases and increase problems with weed growth in the branch canals and distributories. These effects should be monitored and evaluated because of their implications for project expansion and cost sharing.

There is no systematic monitoring of the process of WUA formation nor of the interaction of the WUA's with other rural institutions. These experiences should be continually evaluated for improving the WUA formation process .

**Can the M & E program provide information required by IIP, MPWWR and USAID to evaluate the effectiveness of the Project ?**

Based on the findings and conclusions discussed above, the monitoring and evaluation program is not sufficiently fine-tuned to evaluate the effectiveness of the IIP program with sufficient sensitivity to guide future policy decisions related to IIP type activities. These include investment decisions in similar projects by other donors and increased involvement of the private sector in mesqa improvement activities (see Main Report, Section VIII). The existing monitoring and evaluation program is more geared to the current total IIP program. In the opinion of the evaluation team the differences in IRR and benefit cost ratios between project command areas (see Tables 8-2 thru 8-5) and the differences in the robustness of the sensitivity analysis area (see 8-6) recommends that the monitoring and subsequent analysis should account for project differences between project command areas.

It is recommended that the IIP program employ short-term technical assistance (agricultural economist, agronomist, pedologist and water management specialist for approximately a two to three-month period) to develop a monitoring and evaluation that will determine :

1. Project benefits by project and command area characteristics including absence or presence of drainage, major soil differences,land leveling and type of mesqa. The methodology will need to account for multiple production inputs in the production process.

2. The effects of the new water control practices on downstream water users.

3. The effects of continuous flow on unimproved mesqas including the environmental effects.

4. The benefit streams as seen by farmers at different locations along the mesqa and by type of farmers including tenants, owner operators and absentee owners.

5. The evolution of pump ownership patterns on the improved mesqas, particularly for the emergence of single owners who become waterlords, i.e. individual farmers who have



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gained monopoly pricing power because they control the pump and thus water availability for all the farmers along the improved mesqa.

6. Other relevant activities and outputs.

The specialists should also design training programs for field data collections and conduct training sessions. They should investigate possibilities for involving the Egyptian university community in the monitoring and evaluation program including the use of graduate students for specialized studies. The monitoring and evaluation system should be structured in a way that includes significant participation by persons not directly associated with the IIP, or with the early research which laid the framework for the project. This is a generally accepted principle for maintaining objectivity in any system of monitoring and evaluation. At the same time, it is important that the IIP staff should continue to be directly involved in monitoring and evaluation. This activity must be a process that allows the project to benefit from lessons learned in a continuous and constructive manner. It must not be cast as a policing operation or create opportunities for inter-agency conflict.

A viable data base will not be built up to provide reliable information for use by IIP, USAID and MPWWR prior to the PACD on September 30, 1995. The Project predicts that full benefits generated by IIP will accrue over a three year period; 25% the first year to 75% after the second year and full benefits following the third year after implementation of the improved Mesqa employing the use of continuous flow . Only those few improvements completed prior to September 1992 and most still lacking water delivery by continuous flow will provide a partial base for evaluation of planned benefits by the PACD.

Adequate information to evaluate the benefits of IIP will not be available for USAID by September, 1995. Assistance to the M and E program of the IIP needs to be extended for an additional three years so that the results of this Pilot Project can be fully evaluated within the framework of USAID support.

**Are the field data collection activities providing the required information in a timely manner?**

The socioeconomic surveys that have been carried out appear to have been affectively administered and conducted. The economic section is competent and displays a high level of professionalism. This group should continue to be a part of the monitoring and evaluation program.



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The method of determination of the water application efficiencies can be simplified and improved for timely collection of field information. As stated in the feasibility studies the principal method of irrigation in Egypt is by level basins. Rather than attempting to adapt borrowed methods for level borders, an uncomplicated procedure prepared specifically for the more rudimentary flooding of small level basins can be devised for this irrigation practice. IIP needs to prepare an improved method and forms for collecting field information on the irrigation of level basins and retain the method for level borders for those applicable situations where this practice, requiring the recording of the times of advance and recession of water, is used.

**Are there constraints affecting the timely collection and analysis of data ?**

Constraints associated with the timely collection and analysis of data appear to be associated with the personnel transfer and training problems discussed elsewhere in this evaluation (see Main Report, Sections I-A and I-C; and also Annex 6 & Annex 7).

## TABLE 8-2

## CAPITAL COST, NPV, IRR AND B/C
## BY PROJECT COMMON AREA
## UNLINED RAISED MESQA - SINGLE POINT LIFT

| COMMAND | CAPITAL COST (LE 000) | NPV (LE 000) | IRR | B/C |
|---|---|---|---|---|
| MANTOUT | 12,927 | 8,145 | 17.90 | 1.34 |
| ASHROUBA | 4,804 | 2,598 | 17.1 | 1.3 |
| IQAL SHAMIA | 20,522 | 24,452 | 23.5 | 1.71 (WELL WATER) |
| QIMAN EL ARUS (12%) | | 7,919 | 22.4 | 1.7 (FEB. 91) |
| BAHR EL GAHARAG | 43,418 | 39,841 | 22.2 | 1.9 |
| SAIDIYA (3) | - | - | - | - |
| BAHR EL SAIDI | 53,804 | 23,036 | 17.0 | 1.3 |
| KHOR SAHEL | - | - | - | - |
| QAHWAGI | 15,333 | - | 23.7 | 1.8 (DRAINAGE) |
| BALAGTAR | 8,748 | 8,394 | 21.4 | 1.47 |
| SAIDIYA(1) | - | 951 | 12.8 | 1.1 |

NPV = Net Present Value
IRR = Internal Rate of Return
B/C = Benefit Cost Ratio
SOURCE : IIP COMMAND AREA FEASIBILITY STUDIES.

## TABLE 8-3

## CAPITAL COST, NPV, IRR AND B/C BY PROJECT COMMAND AREA LOW LEVEL EARTH - MULTI POINT LIFT

| COMMAND AREA | CAPITAL COST (LE 000) | NET PRESENT VALUE (LE 000) | B/C | IRR |
|---|---|---|---|---|
| QIMAN EL AROUS | - | 7,533 | 1.6 | 29.1 |
| SAIDIYA(3) | 53,223 | 53,033 | 1.6 | 21.6 |
| BAHR EL SAIDI | 25,955 | 33,992 | 1.6 | 22.5 |
| KHOR SAHEL | 2,061 | 17,000 | 1.2 | 20.5 |
| BENI EBIED | 3,504 | 5,899 | 1.7 | 25.4 |
| QAHWAGI | 6,007 | 7,728 | 1.6 | 26.2 |
| BALAGTAR | 6,975 | 5,774 | 1.28 | 19.1 |
| SAIDIYA (1) | - | 3,407 | 1.1 | 13.5 |
| SAIDIYA (2)A | 16,837 | 8,658 | 1.3 | 17.0 |
| SAIDIYA (2)B* | 18,380 | 9,522 | 1.4 | 18.0 |

* DRAIN WATER AND GROUND WATER RE-USE ELIMINATED
* NPV = Net Present Value
* IRR = Internal Rate of Return
* B/C = Benefit Cost Ratio

Source : IIP command area feasibility studies.



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## TABLE 8-4

## CAPITAL COST, NPV, IRR AND B/C
## BY PROJECT COMMAND AREA
## LOW PRESSURE PVC PIPE

| COMMAND AREAS | CAPITAL COST (LE 000) | NET PRESENT VALUE (LE 000) | IRR | B/C |
|---|---|---|---|---|
| MANTOUT | 26,665 | 903 | 12.4 | 1.03 |
| ASHROUBA | 9,515 | 118 | 11.9 | 1.0 |
| IQAL SHAMIA | 41,101 | 13,470 | 16.1 | 1.3 |
| BAHR EL GHARAG | 63,961 | 27,879 | 17.7 | 1.5 |
| SAIDIYA (3) | 97,492 | 36,967 | 16.6 | 1.4 |
| BAHR EL SAIDI | 63,404 | 18,312 | 15.6 | 1.2 |
| KHOR SAMEL (CONCRETE PIPELINE) | 10,400 | 17,186 | 13.6 | 1.09 |
| BENI IBEID | 11,495 | 384 | 12.4 | 1.0 |
| QAHWAGI | 16,259 | 20,104 | 11.7 | 1.9 |
| BALAGTER | - | - | - | - |
| SAIDIYA(1) | - | 8,427 | 13.0 | 1.1 |
| SAIDIYA 2A | 25,693 | 8,317 | 15.8 | 1.3 |
| SAIDIYA 2B* | 25,054 | 9,522 | 16.5 | 1.3 |

* GROUND WATER AND DRAIN RE-USE ELIMINATED.
* NPV = Net Present Value
* IRR = Internal Rate of Return
* B/C = Benefit Cost Ratio
Source : IIP command area feasibility studies.



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## TABLE 8-5

## CAPITAL COST, NPV, IRR AND B/C
## BY PROJECT COMMON AREA
## PRECAST RAISED LINED MESQA - SINGLE POINT LIFT

| COMMAND | CAPITAL COST LE 000 | NPV LE 000 | IRR | B/C |
|---|---|---|---|---|
| MANTOUT | 17,035 | 8,38 | 17.47 | 1.38 |
| ASHROUBA | 6,214 | 2,98 | 17.1 | 1.3 |
| IQAL SHAMIA | 28,007 | 23,325 | 21.1 | 1.65 |
| QIMAN EL AROUS | | 5,460 | 17.7 | 1.4 |
| BAHR EL GAHARAG | 57,221 | 30,744 | 18.5 | 1.6 |
| SAIDIYA | 69,643 | 54,681 | 20.4 | 1.7 |
| BAHR EL SAIDI | 67,822 | 13,061 | 14.5 | 1.2 |
| KHOR SAHEL | 10,616 | 17,160 | 12.9 | 1.05 |
| BENI EBIED | 7,136 | 4,232 | 18.1 | 1.4 (CAST INPLACE) |
| BENI EBIED | 6,113 | 5,025 | 20.1 | 1.5 (PRECAST 5 SECTIONS) |
| QAHWAGI | 18,503 | 17,055 | 21.2 | 1.7 |
| BALAGTER | 10,525 | 7,374 | 19.3 | 1.38 |
| SAIDIYA (2)A | 29,125 | 12,540 | 16.5 | 1.3 |
| SAIDIA (2)B* | 21,970 | 13,598 | 19.3 | 1.5 |

* GROUND AND DRAIN WATER RE-USE ELIMINATED.

NPV = Net Present Value
IRR = Internal Rate of Return
B/C = Benefit Cost ratio

SOURCE : IIP COMMAND AREA FEASIBILITY STUDIES.



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# TABLE 8-6

## PERCENTAGE CHANGE IN BENEFIT AND COST
## BEFORE B/C <I (NPV <O)
## FOR MESQA ALTERNATIVES BY COMMAND AREA
## (ECONOMIC ANALYSIS)

| COMMAND AREA | RAISED MUD MESQA (1) %D B | %D C | %A B&C | PIPE LINE MESQA (2) %A B | %A C | %A B&C | RAISED EARTH UNLINED MESQA (3) %A B | %A C | %A B&C |
|---|---|---|---|---|---|---|---|---|---|
| BAHR EL SAIDI | 10 | 15 | 5-10 | 15 | 20 | 5-15 | 20 | 30 | 10-15 |
| SAIDIYA 3 | 35 | 35 | 20-30 | 25 | 35 | 10-20 | - | - | - |
| QIMAN EL AROUS | 35 | 45 | 25-10 | 35 | 55 | 25-15 | 25 | 35 | 25-20 |
| BALAGTER | 20 | 25 | 10-15 | NF | NF | NF | 25 | 40 | 10-25 |
| SAIDIYA 2(A) | 30 | 40 | 15-20 | 20 | 25 | 10-10 | - | - | - |
| SAIDIYA 2(B) (REGULATED REUSE) | 30 | 50 | 20-20 | 20 | 30 | 10-15 | - | - | - |
| SAIDIYA I | 5 | 5 | 5-0 | 5 | 5 | 5-5 | - | - | - |
| BAHR EL GAHARAG | 35 | 45 | 15-30 | 30 | 45 | 15-25 | 45 | 85 | 25-35 |
| IQAL SHAMIA | 35 | 40 | 20-30 | 20 | 25 | 10-10 | - | - | - |
| MANTOUT | 23 | 36 | 18-14 | 0 | 2 | 0-2 | - | - | - |
| ASHROUBA | 20 | 25 | 10-10 | 0 | 0 | 1-0 | - | - | - |
| BENI EBIED | 25 | 45 | 25-15 | 5 | 5 | 2-2 | - | - | - |

(1) ASSUMES BENEFITS CHANGE, COST REMAINS CONSTANT.

(2) ASSUMES COSTS CHANGE, BENEFIT REMAINS CONSTANT.

(3) ASSUMES BENEFITS AND COST CHANGE SIMULTANEOUSLY.
SHOWS MID-POINT OF MULTIPLE POSSIBLE SITUATIONS WITH B AND C CHANGING SIMULTANEOUSLY AND NPV GOING TO ZERO.

Source: SENSITIVITY ANALYSIS : IIP FEASIBILITY STUDIES FOR VARIOUS PROJECT COMMANDS



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# ANNEX 9

## Financial Appraisal

TABLE 9.1 ACREAGE (feddans) AND CONTRACT COSTS (LE) FOR PROJECT AREA

| Commands Areas | Main Delivery System | | | | Mesqa Improvement | | | | | | Total Cost All Imprmts LE |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Present Contrcts LE | To Be Contrcted LE (1) | Total Area fd | Total Cost LE | Present Contrcts Area fd | Present Contrcts Cost LE | Under Bidding (1) Area fd | Under Bidding (1) Cost LE | Total Area fd | Total Cost LE | |
| Saidia 1 | 2,244 | | 8,050 | 2,244 | 7,160 | 7,408 | | | 7,160 | 7,408 | 9,652 |
| Saidia 2 | 2,578 | 1,100 | 17,180 | 3,678 | 10,980 | 10,204 | | | 10,980 | 10,204 | 13,882 |
| Saidia 3 | | 1,000 | 9,850 | 1,000 | | | | | 0 | 0 | 1,000 |
| Qahwagi | 4,566 | | 12,800 | 4,566 | 5,633 | 4,859 | | | 5,633 | 4,859 | 9,425 |
| Bahr el Saidi | 2,190 | 1,300 | 30,600 | 3,490 | 12,237 | 12,699 | 10,180 | 10,180 | 22,417 | 22,879 | 26,369 |
| Balaqtar | 336 | | 12,000 | 336 | 5,663 | 5,148 | | | 5,663 | 5,148 | 5,484 |
| Qiman el Arus | 1,105 | 330 | 4,200 | 1,435 | 4,600 | 4,510 | | | 4,600 | 4,510 | 5,945 |
| Bahr el Gharag | | | 0 | 0 | 290 | 416 | | | 290 | 416 | 416 |
| Beni Ebeid | 2,346 | | 5,000 | 2,346 | 4,350 | 3,393 | | | 4,350 | 3,393 | 5,739 |
| Ashruba | 1,730 | | 4,000 | 1,730 | 3,760 | 4,441 | | | 3,760 | 4,441 | 6,171 |
| Mantout | | 6,000 | 11,340 | 6,000 | 2,108 | 2,508 | 8,386 | 10,580 | 10,494 | 13,088 | 19,088 |
| Iqal Shamia | | 3,000 | 20,245 | 3,000 | | | 400 | 290 | 400 | 290 | 3,290 |
| Khor Sahel | 349 | 1,000 | 9,960 | 1,349 | | | 558 | 850 | 558 | 850 | 2,199 |
| Abbadi | 4,689 | 350 | 5,000 | 5,039 | 1,772 | 2,849 | 927 | 1,600 | 2,699 | 4,449 | 9,488 |
| TOTAL | 22,133 | 14,080 | 150,225 | 36,213 | 58,603 | 58,435 | 20,451 | 23,500 | 79,004 | 81,935 | 118,148 |

| | |
|---|---|
| Cost/Feddan, All Imp's | 938 |
| Cost/Feddan, Mesqa Imp | 1,038 |

Table 9.2 Input and Outputs

Per Feddan Weighted Averages for each Directorate

| Directorate | Crop Income | Pumping Cost | Seeds | Fertilizer | Agro-Chemicals | Machinery | Labor Work Days | Total Cost | Net Return | Net Return + Labor | Incremental Value | W/project Farmer's Cash |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Qiman el Arus | 1,890 | 162 | 102 | 394 | 138 | 411 | 88 | 1,575 | 542 | 1,072 | 456 | 1,690 |
| Beni Ebeid | 2,559 | 144 | 94 | 261 | 37 | 358 | 87 | 1,362 | 1,356 | 1,968 | 398 | 2,510 |
| Bahr el Saidi | 1,964 | 249 | 81 | 161 | 34 | 416 | 86 | 1,296 | 802 | 1,406 | 385 | 2,040 |
| Saidiya | 3,499 | 174 | 146 | 385 | 132 | 362 | 89 | 1,647 | 1,955 | 2,576 | 507 | 3,258 |
| Mantout | 2,662 | 201 | 101 | 265 | 42 | 437 | 83 | 1,427 | 1,412 | 1,994 | 423 | 2,618 |
| Iqal Shamia | 3,211 | 214 | 121 | 365 | 106 | 416 | 89 | 1,632 | 1,796 | 2,421 | 589 | 3,224 |
| Khor Sahel | 2,184 | 164 | 99 | 310 | 74 | 408 | 83 | 1,471 | 864 | 1,444 | 391 | 1,999 |
| Ashrouba | 2,754 | 214 | 84 | 238 | 59 | 382 | 96 | 1,433 | 1,472 | 2,142 | 453 | 2,809 |
| Bahr el Gharag | 2,700 | 122 | 99 | 207 | 50 | 281 | 65 | 1,089 | 1,677 | 2,129 | 349 | 2,600 |
| Weighted Averages | 2,637 | 200 | 108 | 282 | 78 | 399 | 88 | 1,472 | 1,296 | 1,902 | 440 | 2,543 |

Table 9.3 Crop Budgets – Qiman el Arus
(Outputs and Inputs per Feddan)

| Product | Crop Income | Seeds | Fertilizer | Agro-chem | Machinery | Labor/WrkD | Total Cost | Net Return | Net Return + Labor | Pumping Costs | W/proj Yield Increase | Incremental Value | W/Project Farmer's Cash |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oranges | 1,707 | 100 | 588 | | 269 | 44 | 1,223 | 484 | 750 | 60 | | | 810 |
| Grape | 2,885 | 75 | 472 | 180 | 258 | 54 | 1,309 | 2,076 | 2,400 | 48 | | | 2,448 |
| | 500 | | | | | | | | | | | | |
| Sun Flower | 701 | 19 | 151 | | 173 | 25 | 493 | 276 | 426 | 36 | 0.17 | 157 | 619 |
| | 68 | | | | | | | | | | 0.92 | | |
| Toma(Nili) | 1,422 | 96 | 307 | 342 | 267 | 71 | 1,438 | (16) | 410 | 80 | 0.41 | 123 | 613 |
| Soybean | 707 | 53 | 98 | | 211 | 39 | 596 | 111 | 345 | 98 | 0.15 | 106 | 549 |
| Maize | 515 | 18 | 265 | 56 | 214 | 50 | 853 | (68) | 232 | 95 | 0.66 | 342 | 669 |
| | 150 | | | | | | | | | | 1.80 | | |
| | 120 | | | | | | | | | | | | |
| Cotton | 2,057 | 59 | 197 | 150 | 269 | 104 | 1,299 | 856 | 1,480 | 119 | 0.13 | 47 | 1,645 |
| | 98 | | | | | | | | | | 0.14 | | |
| Toma(Wint) | 1,140 | 96 | 255 | 250 | 217 | 60 | 1,178 | (38) | 322 | 63 | 0.76 | 228 | 613 |
| Berseem(S) | 350 | 45 | 30 | | 111 | 4 | 210 | 140 | 164 | 36 | 2.80 | 70 | 270 |
| Berseem(L) | 766 | 45 | 84 | | 194 | 11 | 389 | 377 | 443 | 119 | 11.11 | 278 | 839 |
| Barley | 528 | 46 | 105 | | 177 | 21 | 454 | 189 | 315 | 36 | 1.19 | 85 | 436 |
| | 115 | | | | | | | | | | 0.43 | | |
| BroadBean | 1,356 | 33 | 140 | | 121 | 39 | 528 | 911 | 1,145 | 60 | 0.75 | 1,100 | 2,304 |
| | 83 | | | | | | | | | | 0.38 | | |
| Wheat | 870 | 71 | 181 | | 208 | 35 | 670 | 353 | 563 | 60 | 1.22 | 132 | 755 |
| | 153 | | | | | | | | | | 0.43 | | |

Table 9.4 Crop Budgets – Beni Ebeid

(Outputs and Inputs per Feddan)

| Product | Crop Income | Seeds | Fertilizer | Agro–chem | Machinery | Labor Work days | Total Cost | Net Return | Net Return + Labor | Pumping Costs | W/proj Yield Increment | Incremental Value | W/project Farmer's Cash |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Citrus | 2,520 | 100 | 307 | 135 | 164 | 45 | 1,021 | 1,499 | 1,814 | 60 | 0.90 | 360 | 2,234 |
| Sugar Cane | 1,898 | 91 | 234 | | 203 | 49 | 871 | 1,027 | 1,370 | 48 | 3.10 | 178 | 1,596 |
| Toma(Nili) | 1,222 | 175 | 251 | 170 | 248 | 65 | 1,299 | (78) | 378 | 96 | 0.56 | 196 | 670 |
| Grapes | 2,254 | 112 | 338 | 120 | 165 | 45 | 1,050 | 1,204 | 1,519 | 120 | 0.90 | 414 | 2,053 |
| Soybean | 715 | 72 | 54 | | 168 | 39 | 567 | 235 | 508 | 99 | 0.35 | 222 | 829 |
| | 87 | | | | | | | | | | | | |
| Maize | 912 | 17 | 154 | 14 | 209 | 41 | 681 | 373 | 660 | 72 | 3.50 | 269 | 1,001 |
| | 22 | | | | | | | | 0 | | 1.28 | | 0 |
| | 120 | | | | | | | | 0 | | | | 0 |
| Cotton | 2,144 | 11 | 146 | 69 | 197 | 103 | 1,144 | 1,035 | 1,756 | 96 | 0.41 | 177 | 2,029 |
| | 35 | | | | | | | | 0 | | 1.70 | | 0 |
| Toma(Wint) | 1,222 | 175 | 252 | 170 | 189 | 67 | 1,255 | (34) | 436 | 96 | | 0 | 532 |
| Berseem(S) | 480 | 51 | 27 | | 48 | 11 | 203 | 277 | 354 | 48 | | 0 | 402 |
| Berseem(L) | 1,200 | 51 | 34 | | 158 | 12 | 327 | 873 | 957 | 120 | | 0 | 1,077 |
| BroadBean | 1,537 | 90 | 105 | 12 | 154 | 36 | 613 | 1,018 | 1,270 | 48 | 1.17 | 276 | 1,593 |
| | 94 | | | | | | | | 0 | | 1.20 | | |
| Wheat | 956 | 47 | 154 | | 200 | 34 | 639 | 473 | 711 | 48 | 2.80 | 261 | 1,019 |
| | 156 | | | | | | | | | | 1.46 | | |

Table 9.5 Crop Budgets – Bahr el Saidi

(Outputs and Inputs per Feddan)

| Product | Crop Income | Seeds | Fertilizer | Agro-chem | Machinery | Labor Work days | Total Cost | Net Return | Net Return + Labor | Pumping Costs | W/proj Yield Increment | Incremental Value | W/project Farmer's Cash |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Citrus | 2,000 | 100 | 395 | 135 | 197 | 43 | 1,128 | 872 | 1,173 | 72 | 0.84 | 336 | 1,581 |
| Toma(Nili) | 3,045 | 175 | 221 | 170 | 236 | 82 | 1,376 | 1,669 | 2,243 | 81 | 1.72 | 602 | 2,926 |
| Maize | 788 | 17 | 146 | 14 | 197 | 41 | 661 | 278 | 565 | 72 | 0.44 | 243 | 880 |
| | 32 | | | | | | | | | | 1.28 | | |
| | 120 | | | | | | | | | | | | |
| Rice | 957 | 35 | 101 | 16 | 361 | 60 | 933 | 64 | 484 | 225 | 0.45 | 204 | 913 |
| | 40 | | | | | | | | | | 1.64 | | |
| Cotton | 1,845 | 11 | 146 | 69 | 199 | 103 | 1,146 | 722 | 1,443 | 108 | 1.12 | 466 | 2,017 |
| | 23 | | | | | | | | | | 1.35 | | |
| SugarBeet | 1,156 | 72 | 151 | 80 | 150 | 36 | 705 | 451 | 703 | 96 | 0.95 | 81 | 880 |
| | 50 | | | | | | | | | | 0.70 | 4 | 4 |
| Toma(Wint) | 1,960 | 175 | 167 | 170 | 153 | 61 | 1,092 | 868 | 1,295 | 63 | 0.71 | 249 | 1,607 |
| Berseem(S) | 200 | 51 | 19 | | 36 | 5 | 141 | 59 | 94 | 36 | 0.67 | 27 | 157 |
| Berseem(L) | 956 | 51 | 18 | | 158 | 17 | 346 | 610 | 729 | 120 | 3.46 | 138 | 987 |
| BroadBean | 1,183 | 90 | 76 | | 134 | 36 | 552 | 720 | 972 | 36 | 0.08 | 118 | 1,126 |
| | 89 | | | | | | | | 0 | | 0.41 | | |
| Wheat | 1,000 | 47 | 86 | | 147 | 35 | 525 | 742 | 987 | 48 | 1.38 | 140 | 1,175 |
| | 267 | | | | | | | | | | 1.18 | | |
| Flax | 560 | 40 | 105 | | 102 | 33 | 478 | 697 | 928 | 48 | 0.05 | 84 | 1,060 |
| | 615 | | | | | | | | | | 0.29 | | |

Table 9.6 Crop Budgets – Saidiya 3

(Outputs and Inputs per Feddan)

| Product | Crop Income | Seeds | Fertilizer | Agro-chem | Machinery | Labor Work days | Total Cost | Net Return | Net Return + Labor | Pumping Costs | W/proj Yield Increment | Incremental Value | W/project Farmer's Cash |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Citrus | 3,676 | 100 | 395 | 135 | 208 | 43 | 1,139 | 2,537 | 2,838 | 108 | 0.88 | 352 | 3,298 |
| Sesame | 711 | 55 | 113 | | 109 | 34 | 515 | 196 | 434 | 48 | 0.77 | 270 | 751 |
| Tomato/S | 2,807 | 175 | 247 | 170 | 248 | 65 | 1,295 | 1,512 | 1,967 | 75 | 1.72 | 602 | 2,644 |
| Watermelon | 2,440 | 53 | 236 | 120 | 165 | 48 | 910 | 1,530 | 1,866 | 120 | 0.96 | 384 | 2,370 |
| Peanuts | 1,223 | 60 | 145 | 32 | 164 | 65 | 856 | 367 | 822 | 75 | 3.51 | 421 | 1,318 |
| Maize | 818 | 17 | 159 | 14 | 173 | 41 | 650 | 310 | 597 | 72 | 0.44 | 243 | 912 |
| | 22 | | | | | | | | 0 | | 1.28 | | 0 |
| | 120 | | | | | | | | 0 | | | | 0 |
| Rice | 918 | 35 | 101 | 16 | 379 | 60 | 951 | 7 | 427 | 225 | 0.62 | 281 | 933 |
| | 40 | | | | | | | | 0 | | 2.34 | | 0 |
| Cotton | 1,529 | 11 | 146 | 69 | 197 | 103 | 1,144 | 408 | 1,129 | 96 | 1.12 | 466 | 1,691 |
| | 23 | | | | | | | | 0 | | 1.35 | | 0 |
| Squash | 1,820 | 70 | 164 | 75 | 201 | 58 | 916 | 904 | 1,310 | 84 | 0.55 | 220 | 1,614 |
| Tomato/W | 1,680 | 175 | 192 | 170 | 163 | 67 | 1,169 | 511 | 980 | 72 | 0.75 | 263 | 1,315 |
| Berseem/S | 424 | 51 | 27 | | 36 | 10 | 184 | 240 | 310 | 36 | 0.62 | 25 | 371 |
| Berseem/L | 1,144 | 51 | 53 | | 128 | 17 | 351 | 793 | 912 | 90 | 1.73 | 69 | 1,071 |
| Barley | 659 | 55 | 91 | | 147 | 34 | 531 | 242 | 480 | 45 | 0.57 | 50 | 575 |
| | 114 | | | | | | | | 0 | | 0.37 | | |
| BroadBean | 1,309 | 90 | 76 | | 134 | 36 | 552 | 856 | 1,108 | 36 | 0.08 | 118 | 1,262 |
| | 99 | | | | | | | | 0 | | 0.41 | | |
| Wheat | 864 | 47 | 100 | | 151 | 34 | 536 | 484 | 722 | 48 | 0.75 | 71 | 840 |
| | 156 | | | | | | | | | | 0.43 | | |

Table 9.7 Crop Budgets – Mantout

(Outputs and Inputs per Feddan)

| Product | Crop Income | Seeds | Fertilizer | Agro-chem | Machinery | Labor Work days | Total Cost | Net Return | Net Return + Labor | Pumping Costs | W/proj Yield Increment | Incremental Value | W/project Farmer's Cash |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Citrus | 3,000 | 100 | 307 | 135 | 325 | 45 | 1,182 | 1,818 | 2,133 | 90 | 0.58 | 232 | 0.05 |
| Soybeans | 762 | 58 | 80 | | 234 | 34 | 610 | 152 | 390 | 126 | 0.38 | 228 | 0.14 |
| SugarCane | 1,914 | 133 | 312 | | 590 | 49 | 1,378 | 536 | 879 | 240 | 3.51 | 204 | 0.01 |
| Toma/Nili | 3,150 | 175 | 472 | 170 | 423 | 104 | 1,968 | 1,182 | 1,910 | 96 | 1.00 | 350 | 0.06 |
| Maize(S) | 919 | 17 | 157 | 14 | 206 | 41 | 681 | 388 | 675 | 72 | 3.35 | 292 | 0.11 |
| | 31 | | | | | | | | 0 | | 1.62 | | |
| | 120 | | | | | | | | 0 | | 0.27 | | |
| Cotton | 2,103 | 12 | 129 | 69 | 203 | 103 | 1,134 | 989 | 1,710 | 96 | 1.67 | 691 | 0.06 |
| | 19 | | | | | | | | 0 | | 1.25 | | |
| Toma(Wint) | 4,200 | 175 | 469 | 170 | 516 | 133 | 2,261 | 1,939 | 2,870 | 150 | | 0 | 0.05 |
| Berseem(S) | 472 | 51 | 24 | | 48 | 11 | 200 | 272 | 349 | 48 | | 0 | 0.00 |
| Berseem(L) | 1,752 | 51 | 39 | | 188 | 13 | 369 | 1,383 | 1,474 | 150 | 0.44 | 26 | 0.00 |
| BroadBean | 1,806 | 90 | 105 | | 147 | 30 | 552 | 1,372 | 1,582 | 48 | | 0 | 0.12 |
| | 118 | | | | | | | | 0 | | | | |
| Wheat | 968 | 49 | 121 | 20 | 257 | 34 | 685 | 501 | 739 | 150 | 1.20 | 118 | 0.02 |
| | 218 | | | | | | | | | | 0.87 | | |

Table 9.8 Crop Budgets – Iqal Shamia

(Outouts and Inputs per Feddan)

| Product | Crop Income | Seeds | Fertilizer | Agro-chem | Machinery | Labor Work days | Total Cost | Net Return | Net Return + Labor | Pumping Costs | W/proj Yield Increment | Incremental Value | W/project Farmer's Cash |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Citrus | 2,520 | 100 | 307 | 135 | 164 | 45 | 1,021 | 1,499 | 1,814 | 60 | 0.90 | 360 | 2,234 |
| Toma/Nili | 3,238 | 175 | 472 | 170 | 367 | 104 | 1,912 | 1,326 | 2,054 | 150 | 4.60 | 1,610 | 3,814 |
| Soybean | 747 | 58 | 80 | | 244 | 34 | 620 | 193 | 431 | 126 | 0.37 | 263 | 820 |
| | 66 | | | | | | | | | | 1.46 | | |
| Sorghum | 768 | 12 | 137 | | 231 | 43 | 681 | 153 | 454 | 150 | 3.43 | 323 | 927 |
| | 66 | | | | | | | | | | 3.34 | | |
| Maize | 783 | 17 | 168 | 20 | 169 | 41 | 661 | 270 | 557 | 111 | 3.04 | 271 | 938 |
| | 28 | | | | | | | | 0 | | 1.60 | | 0 |
| | 120 | | | | | | | | 0 | | 0.29 | | 0 |
| Cotton | 1,738 | 11 | 158 | 69 | 172 | 103 | 1,131 | 632 | 1,353 | 108 | 1.31 | 545 | 2,006 |
| | 25 | | | | | | | | 0 | | 1.54 | | 0 |
| Tomato/W | 4,260 | 175 | 469 | 170 | 420 | 133 | 2,165 | 2,095 | 3,026 | 150 | | 0 | 3,176 |
| Onions | 1,773 | 104 | 276 | 44 | 207 | 33 | 862 | 911 | 1,142 | 105 | | 0 | 1,247 |
| Berseem/S | 464 | 51 | 18 | | 48 | 11 | 194 | 270 | 347 | 48 | | 0 | 395 |
| Berseem/L | 1,685 | 51 | 74 | | 188 | 17 | 432 | 1,253 | 1,372 | 150 | 1.08 | 65 | 1,587 |
| BroadBean | 1,946 | 90 | 139 | | 265 | 31 | 711 | 1,375 | 1,592 | 60 | | 0 | 1,652 |
| | 140 | | | | | | | | 0 | | | | |
| Wheat | 1,185 | 49 | 121 | 20 | 271 | 34 | 699 | 836 | 1,074 | 150 | 1.94 | 201 | 1,425 |
| | 350 | | | | | | | | | | 1.83 | | |

Table 9.9 Crop Budgets – Khor Sahel
(Outputs and Inputs per Feddan)

| Product | Crop Income | Seeds | Fertilizer | Agro-chem | Machinery | Labor Work days | Total Cost | Net Return | Net Return + Labor | Pumping Costs | W/proj Yield Increment | Incremental Value | W/project Farmer's Cash |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Citrus | 1,856 | 100 | 307 | 135 | 157 | 45 | 1,014 | 842 | 1,157 | 60 | 0.75 | 300 | 1,517 |
| Sugar Cane | 2,353 | 133 | 312 | | 380 | 49 | 1,168 | 1,185 | 1,528 | 240 | 3.51 | 202 | 1,970 |
| Toma/Nili | 2,275 | 175 | 190 | 170 | 273 | 65 | 1,263 | 1,012 | 1,467 | 108 | 1.00 | 350 | 1,925 |
| Sesame | 480 | 31 | 113 | | 123 | 34 | 505 | (25) | 213 | 78 | 0.37 | 73 | 364 |
| Sorghum | 648 | 10 | 109 | | 183 | 43 | 603 | 75 | 376 | 96 | 3.43 | 274 | 746 |
| | 30 | | | | | | | | | | 3.34 | | |
| Maize | 702 | 17 | 168 | 20 | 197 | 42 | 696 | 158 | 452 | 111 | 2.25 | 176 | 739 |
| | 32 | | | | | | | | 0 | | 1.53 | | 0 |
| | 120 | | | | | | | | 0 | | | | 0 |
| Cotton | 1,767 | 11 | 158 | 69 | 188 | 103 | 1,147 | 650 | 1,371 | 108 | 1.31 | 545 | 2,024 |
| | 30 | | | | | | | | 0 | | 1.54 | | 0 |
| Tomato/W | 2,562 | 175 | 191 | 170 | 267 | 65 | 1,258 | 1,304 | 1,759 | 96 | | 0 | 1,855 |
| Berseem/S | 400 | 51 | 18 | | 48 | 13 | 208 | 192 | 283 | 48 | | 0 | 331 |
| Berseem/L | 1,685 | 51 | 74 | | 206 | 17 | 450 | 1,235 | 1,354 | 108 | 1.00 | 60 | 1,522 |
| BroadBean | 1,157 | 90 | 86 | 12 | 153 | 31 | 558 | 685 | 902 | 48 | | 0 | 950 |
| | 86 | | | | | | | | 0 | | | | |
| Wheat | 660 | 49 | 121 | | 291 | 34 | 699 | 141 | 379 | 60 | 0.88 | 90 | 529 |
| | 180 | | | | | | | | | | 0.77 | | |

Table 9.10 Crop Budgets – Ashrouba

(Outputs and Inputs per Feddan)

| Product | Crop Income | Seeds | Fertilizer | Agro-chem | Machinery | Labor Work days | Total Cost | Net Return | Net Return + Labor | Pumping Costs | W/proj Yield Increment | Incremental Value | W/project Farmer's Cash |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Citrus | 2,856 | 100 | 307 | 135 | 344 | 45 | 1,201 | 1,655 | 1,970 | 180 | 0.76 | 304 | 0.05 |
| Toma/Nili | 2,275 | 175 | 190 | 170 | 273 | 65 | 1,263 | 1,012 | 1,467 | 108 | 1.00 | 350 | 0.06 |
| Soybeans | 804 | 31 | 140 | 12 | 240 | 31 | 640 | 164 | 381 | 126 | 0.37 | 255 | 0.14 |
| | 0 | | | | | | | | | | 1.03 | | |
| Maize | 898 | 17 | 157 | 20 | 199 | 42 | 687 | 361 | 655 | 111 | 3.23 | 283 | 0.12 |
| | 30 | | | | | | | | 0 | | 1.61 | | |
| | 120 | | | | | | | | 0 | | 0.27 | | |
| Cotton | 2,202 | 12 | 129 | 69 | 207 | 103 | 1,138 | 1,094 | 1,815 | 108 | 1.34 | 554 | 0.06 |
| | 30 | | | | | | | | 0 | | 1.00 | | |
| Toma(Wint) | 4,260 | 175 | 469 | 170 | 417 | 133 | 2,162 | 2,098 | 3,029 | 150 | | 0 | 0.05 |
| Berseem(S) | 449 | 51 | 24 | | 48 | 11 | 200 | 249 | 326 | 48 | | 0 | 0.01 |
| Berseem(L) | 1,685 | 51 | 39 | | 188 | 13 | 369 | 1,316 | 1,407 | 150 | 0.72 | 43 | 0.00 |
| BroadBean | 1,200 | 90 | 105 | | 143 | 30 | 548 | 730 | 940 | 48 | | 0 | 0.18 |
| | 78 | | | | | | | | 0 | | | | |
| Wheat | 936 | 49 | 121 | 20 | 264 | 34 | 692 | 455 | 693 | 150 | 1.36 | 128 | 0.02 |
| | 211 | | | | | | | | | | 0.77 | | |

Table 9.11 Crop Budgets – Bahr el Gharag
(Outputs and Inputs per Feddan)

| Product | Crop Income | Seeds | Fertilizer | Agro-chem | Machinery | Labor Work days | Total Cost | Net Return | Net Return + Labor | Pumping Costs | W/proj Yield Increment | Incremental Value | W/project Farmer's Cash |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sun Flower | 751 | 17 | 111 | | 121 | 27 | 438 | 313 | 502 | 60 | 0.12 | 114 | 676 |
| Grapes | 2,600 | 112 | 333 | 120 | 205 | 45 | 1,085 | 1,515 | 1,830 | 60 | 0.65 | 325 | 2,215 |
| Watermelon | 1,800 | 38 | 236 | 120 | 164 | 48 | 894 | 906 | 1,242 | 60 | 1.60 | 640 | 1,942 |
| Sesame | 1,330 | 55 | 113 | | 109 | 34 | 515 | 815 | 1,053 | 48 | 0.50 | 175 | 1,276 |
| Tomato/Nili | 3,360 | 175 | 246 | 170 | 325 | 65 | 1,371 | 1,989 | 2,444 | 75 | 2.70 | 945 | 3,464 |
| Maize/Nili | 3,268 | 17 | 123 | 14 | 133 | 31 | 504 | 2,900 | 3,117 | 72 | 2.00 | 154 | 3,343 |
| | 17 | | | | | | | | 0 | | 0.70 | | 0 |
| | 120 | | | | | | | | 0 | | | | 0 |
| Maiz Forage | 554 | 47 | 34 | 14 | 35 | 5 | 165 | (165) | (130) | 72 | 1.30 | 6 | (52) |
| Maize | 953 | 17 | 159 | 14 | 173 | 41 | 650 | 445 | 732 | 72 | 2.00 | 154 | 957 |
| | 22 | | | | | | | | 0 | | 0.70 | | 0 |
| | 120 | | | | | | | | 0 | | | | 0 |
| Rice | 957 | 35 | 101 | 16 | 341 | 59 | 906 | 91 | 504 | 225 | 0.40 | 181 | 910 |
| | 40 | | | | | | | | 0 | | 1.45 | | 0 |
| Cotton | 1,599 | 13 | 146 | 69 | 164 | 103 | 1,113 | 509 | 1,230 | 96 | 0.80 | 333 | 1,659 |
| | 23 | | | | | | | | 0 | | 0.95 | | 0 |
| Tomato/W | 3,010 | 175 | 191 | 170 | 389 | 65 | 1,380 | 1,630 | 2,085 | 96 | | 0 | 2,181 |
| Berseem/S | 400 | 51 | 26 | | 36 | 10 | 183 | 217 | 287 | 36 | | 0 | 323 |
| Berseem/L | 1,680 | 51 | 53 | | 128 | 17 | 351 | 1,329 | 1,448 | 90 | 1.50 | 90 | 1,628 |
| Barley | 1,333 | 55 | 91 | | 155 | 34 | 539 | 914 | 1,152 | 45 | 0.16 | 8 | 1,205 |
| | 120 | | | | | | | | 0 | | 0.15 | | |
| Broad Bean | 817 | 90 | 105 | 12 | 157 | 36 | 616 | 295 | 547 | 48 | 0.50 | 120 | 715 |
| | 94 | | | | | | | | 0 | | 0.62 | | |
| Wheat | 1,168 | 47 | 100 | | 110 | 34 | 495 | 829 | 1,067 | | 0.52 | 47 | 1,114 |
| | 156 | | | | | | | | | | 0.22 | | |

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Table 9.12 PRINCIPAL CROPS–PER CENT ACREAGE, INCOME AND NET RETURNS

(Y = Gross Income, NR = Net Returns, Crop % = Acreage of crop in the Directorate)

Qiman el Arus–Total Area=6,250 feddans

| | Y | NR | Crop % |
|---|---|---|---|
| Oranges | 1,707 | 484 | 6% |
| Grape | 2,885 | 2,076 | 1% |
| Wheat | 870 | 353 | 34% |
| Sun Flowr | 701 | 276 | 1% |
| BroadBean | 1,356 | 911 | 10% |
| Toma(Nli) | 1,422 | (16) | 19% |
| Soybean | 707 | 111 | 3% |
| Maize | 515 | (68) | 51% |
| Barley | 528 | 189 | 1% |
| Toma/Wint | 1,140 | (38) | 4% |
| Cotton | 2,057 | 856 | 23% |
| Berseem–S | 350 | 140 | 26% |
| Berseem–L | 766 | 377 | 23% |

Iqal Shamia–Total Area = 400 feddans

| | Y | NR | Crop % |
|---|---|---|---|
| Citrus | 2,520 | 1,499 | 51% |
| Toma/Nili | 3,238 | 1,326 | 5% |
| Soybean | 747 | 193 | 15% |
| Wheat | 1,185 | 836 | 40% |
| Sorghum | 768 | 153 | 10% |
| BroadBean | 1,946 | 1,375 | 13% |
| Maize | 783 | 270 | 25% |
| Tomato/W | 4,260 | 2,095 | 2% |
| Onions | 1,773 | 911 | 1% |
| Cotton | 1,738 | 632 | 18% |
| Berseem/S | 464 | 270 | 5% |
| Berseem/L | 1,685 | 1,253 | 13% |

Beni Ebeid–Total Area=4,350 feddans

| | Y | NR | Crop % |
|---|---|---|---|
| Citrus | 2,520 | 1,499 | 1% |
| Sugar Cane | 1,898 | 1,027 | 16% |
| Toma(Nili) | 1,222 | (78) | 2% |
| Grapes | 2,254 | 1,204 | 2% |
| Soybean | 715 | 235 | 6% |
| Wheat | 956 | 473 | 25% |
| Maize | 912 | 373 | 55% |
| BroadBean | 1,537 | 1,018 | 29% |
| Toma–Wint | 1,222 | (34) | 0% |
| Cotton | 2,144 | 1,035 | 28% |
| Berseem–S | 480 | 277 | 15% |
| Berseem–L | 1,200 | 873 | 22% |

Bahr el Saidi–Total Area=22,625 feddans

| | Y | NR | Crop % |
|---|---|---|---|
| Citrus | 2,000 | 872 | 1% |
| Toma–Nili | 3,045 | 1,669 | 3% |
| Maize | 788 | 278 | 12% |
| Wheat | 1,000 | 742 | 21% |
| Flax | 560 | 697 | 5% |
| Rice | 957 | 64 | 60% |
| SugarBeet | 1,156 | 451 | 1% |
| Cotton | 1,845 | 722 | 22% |
| Berseem(S) | 200 | 59 | 19% |
| Berseem(L) | 956 | 610 | 47% |
| BroadBean | 1,183 | 720 | 3% |

Khor Sahel–Total Area=1,100 feddans

| | Y | NR | Crop % |
|---|---|---|---|
| Citrus | 1,856 | 842 | 37% |
| Sugar Cane | 2,353 | 1,185 | 1% |
| Toma/Nili | 2,275 | 1,012 | 3% |
| Sesame | 480 | (25) | 1% |
| Sorghum | 648 | 75 | 34% |
| Wheat | 660 | 141 | 48% |
| Maize | 702 | 158 | 31% |
| BroadBean | 1,157 | 685 | 6% |
| Tomato/W | 2,562 | 1,304 | 2% |
| Cotton | 1,767 | 650 | 13% |
| Berseem/S | 400 | 192 | 9% |
| Berseem/L | 1,685 | 1,235 | 17% |

Mantout–Total Area=10,554 feddans

| | Y | NR | Crop % |
|---|---|---|---|
| Citrus | 3,000 | 1,818 | 6% |
| Soybeans | 762 | 152 | 12% |
| SugarCane | 1,914 | 536 | 12% |
| Toma/Nili | 3,150 | 1,182 | 2% |
| Maize(S) | 919 | 388 | 55% |
| Wheat | 968 | 501 | 28% |
| BroadBean | 1,806 | 1,372 | 24% |
| Cotton | 2,103 | 989 | 22% |
| Toma(Wint) | 4,200 | 1,939 | 2% |
| Berseem(S) | 472 | 272 | 22% |
| Berseem(L) | 1,752 | 1,383 | 15% |

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| | Y | NR | Crop % |
|---|---|---|---|
| Citrus | 3,676 | 2,537 | 43% |
| Sesame | 711 | 196 | 2% |
| Tomato/S | 2,807 | 1,512 | 9% |
| Watermelon | 2,440 | 1,530 | 6% |
| Peanuts | 1,223 | 367 | 6% |
| Maize | 818 | 310 | 41% |
| Wheat | 864 | 484 | 21% |
| BroadBean | 1,309 | 856 | 4% |
| Rice | 918 | 7 | 10% |
| Barley | 659 | 242 | 3% |
| Cotton | 1,529 | 408 | 5% |
| Squash | 1,820 | 904 | 2% |
| Tomato/W | 1,680 | 511 | 22% |
| Berseem/S | 424 | 240 | 5% |
| Berseem/L | 1,144 | 793 | 22% |

Ashrouba–Total Area=3,665 feddans

| | Y | NR | Crop % |
|---|---|---|---|
| Citrus | 2,856 | 1,655 | 4% |
| Toma/Nili | 2,275 | 1,012 | 1% |
| Soybeans | 804 | 164 | 5% |
| Wheat | 936 | 455 | 24% |
| Maize | 898 | 361 | 47% |
| BroadBean | 1,200 | 730 | 23% |
| Toma/Wint | 4,260 | 2,098 | 3% |
| Cotton | 2,202 | 1,094 | 45% |
| Berseem/S | 449 | 249 | 24% |
| Berseem/L | 1,685 | 1,316 | 23% |

Bahr el Garag–Total Area = 290 feddans

| | Y | NR | Crop % |
|---|---|---|---|
| Sun Flwr | 751 | 313 | 4% |
| Grapes | 2,600 | 1,515 | 1% |
| Watermeln | 1,800 | 906 | 9% |
| Sesame | 1,330 | 815 | 1% |
| Tomato/Nili | 3,360 | 1,989 | 14% |
| Maize/Nili | 3,268 | 2,900 | 10% |
| MaizForage | 554 | (165) | 9% |
| Maize | 953 | 445 | 22% |
| Wheat | 1,168 | 829 | 35% |
| BroadBean | 817 | 295 | 12% |
| Barley | 1,333 | 914 | 2% |
| Tomato/W | 3,010 | 1,630 | 1% |
| Rice | 957 | 91 | 10% |
| Cotton | 1,599 | 509 | 6% |
| Berseem/S | 400 | 217 | 13% |
| Berseem/L | 1,680 | 1,329 | 37% |

Table 9.13a Benefits and Costs, Total Acreage

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Total Feddans of Mesqa Improvements = | 79,004 | | | | | | | |
| Per cent Under Contract 74% | | | | | | | | |
| Per cent to be Contracted 26% | | Years of Project Costs and Benefits (Actual Calculations run over 30 years) | | | | | | |
| Years | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Project Benefits | | | | | | | | |
| (2)Pumping Costs Savings | 5,867 | 11,734 | 15,833 | 15,833 | 15,833 | 15,833 | 15,833 | 15,833 |
| (3)Incremental Income Values w/Project | | | 12,896 | 25,793 | 34,801 | 34,801 | 34,801 | 34,801 |
| (1)Total Benefits (2+3) | 5,867 | 11,734 | 28,729 | 41,625 | 50,634 | 50,634 | 50,634 | 50,634 |
| (4)Estimated Benefits to Yield Increases | 34,253 | 9,626 | 43,879 | | | | | |
| (4a)Est Benfts (4), mesqa area only | | | 12,693 | 25,386 | 34,253 | 34,253 | 34,253 | 34,253 |
| (4b)Est Benfts (4), mesqas and canal areas | | | 16,260 | 32,521 | 43,879 | 43,879 | 43,879 | 43,879 |
| (4c)Est Bnfts (4a) +Pmpng Cst Savgs (2) | 5,867 | 11,734 | 28,526 | 41,219 | 50,086 | 50,086 | 50,086 | 50,086 |
| (4d)Est Bnfts (4b) +Pmpng Cst Savgs (2) | 5,867 | 11,734 | 32,093 | 48,353 | 59,712 | 59,712 | 59,712 | 59,712 |
| Farmers Cash Returns | 74,445 | 148,889 | 200,892 | 200,892 | 200,892 | 200,892 | 200,892 | 200,892 |

Table 9.13b Benefits and Costs, Total Acreage

| Project Costs | | | | | |
|---|---|---|---|---|---|
| Cost/Feddan | | | | | |
| (5)For Mesqas Already Contracted | 998 | | @ 80 % of cost | | 798 |
| (6)Mesqas Contracted and to be contracted | 1,037 | | | | 830 |
| (7)Total Mesqas and Canal Improvements | 1,495 | | | | 1,196 |
| (8)Cost for Mesqas(#5)*(Ttl Fdns Msqa Impmts) | 30,363 | 30,363 | 21,210 | | |
| (9)Cost for Mesqas(#6)*(Ttl Fdns Msqa Impmts) | 43,782 | 43,782 | 30,584 | T26 = $1,037 | |
| (10)Cost for Pumps (1,200 * LE5,000) | 4,447 | 4,447 | 3,106 | U26 = $1,495 | |
| (11)Total Costs (8+10) | 34,809 | 34,809 | 24,316 | | |
| (12)Total Costs (9+10) | 48,229 | 48,229 | 33,690 | | |

Table 9.13c Benefits and Costs, Total Acreage

| Net Benefit Calculations | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| (13)NB (4c)/Ttl Csts (11) | (28,942) | (23,075) | 4,413 | 41,625 | 50,634 | 50,634 | 50,634 | 50,634 |
| (14)NB (4c)/Ttl Csts (12) | (42,362) | (36,495) | (4,961) | 41,625 | 50,634 | 50,634 | 50,634 | 50,634 |
| NPV @ 12% (13) | 239,429 | | | | | | | |
| (15) IRR (13) | 50% | | | | | | | |
| NPV @ 12% (14) | 210,077 | | | | | | | |
| (16) IRR (14) | 36% | | | | | | | |
| (17)PmpgBfts (2)/Ttk Csts (11) | (28,942) | (23,075) | (8,483) | 15,833 | 15,833 | 15,833 | 15,833 | 15,833 |
| (18) IRR (17) | 20% | | | | | | | |
| (19)PmpgBfts (2)/Ttl Csts(12) | (42,362) | (36,495) | (17,858) | 15,833 | 15,833 | 15,833 | 15,833 | 15,833 |
| (20) IRR (19) | 13% | | | | | | | |
| (21)NB (4c)/Ttl Csts (11) | (28,942) | (23,075) | 4,210 | 41,219 | 50,086 | 50,086 | 50,086 | 50,086 |
| (22) IRR (21) | 50% | | | | | | | |
| (23)NB (4c)/Ttl Csts (12) | (42,362) | (36,495) | (5,164) | 41,219 | 50,086 | 50,086 | 50,086 | 50,086 |
| (24) IRR (23) | 36% | | | | | | | |
| (25)NB (4d)/Ttl Csts (11) | (28,942) | (23,075) | 7,777 | 48,353 | 59,712 | 59,712 | 59,712 | 59,712 |
| (26) IRR (25) | 56% | | | | | | | |
| (27)NB (4d)/Ttl Csts (12) | (42,362) | (36,495) | (1,597) | 48,353 | 59,712 | 59,712 | 59,712 | 59,712 |
| (28) IRR (27) | 41% | | | | | | | |
| (29)NB (4d)*(multiplier)/Ttl Csts (12) | (42,362) | (34,495) | 2,403 | 54,353 | 67,712 | 69,712 | 69,712 | 69,712 |
| (30) IRR (29) | 46% | | | | | | | |
| (31)NB (1)/USAID Costs ($63 M) | (98,555) | (40,477) | (23,482) | 41,625 | 50,634 | 50,634 | 50,634 | 50,634 |
| (32) IRR (31) | 22% | | | | | | | |
| (33)NB (4b)/USAID Costs ($63 M) | (98,555) | (40,477) | (20,118) | 48,353 | 59,712 | 59,712 | 59,712 | 59,712 |
| (34) IRR (33) | 25% | | | | | | | |
| (35)NB (1)/GOE Csts(2*USAID) | (202,978) | (92,688) | (75,694) | 41,625 | 50,634 | 50,634 | 50,634 | 50,634 |
| (36) IRR (35) | 11% | | | | | | | |
| (37)2*Yl (3)+Pmpg Bnfts (2)/GOE | (202,978) | (92,688) | (62,797) | 67,418 | 85,435 | 85,435 | 85,435 | 85,435 |
| (38) IRR (37) | 18% | | | | | | | |
| (39)2*Est Bnfts (4b)+Pmpg Bnfts (2)/GOE | (202,978) | (92,688) | (56,069) | 80,874 | 103,591 | 103,591 | 103,591 | 103,591 |
| (40) IRR (39) | 21% | | | | | | | |

Note: Estimated benefits (4a) are calculated by taking a 15% yield increase in the lower third of the mesqa improvement areas in the Upper River Command Areas and a 30% increase correspondingly in the Delta Command Areas.
Estimated benefits (4b) include 4% benefits for the entire area in the Upper River, due to yield increases stemming from continuous flow canal improvements, and a corresponding 8% increase in the Delta Area.

Table 9.14 Benefit and Cost Analyses for Individual Command Areas

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Qiman el Arus | | | | | | | | | | |
| Constrtn & Maint Costs | | | | | | | | | | |
| Mesqas (a) | 4,510 | 922 | 92 | 92 | 92 | 92 | 922 | 92 | 92 | 92 |
| Mesqas and Canals (b) | 8,710 | 922 | 92 | 92 | 92 | 92 | 922 | 92 | 92 | 92 |
| Benefits | | | | | | | | | | |
| Benefits from yield incr's | 711 | 1,421 | 2,132 | 2,842 | 2,842 | 2,842 | 2,842 | 2,842 | 2,842 | 2,842 |
| Benefits–Costs | | | | | | | | | | |
| NB (a) | (3,799) | 499 | 2,040 | 2,750 | 2,750 | 2,750 | 1,920 | 2,750 | 2,750 | 2,750 |
| NB (b) | (7,999) | 499 | 2,040 | 2,750 | 2,750 | 2,750 | 1,920 | 2,750 | 2,750 | 2,750 |
| IRR (a), NPV (a) | 47.93% | 980 | | | | | | | | |
| IRR (b), NPV (b) | 26.08% | 1,292 | | | | | | | | |
| Beni Ebeid | | | | | | | | | | |
| Constrtn & Maint Costs | | | | | | | | | | |
| Mesqas (a) | 3,393 | 727 | 87 | 87 | 87 | 87 | 727 | 87 | 87 | 87 |
| Mesqas and Canals (b) | 8,393 | 727 | 87 | 87 | 87 | 87 | 727 | 87 | 87 | 87 |
| Benefits | | | | | | | | | | |
| Benefits from yield incr's | 589 | 1,179 | 1,768 | 2,358 | 2,358 | 2,358 | 2,358 | 2,358 | 2,358 | 2,358 |
| Benefits–Costs | | | | | | | | | | |
| NB (a) | (2,804) | 452 | 1,681 | 2,271 | 2,271 | 2,271 | 1,631 | 2,271 | 2,271 | 2,271 |
| NB (b) | (7,804) | 452 | 1,681 | 2,271 | 2,271 | 2,271 | 1,631 | 2,271 | 2,271 | 2,271 |
| IRR (a), NPV (a) | 52.76% | 780 | | | | | | | | |
| IRR (b), NPV (b) | 22.72% | 1,319 | | | | | | | | |
| Bahr el Saidi | | | | | | | | | | |
| Constrtn & Maint Costs | | | | | | | | | | |
| Mesqas (a) | 12,699 | 12,575 | 2,598 | 448 | 448 | 448 | 2,598 | 2,598 | 448 | 448 |
| Mesqas and Canals (b) | 43,299 | 12,575 | 2,598 | 448 | 448 | 448 | 2,599 | 2,434 | 448 | 448 |
| Benefits | | | | | | | | | | |
| Benefits from yield incr's | 1,939 | 5,491 | 9,044 | 12,596 | 14,209 | 14,209 | 14,209 | 14,209 | 14,209 | 14,209 |
| Benefits–Costs | | | | | | | | | | |
| NB (a) | (10,760) | (7,083) | 6,445 | 12,148 | 13,761 | 13,761 | 11,611 | 11,611 | 13,761 | 13,761 |
| NB (b) | (41,360) | (7,083) | 6,445 | 12,148 | 13,761 | 13,761 | 11,610 | 11,776 | 13,761 | 13,761 |
| IRR (a), NPV (a) | 47.06% | 1,038 | | | | | | | | |
| IRR (b), NPV (b) | 20.62% | 1,323 | | | | | | | | |
| Saidiya 1 | | | | | | | | | | |
| Constrtn & Maint Costs | | | | | | | | | | |
| Mesqas (a) | 7,408 | 1,303 | 143 | 143 | 143 | 143 | 1,303 | 143 | 143 | 143 |
| Mesqas and Canals (b) | 15,458 | 1,303 | 143 | 143 | 143 | 143 | 1,303 | 143 | 143 | 143 |
| Benefits | | | | | | | | | | |
| Benefits from yield incr's | 1,219 | 2,439 | 3,658 | 4,877 | 4,877 | 4,877 | 4,877 | 4,877 | 4,877 | 4,877 |
| Benefits–Costs | | | | | | | | | | |
| NB (a) | (6,189) | 1,135 | 3,515 | 4,734 | 4,734 | 4,734 | 3,574 | 4,734 | 4,734 | 4,734 |
| NB (b) | (14,239) | 1,135 | 3,515 | 4,734 | 4,734 | 4,734 | 3,574 | 4,734 | 4,734 | 4,734 |
| IRR (a), NPV (a) | 51.42% | 1,035 | | | | | | | | |
| IRR (b), NPV (b) | 25.84% | 1,348 | | | | | | | | |
| Saidiya 2 | | | | | | | | | | |
| Constrtn & Maint Costs | | | | | | | | | | |
| Mesqas (a) | 10,204 | 850 | 220 | 220 | 220 | 220 | 850 | 220 | 220 | 220 |
| Mesqas and Canals (b) | 27,384 | 850 | 220 | 220 | 220 | 220 | 850 | 220 | 220 | 220 |
| Benefits | | | | | | | | | | |
| Benefits from yield incr's | 1,713 | 3,426 | 5,138 | 6,851 | 6,851 | 6,851 | 6,851 | 6,851 | 6,851 | 6,851 |
| Benefits–Costs | | | | | | | | | | |
| NB (a) | (8,491) | 2,576 | 4,919 | 6,632 | 6,632 | 6,632 | 6,002 | 6,632 | 6,632 | 6,632 |
| NB (b) | (25,671) | 2,576 | 4,919 | 6,632 | 6,632 | 6,632 | 6,002 | 6,632 | 6,632 | 6,632 |
| IRR (a), NPV (a) | 55.99% | 929 | | | | | | | | |
| IRR (b), NPV (b) | 21.69% | 1,264 | | | | | | | | |

ANNEX 10

Technical Assistance

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# Table 1: Summary Status of TA Staff

Person-Month

| No | Desciplines | Original Contract | Amended Contract | Approved Revision | Actual Utilized | Proposed Utiliz'n |
|---|---|---|---|---|---|---|
| 1 | Team Leader/ Water Resources Engr. | 29.75 | 54.00 | 54.00 | 54.00 | 54.00 |
| | Team Leader/ On-Farm Water Mngm't | 0.00 | 0.00 | 24.00 | 0.00 | 24.00 |
| 2 | Adminstrator | 29.75 | 30.00 | 29.75 | 29.75 | 29.75 |
| 3 | Sr. Sociologist | 27.75 | 78.00 | 79.00 | 55.00 | 79.00 |
| 4 | Sociologist | 27.75 | 42.00 | 69.00 | 57.00 | 69.00 |
| 5 | Economist | 27.75 | 30.00 | 27.54 | 27.54 | 27.54 |
| 6 | Design Engineer | 27.75 | 30.00 | 25.50 | 25.50 | 25.50 |
| 7 | Irrigation Engineer | 29.75 | 42.00 | 36.75 | 36.75 | 36.75 |
| 8 | Field Engineer (Damanhour) | 27.75 | 54.00 | 38.43 | 38.43 | 38.43 |
| 9 | Field Engineer (Fayoum) | 27.75 | 28.00 | 28.00 | 28.00 | 28.00 |
| 10 | Field Engineer (Zagazig) | 27.75 | 54.00 | 37.47 | 37.47 | 37.47 |
| 11 | Field Engineer (Tanta) | 27.75 | 30.00 | 24.00 | 24.00 | 24.00 |
| 12 | Field Engineer (Esna) | 27.75 | 30.00 | 29.63 | 29.63 | 29.63 |
| 13 | Field Engineer (Minia) | 27.75 | 42.00 | 37.00 | 37.00 | 37.00 |
| 14 | Planning Engineer | 27.75 | 42.00 | 39.50 | 39.50 | 39.50 |
| 15 | Training/Procurement | 0.00 | 24.00 | 24.00 | 24.00 | 24.00 |
| 16 | On-farm Water Management | 0.00 | 48.00 | 28.43 | 24.00 | 38.00 |
| 17 | Quality Control Specialist | 0.00 | 0.00 | 9.00 | 9.00 | 9.00 |
| 18 | Area Engineer – Upper Egypt | 0.00 | 0.00 | 14.00 | 14.00 | 14.00 |
| 19 | Area Engineer – Lower Egypt | 0.00 | 0.00 | 18.00 | 15.00 | 18.00 |
| 20 | Sociologist | 0.00 | 0.00 | 18.00 | 0.00 | 18.00 |
| | TOTAL | 394.50 | 658.00 | 691.00 | 605.57 | 700.57 |

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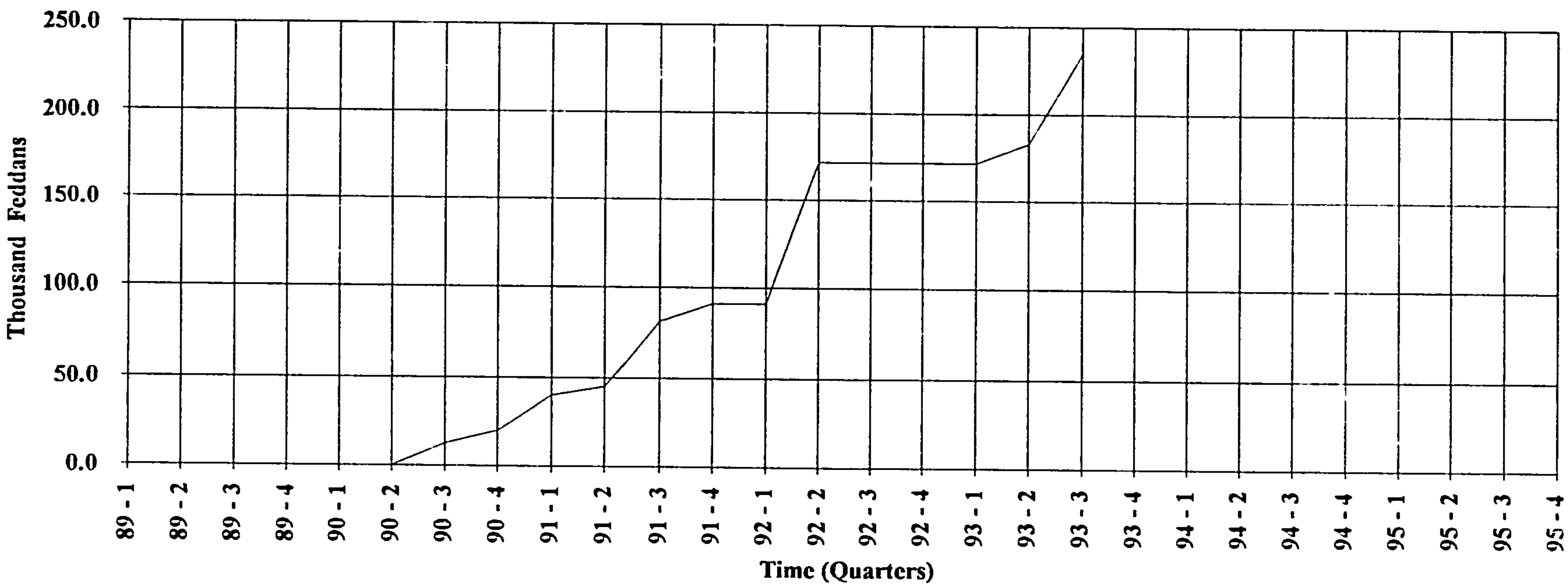
**Figure 10 - 1: Status of Approved Feasibility Studies**

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## Table 2: Summary of TDY Staff

September 30, 1993

| No | Descipline | Period | | | No of Trips | Assignments |
|---|---|---|---|---|---|---|
| | | From | To | Month | | |
| 1 | Programmer | 1989 | 1989 | 1.90 | 1 | Development of SAADA software program |
| 2 | Training | 1989 | 1989 | 2.70 | 1 | Development of IIP traininig |
| 3 | Construction Engineer | 1989 | 1989 | 2.20 | 1 | Construction quality control measures |
| 4 | Procurement Specialist | 1989 | 1989 | 1.50 | 1 | Assistance in commodity procurement |
| 5 | Economist | 1989 | 1990 | 2.50 | 2 | Cost recovery study |
| 6 | Procurement Specialist | 1989 | 1990 | 5.7 | 2 | Assistance in commodity procurement |
| 7 | Agronomist | 1989 | 1991 | 13.30 | 5 | Development of SAADA software program |
| 8 | Procurement Specialist | 1989 | 1992 | 1.80 | 3 | Assistance in commodity procurement |
| 9 | Irrigation Engineeer | 1989 | 1992 | 1.60 | 3 | Coordination of overseas training programs |
| 10 | Sociologist | 1990 | 1990 | 3.10 | 1 | Development of training materials for WUAs |
| 11 | Irrigation Engineer | 1990 | 1990 | 2.10 | 1 | Development of design criteria for pipeline mesqas |
| 12 | Hydraulic Engineer | 1990 | 1990 | 2.10 | 1 | Development of plans and specs for automatic gates |
| 13 | Training Specialist | 1990 | 1990 | 2.70 | 1 | Rivision of training guides for training trainers |
| 14 | Economist | 1990 | 1990 | 1.20 | 2 | Cost recovery study |
| 15 | Irrigation Engineeer | 1990 | 1990 | 3.30 | 1 | Development of O&M manuals for mesqas |
| 16 | Training Specialist | 1990 | 1990 | 4.30 | 1 | Development of training materials for IAS |
| 17 | Water Management Spec | 1991 | 1991 | 1.60 | 1 | Development of training materials |
| 18 | Training Specialist | 1991 | 1991 | 1.10 | 1 | Needs assessment & development of training program |
| 19 | WUA Specialist | 1992 | 1992 | 3.20 | 1 | Internal evaluations of IAS and WUAs |
| 20 | Topo Surveyor | 1993 | 1993 | 1.80 | 1 | Assessment of survey equipment & training |
| 21 | Irrigation Engineer | 1993 | 1993 | 1.40 | 1 | Training materials & courses on operation of the main system |
| | TOTAL | | | 61.10 | 32 | |

TDY.WK1 11/29/93

SOURCE: Irrigation Improvement Project

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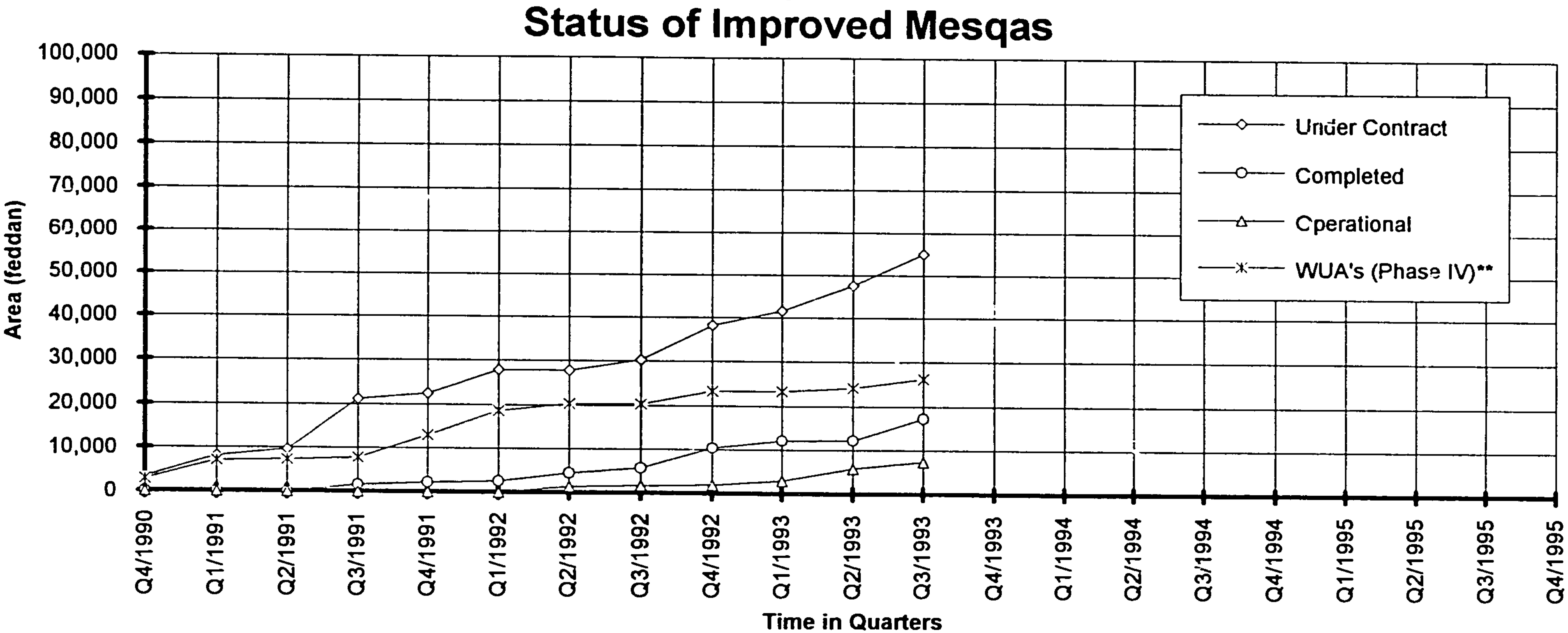
Figure 10 - 2




Source : Mabrouk's files USAID/AGR/ILD, Cairo.

# ANNEX 11

## Planning and Design

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# ANNEX 11

## PLANNING AND DESIGN

### A. PLANNING

Assess progress in developing the rational interdisciplinary approach for planning, designing and implementing irrigation improvements called for in the project design.

<u>Questions</u> :

1. (i) Has an interdisciplinary approach been applied in the planning phase ?

   (ii) Is the project's approach to obtaining non-engineering professional services an effective & sustainable solution ?

The planning process through the feasibility studies has employed socio-economic surveys, incorporated the results of earlier surveys and studies, utilized technical assistance in the socio-economic and engineering dimensions , and repeatedly recognized the value of the interaction between, and the need for, an interdisciplinary approach to planning.

Documentary evidence (feasibility studies, socio-economic surveys, Project correspondence) indicates an interdisciplinary approach to planning, however there is a need to increase the inputs of sociologists in future efforts. Such planning should include more evaluation of indigenous existing organizations and how the new WUAs will interface and interact with these institutions. There may be a shortage of strong leaders in some areas which would recommend other types of training activities.

2 (i) Are the feasibility studies as now being developed of good quality and are they an effective means of determining recommended improvements and establishing economic justification ?

  (ii) Can another more efficient process be used ?



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Thirteen of the completed and accepted feasibility studies over the seventeen project command areas were reviewed for cost and benefits estimates (see Table 11-1). The quality of the analysis improved after the initial studies by way of a more complete presentation of the data and a better presentation format. The analytical framework for computing the benefit cost streams is appropriate. The analysts claim to have taken a conservative approach attempting to show not what the best possible outcomes might be, but that the projects were feasible under conservative estimates.

The data presented in the feasibility studies show a complex set of benefit streams which vary across project command areas. The constant is the decreased pumping costs which is a function of the crop grown and its seasonal water requirement.

It is recommended that no other new mesqa improvement projects be initiated with USAID funding without a thorough appraisal of the benefit streams of those already underway. This is totally consistent with the formulation of this IIP as a prototype project to give guidance to possible similar projects across the Nile irrigation system. In other words, the project has moved to a position to be able to accomplish its primary mission.



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## TABLE 11.1

### FEASIBILITY STUDY COMPLETION DATE, PRICE AND INTEREST RATE.

| COMMAND AREAS | PRICES | B/C INTEREST RATE | DATE ACCEPTED |
|---|---|---|---|
| QAHWAGI | 1988/89 | 12% | JULY 1990 |
| SAIDIYA (1) | 1988/89 | 12% | AUG. 1990 |
| BALAQUTHAR | 1988/89 | 12% | DEC. 1990 |
| QUIMAN WL ARUS | 1988/89 | 12% | FEB. 1991 |
| BAHR EL SAIDI | 1989/90 | 12% | APR./JUL.91 |
| KHOR SAHEL | 1989/90 | 12% | APR./JUL.91 |
| BENI IBEID | 1989/90 | 12% | SEP. 1991 |
| MANTOUT | 1989/90 | 12% | APR. 1992 |
| SAIDIYA (2) | 1990/91 | 12% | APR. 1993 |
| ASHROUBA | 1989/90 | 12% | MAY 1992 |
| BAHR EL GHARAB | 1989/90 | 12% | MAY 1993 |
| SAIDIYA (3) | 1992/93 | 12% | JUL. 1993 |
| IQUAL SHAMIA | 1989/90 | 12% | AUG. 1993 |

Crop yields in Egypt rank among the highest the world (see Table 11-2). The yield benefits claimed for the various crops in different project areas are less than the between year variability that is suggested by the multiple years yield data given for all of the project command areas. This alone raises questions regarding estimates of yield increases and minimally suggests that careful monitoring will be required to verify the impacts of project activities. In addition, the sources of benefit and the constraints to yield increases are quite different across the selected command areas (see Table 11-3).

The yield increases that are projected from improved distribution and water management are calculated as the increases necessary to bring the average yields of all the farms up to the level of the average yields of the highest third of the farms in the 1990 farm survey carried out by the IIP. There is no analysis to show that the reason for these yield differences is indeed the result of better water availability and on farm water management practices on the third best farms in the survey year (see Tables 11-4 and 11-5).

**TABLE 11-2. Comparison of Selected Average Crop Yields (Kg/Ha) Between Egypt (per feddan) and Selected Countries (1988).**

| COUNTRY CROP | UNIT | EGYPT | SPAIN | PORTUGL | USA | BRAZIL | INDIA | SOUTH KOREA |
|---|---|---|---|---|---|---|---|---|
| WHEAT | ARDAB | 14.0 | 6.7 | 5.0 | 6.2 | 4.6 | 6.3 | 11.6 |
| RICE | TON | 2.7 | 2.4 | 1.9 | 2.7 | 0.9 | 1.1 | 3.0 |
| MAIZE | ARDAB | 17.4 | 18.8 | 7.5 | 21.1 | 6.2 | 4.0 | 19.6 |
| COTTON | KENTA R | 5.1 | 7.6 | === | 4.9 | 2.3 | 1.6 | 4.2 |
| SUGARCANE | TON | 41.2 | 30.0 | 9.7 | 33.1 | 27.2 | 23.8 | === |
| TOMATOES | TON | 11.7 | 18.6 | 14.5 | 23.0 | 16.4 | 4.0 | 5.8 |
| ONIONS | TON | 11.5 | 15.7 | 11.5 | 16.9 | 4.4 | 3.6 | 6.4 |
| POTATOES | TON | 8.9 | 8.0 | 3.7 | 13.5 | 5.7 | 6.6 | 5.6 |
| BROAD BEANS | ARDAB | 7.7 | 3.2 | 2.6 | === | 0.7 | === | === |

NOTE: ONE ARDAB WHEAT = 150 KG. ONE ARDAB MAIZE = 140 KG.ONE KENTAR COTTON = 157.5 KG. ONE ARDAB BROAD BEANS = 155 KG. AND ONE TON = 1.000 KG.

Source : FAO YEARBOOK VOL. 43 - 1898 - FAO STATISTICS SERIES NO. 94.

**Table 11-3. Sources of Output Growth from Selected IIP Project Command Areas**

| | A CROPPING PATTERN AND INTENSITY | INCREASED AVERAGE | INCREASED YIELDS | INCREASED PUMPING COSTS | DRAINAGE EXPERIMENT (% OF PROJ. AREA) | GYPSUM | LAND LEVELING REQUIRED |
|---|---|---|---|---|---|---|---|
| COMMAND | | | | | | | |
| QAHWAGI | YES | 611(SUMMER) | 2 TO 49% | | INCLUDED 33% (12% YIELD INCL) | EVERY 5 YEARS | 25% OF AREA |
| MANTOUT | YES | NO CHARGE | | (SAVE 120 TO 49 DEPEND ON CROP (FUNCTIONS OF CROP) | 0% (AREA 100%) | NO | 100% (20% UP) |
| ASHROUBA | NO CHANGE | NO CHANGE | | | SAID TO BE INADEQUATE | NO | 50 % OF AREA |
| BALAQTAR | INCREASE DEC MAIZE SUMMER | NO CHANGE | IT MAYBE DRAINAGE ISSUE | | REPORTED MAJOR ITEM AREA REFERENCES | NO | 20% OF AREA |



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Table 11-4. Difference in Average Crop Yields in Kg/Ha for Canal Head and Tail Reach Farms

| Canal Commands / (Number of Farms) | Wheat Kg/Ha | Maize Kg/Ha | Beseem Tons/Ha | Cotton Kg/Ha | Beans Kg/Ha | Rice Kg/Ha |
|---|---|---|---|---|---|---|
| Saidyia | | | | | | |
| Head Farms (N=76) | 1229 | 2935* | 30.6 | 1698 | 2948# | 5625**+ |
| Tail Farms (N=50) | 2828# | 2800 | 36.4 | 1688 | 2560 | 4345# |
| Bhar el Saidi | | | | | | |
| Head Farms (N=8 ) | 3525* | 3150 | 35.0+ | 2558 | 2170 | 3150+ |
| Tail Farms (N=47) | 2860 | 2900 | 32.2 | 2290 | 2490 | 2700 |
| Balaqtar | | | | | | |
| Head Farms (N=4 ) | 3288 | 3675 | 26.3 | 2343 | NA | 3750 |
| Tail Farms (N=13) | 3750*+ | 3675 | 28.9 | 2343 | NA | 3113 |
| Qhawagi | | | | | | |
| Head Farms (N=18) | 4500* | NA | 35.0 | NA | NA | NA |
| Tail Farms (N=4 ) | 3470 | NA | 30.6 | NA | NA | NA |
| Iqal Shamia | | | | | | |
| Head Farms (N=13) | 3535 | 3605 | 39.3 | NA | NA | NA |
| Tail Farms (N=2 ) | 4500+ | 3500 | 37.1 | NA | NA | NA |
| Qiman Arous | | | | | | NA |
| Head Farms (N=12) | 3470 | 2863**+# | 39.8 | 2363+ | 2908* | NA |
| Tail Farms (N=8 ) | 3535# | 2250 | 36.8 | 2093 | 1808 | |
| Bhar Gharaq | | | | | | |
| Head Farms (N-34) | 3288# | 2483 | 34.7**# | 1660 | 2960* | 11233 |
| Tail Farms (N=45) | 2368 | 3435? | 30.8 | 2093 | 2593 | 10045 |
| Bahig | | | | | | |
| Head Farms (N=50) | 2400*+ | 2465*# | 37.1 | NA | 2618 | NA |
| Tail Farms (N=14) | 1500 | 1633 | 32.1 | NA | 2843 | NA |
| Serry | | | | | | |
| @Head Farms (N=427) | 3414*# | 2928 | 39.2** | 1788 | 2623*# | NA |
| @Tail Farms (N=322) | 2978 | 3200** | 36.4 | 1825 | 2525 | NA |

* Denotes statistical significance between farms on head reaches and tail reaches of canal commands at .05 to .10 levels and ** denotes statistical significance of .001 to .04 levels. The plus sign + denotes a statistical significance between yields and days canal supplies were reported too low for good crop production. The # denotes statistical significance between times irrigated and location of farms on the system at .01 to .10 levels.

**Source for Table 11-4 :** From Lowdermilk, M.K and Barakat. "Irrigation System Performance Management; Opportunities and Challenges For Egypt. IIP Project Memo, USAID, Cairo - Egypt.

TABLE 11-5. Summary of Regression Model Impacts of Differences in observed yields of head and lower canal reach

| Canal Commands | Maize | Wheat | Cotton | Berseem | Rice | Beans | Tomatoes |
|---|---|---|---|---|---|---|---|
| 1. Abbadi | NA | .41 | NA | .56 | NA | NA | NA |
| 2. Radissia | .36 | .12 | NA | NA | NA | NA | .75+* |
| 3. Serry | .07 | .11 | .06 | .06 | NA | .02 | .60* |
| 4. I. Shamia | .36 | .86* | NA | .63* | NA | NA | NA |
| 5. B. Gharaq | .20* | .25* | .38 | .22* | .17 | .15 | .96** |
| 6. Q. Arous | .27 | .24* | .45 | .43 | NA | NA | 1.00+* |
| 7. Bhaig | .42** | .40+* | .30* | .26* | .15 | .21 | .99+* |
| 8. Balaqtar | .31** | .69* | NA | .26 | NA | NA | NA |
| 9. B. Saidi | .47* | .12 | .48* | .10 | .35+* | NA | NA |
| 10. Qhawagi | NA | .90** | .48* | .10 | .31** | .14 | NA |
| 11. Saidyia | .02 | .03 | NA | .04 | .18 | NA | .99+* |

**Note:** The regression model included the following independent variables: size of operational holding in feddans; fertilizer (actual NPK) in Kg/feddan; location of farm on Main System; days reported during reference crop growing season when canal supplies "too low for good production" and number of irrigations applied to crops. NA denotes that there were insufficient cases or no sample farms cultivating the reference crops. The symbol *+ denotes inter correlations with "items irrigated and days reported when canal supplies were low" had a correlation coefficient of .25 or greater. The symbol ** refers to statistical significance of .01 to .001 and * denotes .02 to .10 levels of significance. None of the regression models included the ownership and use of deep wells. The Small amount of differences explained by the regression model especially for selected crops on Serry and Saidyia canal commands may have been the extra water provided by private tube wells. Of the sample farms on these two commands, six and twelve percent owned deep wells. The vast majority of these wells were located at middle and tail reaches of the main canals. It should also be noted that Abaddi (N=6) and Radissia (N=13) are intensive sugar cane areas and the sample farms were too few for useful analyses for most of the crops shown in Table 1 above using step-wise multiple regression methods.

**Source** : From Lowdermilk, M.K and Barakat. "Irrigation System Performance Management; Opportunities and Challenges For Egypt. IIP Project Memo, USAID, Cairo - Egypt.

The judgement of the evaluation team is that the feasibility studies strongly suggest that the benefits from yield increases due to improved water distribution and on-farm water management have not been established in a rigorous manner due to data limitations. On the other hand, the benefits which are claimed by way of cost reduction, which are based on an analysis of the relative cost efficiency of larger pump sets, well established by empirical studies, are accepted with a high level of confidence.

It is recommended that the projects which have been started be completed and that a careful monitoring program of output increases be initiated immediately (see Section IV).

**3. Are the feasibility studies being used as a useful tool by MPWWR in their planning for irrigation improvement activities ?**

The feasibility studies provide a plan of action to begin the construction and organizational activities that are required to provide the new water management system. They have shown that their is considerable variation in the projected discounted net benefits across the project areas as a function of the alternative mesqas designs( see Annex 8, Tables 8-2 through 8-5) and the physical parameters that define the project activities (see Table 11-6) for examples of significant differences in soil type and salinity between project command areas). The command areas were selected for inclusion in the project on the basis the existence of known problems associated with irrigation. As such they must be seen as a set of unique sites to be analyzed and carefully monitored in order to provide the type of guidance that is inherent in the pilot or prototype project concept.

**4. (i) Is there an appropriate mechanism for selecting priority areas for improvement ? If not**

**(ii) what criteria should be incorporated into such a selection mechanism?**

There are no indications that a process has been developed which can use the experience gained from the selected project command ares to provide guidance for future project selection.

## TABLE 11-6.

## EXAMPLE SOIL DIFFERENCES AND PRE-PROJECT DRAINAGE CONDITIONS THAT MAY EFFECT IIP PROJECT RETURNS.

**QAHWAGI:** Soil - clay traction 5.1% to 62% - well drained to .6 M - groundwater 1.5 M over 80%, or 15 meters in rice area during summer (farmer may interfere with drain; 30% land leveling required on 25% of field.

**MANTOUT:** Soil clay content 40 to 60%, assume rooting depths of 40 cm. No mention of remaining fractions. Large numbers of individually owned pumps along drain, and 15 privately owned tube wells supplying in total 1.36 M/Cm. Land levelling required on 100% of the UCA.

**BAHR EL SAIDI:** Clay fraction varies from .0 to 70%. Half of soils (53%) are saline and sodic, 139. saline, and 12% sodic., test suggest land levelling not required. Assume, although that some area will need land leveling.

**BALAQTAR:** Clay, however, soil with lighter texture occurs in some areas. Soils are deep and relatively will drained except where the structure has been affected by high salinity. A high water table and salinity problems throughout the area. Drainage facilities not yet completed for part of the area and on the left bank of Balagtar canal. The drain system is not functioning effectively. Studies report within area yield differences are the direct result of drainage differences (Balagtar feasibility study, 1990 - p10).

**ASHROUBA:** Soil of clay, silty clay and silt only minor occurrence is salinity and sodicity, 30 privately owned tubewells capable of providing an added flow of 8 $Cm^3$/Water/Feddan/day.

It is recommended that a project identification process be established that:

a. establishes those project characteristics that are most likely to have higher benefit streams on the basis of experiences learned from the current projects including the alternative mesqa designs.

b. focus any new projects in areas where water quality prohibits the reuse of drain water. These may be areas in which there are known salt sinks.

c. avoids areas where decreased percolation and drainage , claimed for project activities, could allow increased salt water intrusion

d. recognizes that there are no benefits to be claimed from saving water that has been part of a water reuse system. (these benefits are not claimed for the individual project command areas but are alluded to in some cost sharing analysis, (see Section V).

e. Recognizes the role of water re-use, both drain and groundwater, as part of the total water management system.

It is also recommended that the IIP project form a multi-disciplinary Project identification team that works closely with the proposed monitoring activities (see Section IV) for the purpose of developing a system of priorities for selecting new Project areas.

## B. DESIGN

### 1. Appropriateness of Engineering Designs

#### a. Design Concepts

Designs have been developed and prepared in a professional manner since the initial phases of conception and establishment of the IIP program as it is now being implemented. The Design Staffs have developed expertise in the fields of the main delivery system and the new mesqa design technology. The engineering designs for the targets of the current IIP program are essentially completed. There is a strong possibility that the technical competence and abilities built-up by the IIP design staff will be cut-back due to the termination of planned design activities. The staff should be retained to continue to prepare sets of design and contract documents for command areas with completed feasibility studies.

The fundamental concepts for which the IIP program has been developed, requiring engineering design considerations, are; (i) the improvement of the main canal system for transmission of continuous flow and (ii) the improvement of mesqas for more effective delivery of water to the farm in accordance with plant and water user needs. Principal measures for which designs are prepared to achieve these improvements include:

- Main system improvements to facilitate continuous flow.
- Downstream control gates affording demand irrigation.
- Flow control regulators to regulate over supply.
- Single point lifting for economic and controlled supply.
- Elevated mesqas (concrete lined and low pressure pipeline).

b. Design Components

Improvements to the main system under the IIP program include those measures that are required to rehabilitate the canals and their structures and to provide the necessary measures to implement downstream control (DSC) of continuous flow in the branch canals.

Continuous flow will provide the flexibility the water user needs to irrigate his crop at the time it is needed rather than being constrained by a system of rigid water rotation. Designs for main system improvement structures are made to distribute the same amount of water that has been allowed by the existing system but on a continuous flow basis.

Downstream control gates are designed to allow irrigation flow in the delivery canal to be available on demand of the water users and to decrease or stop the flow as there irrigation use diminishes. This prevents flows in the canals from being wasted to the drains during the night or other periods of low water use. Regulating structures are also provided to control the amount of flow in the delivery system so that it does not exceed the allowable canal delivery amounts.

Tail escapes are an integral unit of the DSC system. They are designed to provide a controlling water level in the canal required for the operation of the DSC system and to provide for emergency release of canal flows. Under normal conditions the DSC gates will be designed to close when the water level reaches the crest of the tail escape (and open as it recedes - increased demand).



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Elevated mesqas designed under the IIP program are either lined channels or low head buried pipelines supplying water to the farmer by gravity flow. These improved mesqas provided water from single point pumping unit(s) located at an offtake point from the supply canal. These more expensive designs are justified by their efficiency of water conveyance, low maintenance costs and convenience of water delivery. Water losses in either lined channels or pipelines will be minimal.

Single point pumping stations are designed to lift water to elevated mesqas and replace the current practice of many individual farmer pumps lifting water from the low level mesqa to the merwas. This eliminates many of the inefficiencies of the existing individual pumping units. It has been shown that water user pumping costs are reduced by one half to one third by a properly designed, more efficient single point pumping system. These pumping costs can be further reduced, by another 50 percent or more through introducing good engineering design for the implementation of properly designed pumping units that are permanently installed in modern pumping station. The design would include better sizing of suction and discharge pipes, more compact pumping station and the up-grading of other appurtenances as suggested by Clay in Reference #48.

Table 11-6, from the above reference, shows the fuel cost savings the can be achieved through minimul upgrading of an IIP demonstration pumping unit. Minimun upgrading consists of modifications, primarily changing suction and discharge lines from 15 to 20 cm. in diameter. Other pumping parameters include: Q = 60 lps, intake line = 15 m, discharge line = 2 m, and C = 120.



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**Table 11-6. Mesqa Single Lift Pump Stations**

**Summary of Calculated Pumping Costs at Demonstration Mesqas**

| PUMPING HEADS (METERS) | | | | | | | HORSEPOWER REQUIRED | | FUEL CONSUMPTION ltr/1000m^3 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Before | | | After | | | Befr | Aftr | Befr | Aftr |
| Msq | Lift | Fric | TDH | Lift | Fric | TDH | (HP) | (HP) | lit | lit |
| 10 | 2.00 | 4.35 | 6.35 | 1.30 | 1.24 | 2.54 | 8.0 | 3.2 | 8.4 | 3.3 |
| 26 | 2.00 | 5.41 | 7.41 | 1.30 | 1.28 | 2.58 | 9.3 | 3.2 | 9.8 | 3.4 |
| 31 | 0.80 | 3.58 | 4.38 | 0.80 | 1.16 | 1.96 | 5.7 | 2.5 | 5.8 | 2.6 |
| 33 | 2.30 | 5.41 | 7.71 | 1.30 | 1.28 | 2.58 | 9.7 | 3.4 | 10.2 | 3.4 |
| 19 | 2.00 | 5.32 | 7.32 | 1.30 | 1.26 | 2.56 | 9.2 | 3.2 | 9.6 | 3.4 |
| 29 | 1.80 | 4.77 | 6.57 | 1.30 | 1.20 | 2.50 | 8.2 | 3.1 | 8.7 | 3.3 |
| 39 | 2.00 | 4.01 | 6.01 | 1.30 | 1.15 | 2.45 | 7.5 | 3.1 | 7.9 | 3.2 |
| 43 | 2.30 | 5.54 | 7.84 | 1.00 | 1.52 | 2.52 | 9.8 | 3.2 | 10.3 | 3.3 |
| 31 | 1.60 | 2.94 | 4.54 | 1.60 | 0.77 | 2.37 | 4.7 | 2.5 | 6.0 | 3.1 |
| 33 | 1.50 | 3.38 | 4.88 | 1.50 | 0.87 | 2.37 | 5.6 | 2.8 | 6.5 | 3.2 |
| Avg | 1.83 | 4.47 | 6.30 | 1.27 | 1.17 | 2.24 | 7.8 | 3.0 | 8.3 | 3.2 |

TDH = Total Dynamic Head

Annex 1



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c. Crop Water Requirements

Mesqa flow and pumping capacities are designed by IIP engineers using criteria that will provide sufficient water during periods of critical water demand. The capacities of improved mesqas are determined by considering the peak evapotranspiration (ET) for the most water demanding crop grown in the area under consideration. This amount is increased by a reasonable factor for field application efficiency or, as in the case of paddy cultivated rice, allowing amounts for percolation and runoff loss. Crop monthly consumptive use values are taken from the Water Master Plan, UNDP Report No. 17 and increased to reflect peak daily ET by the Soil Conservation Service Method. Water transmission losses in the improved mesqa and merwa are also considered in determining the mesqa water requirements. Improved mesqas designed with flow capacities meeting these standards and with the ability of timely irrigation afforded by the introduction of continuous flow provides a mesqa system capable of meeting crop water requirements and provide farmers with the flexibility to irrigate at the time, rate and duration needed by the crop.

A review of the feasibility studies revealed that in most Project command areas the allocated flow in the canal system during the high use summer period is not adequate to meet the designed crop peak use requirements. Measures for conjunctive use of both ground and drainage water have been made to meet the peak use requirements of the crop used for the design of this worst case water demand scenario.

d. Water User Considerations

Project design allows for 16 irrigating hours per day during the peak use period thus eliminating the drudgery of night irrigation for the farm irrigators. Shorter durations of pumping will be adequate for winter irrigation and during non-peak use periods in the summer. Storage the main delivery canals, behind the downstream control gates offsets the water not used during the night and allows 24 hours of branch canal supply to be used in the mesqa during the 16 hour running period.

Continuous flow, available to the mesqa, allows the members of the WUA to schedule the irrigation of there land when it is needed. The unit stream selected by IIP for use by water users is 30 lps. This is considered to be the normal capacity of the merwa and a large enough flow to permit good application efficiencies. It is also considered to be a flow amount that can be most easily managed by small farmers.

### e. Conservativeness of Design

Review of designs indicates that there is a tendency to over-design flow capacity for mesqa improvements. Design factors that seemed to be excessive included assumptions based on the following reasons.

- o demand using 100% of the area in the most water demanding crop,
- o peak daily consumptive used for the Irrigation period.
- o a minimum flow of 60 lps for areas up to 52 feddans..
- o 16 hour daily pumping capacity to meet maximum crop demand.
- o a PVC low pressure pipe design velocity of 1 meter per second

There are valid reasons for each of the above findings. These design assumptions introduce additional capacity to the system which will allow the farmers more freedom of water use. Additional costs of the resulting increases in capacity are considered to be marginal. Downstream control, as designed by IIP, permits demand irrigation and will allow periodic excessive withdrawals of water from the delivery system. Conservative design assumption may permit periods of overuse of water by the mesqa may occur and there may be some increases in mesqa costs.

### f. Flexibility of Irrigation

The concerns regarding excessive design assumptions are valid and should not be overlooked. However, resulting increases in freedom of water use by the farmer is considered to be beneficial and the additional capacity resulting from overconservative design assumptions can be condoned. Increased flexibility will boost farmer satisfaction and support for the improvements provided by this pilot project. Increased capacity will allow overuse of canal water during some time periods.

IIP should reevaluate engineering assumptions which influence the design capacity considering realistic projections of cropping pattern, pumping time, peak use period and allowable PVC pipe velocities. Provide the freedom of water use, needed by the farmers, in the planned design flexibility factor. A study should be made on the interrelation of water use from the branch canals by the combined mesqas and how the variations in their demands on the available flow can be shared equitably over the irrigation period.

g. Improved Design of Pumping Station

Mesqa single point pumping stations, to be managed by WAU's, have been designed with the concept of installation of the conventional mobile pumping units. A well designed permanent pumping facility has not been included. This omission of good design for pumping to the command area of the mesqa can be contributed to the policy that the farmers are responsible for the purchase of the pumping unit. With the exception of sizing of the pumping units and a pumping pad it is not really considered as a part of the improved mesa design. The implementation of pumping units for improved mesqas, as currently being executed, are not up to the concepts of good engineering design. These units should be properly designed for permanent placement in a well planned pumping station. Installation of these units should be a part and parcel of the improved mesqa construction contract and designed so that it can be effectively operated and maintained by the WUA.

The following constraints regarding the implementation of pumping units have been identified : (i) most farmers and many engineers consider "pumps on wheels" as the accepted method of lifting water from the canal, (ii) the concept by some that the pumping unit is a separate entity and can be removed from the design without impairing complete improvement package and (iii) acceptable methods of providing the pump have not been agreed upon.

The MPWWR should require that engineering designs for mesqa improvements include all necessary details for the proper placement of permanently installed pumping units (either purchased or provide) and included in the construction contract for improved elevated mesqas. Controversy over how the pump is purchased should be settled outside of this requirement.

## 2. Cost Effectiveness (Downstream Control Structures)

a. Continuous flow

Continuous flow has been referred to elsewhere in this evaluation as one of the major measures being introduced by the IIP project. Shouman and Hackbart state that "Continuous flow is the foundation of the improvement and modernization effort of the Irrigation Improvement Project", (Ref. 4). This innovation, which allows water users to provide irrigation water at the time it is needed by their crop, is made possible by the installation of downstream control gates and regulators in the delivery system. Downstream control is the method whereby continuous flow and demand irrigation is enhanced to provide the efficient delivery and use of canal water. The MPWWR has sanctioned the use of continuous flow in the command areas being improved by IIP.

b. Downstream control (DSC)

In addition to providing scheduling flexibility as provided by continuous flow, the installation of these control facilities will allow farmers to irrigate during the daylight hours, significantly reduce waste water flow at the tail and provide storage in the canals during periods of non or low water use. It is noteworthy to repeat that these important improvements are brought about with a smaller flow capacity in the delivery system previously served by rotation irrigation but with same amount of water supplied in the during the overall rotation period.

DSC gates automatically reduce or increase canal flows in accord with downstream irrigation demand. DSC gates can not, by themselves, regulate the flow of water in the canal system, therefore, flow control devices are used to regulate and limit flow into sub canals. Types of these devices used by IIP include baffle distributors and constant head, double orifice gates. These distributors and double gated orifices are designed to release a nearly constant amount of set flow for a wide range of water stage elevations from the delivery system.

There is very little information to be found on the use of DSC gates in Egypt. A few of these automatic gates have been installed for some time on the Herz/Numania Command Area but have had problems and have not been used effectively. Continuous flow has also been reported to be operational in the Balaqtar UCA but the evaluation team had to cancel plans to visit this Project area. However, because of the importance of the introduction of continuous flow as the cornerstone of obtaining improved water management in Egypt, the implementation of DSC measures to extended to planned areas as expeditiously as possible.

b. Distributors

Baffle distributors are water control structures designed to control discharges at a nearly constant value within certain limits. These limits include a relatively wide range of upstream water levels. There is a maximum downstream level for constant discharge. The permissible upstream range and maximum downstream level are related to the maximum discharge margin desired. This margin is typically plus or minus about 5 to 10 percent. A distributor unit consists of several sluices placed side by side. They have the same longitudinal profile and various widths. The widths correspond to the various fractions of maximum flow capacity. each sluice is fitted with a shutter which must be maintained and locked in either a fully open or closed position. The nominal discharge is set by steps from zero to the maximum by operating the shutters.

Constant head orifice (double) gates are also used to control discharges. To set a given flow, the orifice opening required to pass the given discharge is determined from a graph or table. The orifice gate is set at this opening. The downstream turnout gate is then adjusted until the head differential as measured over the orifice gate equals the required constant-head.

c. Efficient Installation:

DSC structures is very appropriate for use in the irrigation delivery system existing in the old lands of Egypt. Irrigation water is conveyed in canals that have flat slopes and water levels below the ground surface. These conditions provide natural storage capacity for the water levels retained upstream of the automatic gate during periods of low or non-use for long 5

reaches of the canal are ideal for the installation of a DSC system. The much higher costs of construction of level top canals for conventional above ground irrigation delivery systems and the requirement of many closer spaced structures on steeper channel gradients do not occur.

d. Reliability

The use of automatic DSC systems has been in use for more than 20 years for improved efficiency of water delivery on an increasing number of irrigation projects throughout the world. It has a proven track record of operational reliability and dependability and, although a new concept for use in Egypt, it should not be considered as an creative innovation to be tried on an experimental basis. Avis and Avio type automatic water level control gates are used on most these improvements and in combination with regulators (baffles or double gated orifices) and tail escape control structures make up the DSC system for irrigation canals. The evaluation team considers these control structures to be most appropriate means of achieving the full benefits of demand irrigation and delivery efficiency that can be realized with introduction of continuous flow.

e. Costs

Investigation of costs associated with the installation of automatic DSC structures and required appurtenances (excluding main delivery system costs for structural improvements, canal lining, earthwork, etc.) indicate that the average unit cost for the area benefitted by continuous flow/demand irrigation with DSC should not exceed LE 100/fed. for the overall IIP program.



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Compared to costs exceeding £E 1000 per feddan for improved mesqas, this seems to be a small cost for the additional benefits received due directly to DSC. The two most prominent advantages provided by DSC are the elimination of wastage of irrigation flow at the tail end of the canal at times of low water use and the creation of nighttime storage capacity within the canal banks allowing daytime irrigation. These attributes will also allow water savings to remain in the delivery system rather than recycling this wasted water through the drainage or groundwater system where contamination or minor loses can occur.

The use of DSC gates, regulators and tail escapes as planned and designed for the IIP program can be considered "state of the art" measures for providing continuous flow in the improved areas. The same results might be possible using manually controlled gates at less cost but would be very unwieldy to manage and probably wouldn't work anyway. It may also be possible at some future time to carry-out this same function by telemetry and computerized gate control operating electrically from information relayed from water level sensors at equal or less cost. But this technology has yet to be developed for DSC and electricity is not yet reliable in rural areas of Egypt. It, therefore, can be concluded, by the process of elimination, that the current techniques of DSC are the best and most practical means of providing continuous flow to water users in Egypt today.

f. Suitability of DSC

Downstream control (DSC) structures and appurtenant structures are well suited to Egyptian conditions. They are designed to provide the necessary controls to deliver continuous flow to the mesqa, on demand, with widely spaced gates in canals below the ground surface with flat gradients. Distributors are set to deliver required flows to secondary canals. The DSC system with well designed tail escapes will allow automatic reduction or stoppage of flow as the demand for water becomes less or stops. Tail losses at the end of the canal are eliminated, water is stored in the canal, and only the amount needed for irrigation is drawn from the main canal system.

g. Constraints

There are always negative ramifications of establishing new ways of doing things.

- The introduction of continuous flow will reduce the amount of flow in the canal by 1/2 or 1/3 and although the quantity of water provided will not be reduced the farmers/water users will have to learn how to share their water over a longer time period. The WUA's will assist members in this transition but it may be more difficult for the many farmers not on improved mesqas using small direct outlets to learn how to spread out their usage evenly between irrigations.

- o The DSC gates and regulators are mechanical devices and can be tampered with. It may be necessary to provide protection for these structures. Tamper proof fences or the use of guards initially may be necessary.

- o The concept of continuous flow and demand irrigation are new to Egypt an some officials may not fully understand the beneficial effects of these measures and be reluctant to move forward with measures or delay actions for the introduction of continuous flow and implementation of DSC measures.

- o Because DSC gates and regulators are mechanical in nature the must be cared for if they are to function properly for there intended life period. A program for regular and routine maintenance must be put into place from the very beginning of the use of these facilities.

h. <u>Implementation of DSC</u>

No effective continuous flow regulated by DSC gates were observed by the evaluation team. Twelve automatic downstream control gates have been purchased by IIP and have been lying about in-country for some time. Many of the structures for which they are to be installed have been completed. Installation of these gates finally began during the period of this evaluation and the delayed process for the purchase of 20 more gates has been recently initiated. In the meantime, a large number of mesqas have been completed and farmers are having to get by on rotational delivery of their water supply.

The standing of the IIP with the farmer groups a number of completed mesqas is being diminished by absence of continuous flow in their delivery canal. The installation of existing gate and acquisition of additional DSC structures has been delayed for far to long. Purchasing procedures which are very time consuming were not expedited. MPWWR as unfamiliar with installation procedures and there were delays in getting an expert from Waterman Co. in the country. Reluctance by some officials to the introduction of new methods. It is recommended that IIP place its highest priority on the expeditious acquisition and implementation of DSC gates and regulators for the timely introduction of continuous flow to UCA's where improved mesqas have been completed.

i. <u>Recommendation</u>

Implementation of continuous flow with DSC structures can be very beneficial to the irrigation system in Egypt. It is very appropriate and well suited to Egyptian conditions. Much of the water wastage that normally goes to the drainage system will remain in the distribution system without being recycled through the drainage or groundwater system where contamination and/or system loses can occur. MPWWR should consider the adoption of continuous flow and DSC demand irrigation to as wide an are as possible to achieve the water saving benefits provided by these measures.

k. Other Cost Effective Measures

The cost effectiveness of structures designed for irrigation improvements can be improved as new and better methods are conceived. More suitable and less costly products such as thin wall PVC pipe with lower pressure requirements will become available. Examples of areas where more cost effective measures can be used in IIP are: (i) the cost of PVC pipe used for low pressure pipeline mesqa improvement will be reduced as the demand for thinner wall pipes increases and (ii) more compact design of single point pumping stations and pumps with permanent settings designed with properly sized suction and discharge pipes.

Improved and more cost effective methods of design of many IIP components will emerge as the Project progresses. These effective measures should be addressed promptly and, if practical, implemented without delay. Constraints to cost effective changes are: (i) reluctance of water users to change from existing pumping facilities and procedures, (ii) continuance of difficulties associated with the establishing a properly installed WUA pump as a part IIP mesqa improvement and reduced demand for the installation of low pressure pipelines. It is recommended that the MPWWR, with projections of future use of low pressure pipelines both in the old and new lands, contact local manufactures of PVC pipe to encourage the production of more economical and thinner wall pipe. IIP or its successor should import a small amount of low pressure PVC pipe to demonstrate the use of this less expensive option. IIP should review and recommend To each Directorate the adoption more efficient measures proposed for pumping stations as presented in Ref. #48

### 3. Design Sets and Contract Documents

a. Preparation

In IIP contract documents, including detailed design drawings and specifications for selected contract units, are prepared and assembled at the Directorate and reviewed and approved by the Cairo central office. Contract units are selected which provide a amounts of work large enough to attract the necessary interest by contractors to receive competitive bidding for the construction of either main delivery system or mesqa improvements. For this purpose, main canal reaches with a suitable quantity of structures, earthwork and lining or for mesqa improvement sets of
from 7 to 44 mesqas are selected. These contracts range in cost

from £E 350,000 or less up to 3,000,000 or more. Approval of the Director of IIP is required for contracts in excess of £E 500,000.

b. Content

Contract documents and contracting procedures were reviewed by members of the evaluation team. The contents of these documents were interpreted by local officials and an English translation was furnished to the Team by USAID. Contract documents contain the following sections:

PART ONE - CONTRACT AND SPECIFICATIONS
(MPWWR Irrigation Department)

I. Conditions of the Tender and Instructions to Bidders

II. General Provisions

III. Work Specifications and Technical Conditions

Chapter 1. Generalities

Chapter 2. Part A. Specifications of the Illustrated Works in the Contract Drawings.

Part B. Specifications of the Different parts of the Works - the Foundations.

Chapter 3. Materials Specifications.

PART TWO - SPECIAL PROVISIONS AND SPECIFICATIONS
(as prepared by the Directorate)

PART THREE - CONTRACT DRAWINGS

Review of these documents revealed that complete, with provisions and specifications containing far more conditions than are necessary for the modest requirements of IIP structural improvements. This universal publication along with the special provisions and specifications and contract drawings added by the Directorate make these a very bulky document. However, the Team did find these documents to well prepared with adequate provisions and specifications to promote timely completion of contract works and to assure good quality construction.

The conditions contained in this document are more than adequate to enforce problems encountered by IIP with contractors. A case in point is the problem with a number of serious delays in construction performance. It was determined that there are ample provisions contained in the General Provisions to control this problem and most other that are apt to occur if the Directorate should choose to use them.

The Team also felt that the conditions contained in the general provisions were prejudiced toward GOE Agency as demonstrated by comparing the unlimited freedom accorded to the contracting agency with the heavy obligations imposed on the contractor therein.

Items brought to the attention of the Team were:

- provisions permit indefinite delays in payment (Although this was not found to be a problem on IIP projects visited).
- contractors work must be guaranteed for a period of ten years. (This provision is also not normally enforced but there have been cases where it has been used)
- prices are negotiated after submitting the low bid. This was discovered when queries were made regarding a number cases where contract prices were shown as the same amounts of the estimated figures.
- The contractor is required to provide an office and a vehicle for transportation of the IIP engineer supervising construction. (the Project had oncc planned to provide pickup trucks and use existing trailers for this purpose) The contractor must allow for these costs in the amount of his bid)

d. Construction Designs

Designs drawings prepared by IIP and included with the contract document were reviewed and found to be well prepared, complete and appropriate for the planned construction operations. IIP designs have been discussed in the foregoing section and will not be repeated herein other than to reconfirm their acceptability to achieve good quality construction five percent of the total value of his accepted tender (Performance Bond) within ten days after acceptance of tender as a pecuniary guarantee for his due execution of the contract. Public corporations are not required to provide a performance bond. If the contractor is unknown, the performance bond may be increased to ten percent but this is rarely if ever invoked. It has been appropriately suggested by other evaluators that the amount of the performance bond be increased to ten percent for all contractors, private and public, to induce improved contract execution.

Contracting procedures attract both private and public company participation. Averages thus far are nearly even. IIP has tried to kept its contracts over the £E one million to attract more interest and obtain responsible contractors. With the exception of Abbadi contract for main system works have averaged about £E 1,200,000 while contracts for mesqa improvement have averaged about £E 1,250,000.

i. Summary and Conclusions

Review of Contract Documents Construction Drawings revealed that they are complete, with provisions and specifications for more conditions than are necessary for IIP structural improvements. The Team found these documents to well prepared with adequate provisions and specifications to promote timely completion of contract works and to assure good quality construction. IIP contract awards for civil works are the responsibility of each Directorate. Contracting procedures were reviewed by members of the evaluation team and found to be adequate. There is no prescribed method of prequalification or screening of contractors for small works such as are carried-out by IIP. Sometimes a contractors unsatisfactory past performance is overlooked. Requirements for advertisement of contracts and bidding procedures are adhered to but there is a reluctance to award contracts to anyone other than the low bidder. Elimination of unacceptable contractors would improve contract performance and reduce delays in contract completion.

Contracting procedures should be modified to require a system of prequalification and improved screening of contractors with assured support and responsibility provided by the Cairo office. Prequalification requirements should have flexibility to encourage participation of qualified contractors entering into this new field. There is a reluctance to taking measures that would exclude contractors from work for fear that allegations of collusion or favoritism might arise. Some contractors may be discouraged by the rigors of going through the requirements of prequalification procedures.

The team recommends that IIP adopt and implement prequalification procedures for the purpose of identifying eligible
contractors capable of performing IIP work to good technical standards. In addition, the IIP Cairo

e. Construction Specifications

Ministry specifications used for all irrigation projects are all-inclusive and therefore somewhat difficult to interpret but, none the less, adequate to portray the necessary stipulations to meet the requirements of high quality construction. It would be advantageous if, through the process of standardization, specifications pertaining directly to IIP needs were developed for the particular use in project contract documents. Special specifications have been prepared for new and uncommon items such as criteria for PVC pipe used for low pressure pipelines for mesqa improvement.

f. Contract Bidding Procedures

IIP contracts are advertized in at least three local newspapers for period of 30 days. Contractors must submit their bid as prescribed on Tender form "A" prior to the specified date. Bids are received by the directorate and the qualified low bidder is selected. There in no prequalification of contractors and there performance on other contracts in not always considered.

g. Prequalification and contractor screening

IIP contract awards for civil works are the responsibility of each directorate. There is no prescribed method of prequalification or screening of contractors for small works such as are carried-out by IIP. In many cases there is a reluctance to award contracts to anyone other than the low bidder because of fear that allegations of collusion or favoritism might arise. In some cases the suitability of contractors has been judged by reviewing their records of completion for previous work. But occasionally contractors with poor records in one directorate have been awarded work in another because there had been no exchange of information about contractors. It is suggested that a system of prequalification and improved screening of contractors in the directorate would poor contract performance and reduce delays in contract completion. Prequalification requirements should have flexibility to encourage participation of smaller contractors.

The work performed by IIP were for a new technology and Project contract officials were required on one hand find and develop a new cadre of contractors who would be interested in this new kind of work and on the other hand follow set procedures for selection of a qualified contractor.

h. Bid and performance bonds

Bidders must deposit in the department a temporary insurance (Bid Bond) of one percent of the total value of the tender on or before the time of bidding . The contractor must deposit

Construction Unit should monitor contracting performance and maintain and circulate among all its Directorates a list of all prequalified contractors and another list of those found unsatisfactory.

### 4. Standard Designs

a. Similarity of Design

Structural designs prepared by IIP for both main system and mesqa improvements are normally equivalent or comparable to other structures used and can be standardized. In the main system, regular improvements correspond to other structures constructed by the MPWWR and many of their designs are standardized innovations, such as, the downstream control gates are alike and computerized methods are used in the preparation of their design. The design of improved mesqas for IIP is a repetitive process and large numbers of intake structures, stand pipes, division boxes, etc are being constructed. Most of the structures employed in raised lined channels and low pressure pipelines are either identical or similar in style and lend themselves readily to the use of standardized design procedures. Standard drawings for mesqa structures have been prepared and, are indeed, used extensively throughout the Directorates of IIP. The time required to design mesqa improvements and develop construction drawings has been reduced by the use of standard drawings.

b. Standard Drawings

A complete set on Standard Drawings for improved mesqas has been prepared by the Design Division in the IIP headquarters in Cairo. These designs were provided to the Evaluation Team and found to be relevant to the requirements of the measures used for the improvement of mesqas. As in any well managed process these designs are regularly updated as new concepts and improvements arise. Standard design drawings produced in IIP Cairo office for the delivery and mesqa systems were prepared using the computer aided design program Autocad are of outstanding quality. These designs are periodically reviewed by project directorate design engineers and the Cairo Design Department and improvements and revisions are made as necessary. A manual of the standard drawings. prepared using Autocad, was provided for the Evaluation Team and reviewed. The following typical IIP mesqa structures were included:

Low Pressure Pipelines

1. Layout for low pressure pipelines
2. Intakes from a branch canal (2)
3. Sumps for raised lined & low pressure pipeline mesqas (2)
4. Pump shed
5. Stand for low pressure pipelines (3)
6. Alfalfa valve
7. Alfalfa box
8. Air vent

Raised Lined Mesqas

9. Layout for raised lined mesqa
10. "J" section (60 to 180 l/s)
11. "J" section (210 to 360 l/s)
12. Delivery basin for a raised lined mesqa (2)
13. Turnout
14. Two way turnout
15. Drop structure and division box
16. Crossing
17. Syphon

The Autolisp program has also been used to prepare standard design drawings for Avis and Avio downstream water level control gates by imputing design criteria.

c. Responsibility for Design

Mesqas designs are the responsibility of the IIP Directorate and there is a Design Unit in each of these headquarters. Members of the Evaluation Team inspected designs prepared by Directorates and used in the contract documents and found these designs were standardized applying to a number of mesqas. They were well prepared and appropriate to the needs of mesqa construction. Some of the designs reviewed did not employ the use of Standard Drawings prepared by the Cairo office but rather used standard designs developed in the Directorate. However, the use of the Standard Designs prepared Cairo design department were found to be more frequently in the more recently prepared design sets used in newer contract documents.

As anticipated contractors are becoming familiar with the construction of mesqa structures and are finding new and better ways to build and reproduce these structures. Reusable forms and prefabrication in the contractors yard are some of the methods that have been used.

The use of IIP standard designs, prepared in Cairo, is determined by design unit in the Directorate. These designs as portrayed in standard drawings can be used more effectively. More interaction is needed between design engineers in the directorates and the center is indicated for improvement and better understanding of standard designs.

e. Summary and Conclusions

It was found that designs for civil works prepared by IIP for both main system and mesqa improvements are normally equivalent or comparable to other structures used and can be standardized. Because of the repetitive nature of these designs, involving hundreds of improved mesqas, standard drawings have been prepared by the Design Division in the IIP headquarters in Cairo for use by the Directorates. These designs were provided to the Evaluation Team and found to be relevant to the requirements of the measures used for the improvement of mesqas. These standard designs were observed to be used by the Directorates but not to the extent that they could be.

The use of standard drawings is very appropriate for use for the type of repetitive designs used in IIP. The quality of contract drawings will be improved and the time of design engineers will saved by there use. They should be used to the maximum extent possible in IIP. Constraints identified by the Evaluation Team are: (i) design engineers do not always accept work prepared by others and (ii) standard drawings do not always reflect the latest innovations in design improvements. Regularly scheduled meetings of design engineers should be held for the purpose of review and revision of standard designs and for the exchange of information in regard to updating the design of irrigation improvement structures.

# ANNEX 12

## Future Potential Role of IIP

# IRRIGATION IMPROVEMENT PROJECT

# EGYPT

# Annex 12

## I. INTRODUCTION

### A. Potential for an Egyptian Agribusiness Trade and Development Fund

This annex presents a plan for an ***Egyptian Agribusiness Trade and Development Trust Fund.*** An Egyptian Agribusiness Trade and Development Trust Fund will provide the organizational structure for the development of improved irrigation lands and encourage the production of new, high-valued, export-oriented crops and products that will greatly enhance farmers' income, employment and well-being, and significantly increase Egypt's revenues from agricultural pursuits.

The agricultural potential land area of Egypt covers about 7 million feddans, of which 6 million feddans are considered "old lands" where agricultural practices have not materially changed over the centuries. The remaining one million feddans of "new lands" have been earmarked for improved agricultural and irrigation technologies. All of Egypt's agricultural area requires full or partial irrigation from the River Nile for the production of any crop, because there is virtually no rainfall. Each and every crop is now irrigated by furrow or flood irrigation systems, and sprinkler and drip irrigation technologies are practically ignored. Despite the mighty Nile River and its seemingly abundant water supply, water is becoming scarce as Egypt's allocation is limited by common agreement with its neighboring countries. The contemplated horizontal expansion of the agricultural new lands will exacerbate water scarcity for agricultural and industrial purposes. In addition, rice which is extensively grown as a staple crop, is the most highly water-consumptive crop when measured on a day-to-day basis.

Conservation and better use of available water from the Nile River is a GOE policy. However, its almost unlimited utilization in rice production is ironically a contradiction to this policy, although a substantial acreage under rice, a subsistence and essential commodity, is also a national and imperative necessity. Efficient use of water has also become a dire necessity, not only for Egypt but for the world at large, and one way of reducing agricultural consumption of water is to utilize proven modern technologies that have been designed for this particular purpose. Although not adaptable to rice or similar crops like wheat and barley, modern irrigation technologies exist which utilize less water for higher cash-crop yields.

- The agronomic potential is readily apparent and can be demonstrated to be appropriate for exportable high-cash crops, under enhanced irrigation technologies, with market potential;

- Markets exist for high-valued quality produce in Europe, the U.S., the Far East, the Near East and the newly emerging former communist block;

- A potential financing mechanism exists with USAID, either through the PL 480 program or with a direct project grant allocation; and

- A unique "organizational structure" has been designed to package these elements into a cohesive operational system that can produce, process and market thousands of tons of high-valued agricultural products to foreign export markets.

The real impact of the improved irrigation systems[1] will not be realized by continuing to produce the basic crops because the returns received for rice, berseem, cotton, other grains, and the traditional crops grown on Egypt's irrigated lands will not be sufficient to sustain her agricultural growth rate, and the impact of the improvements will be minimal. It is only by moving forward into the production of more highly-valued crops utilizing the most recent technology will the farmers feel and experience the incentives they need for continuing to expand and grow in their agricultural pursuits.

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[1] See Appendix 12-1 to this Annex 12



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## II. THE AGRICULTURAL DEVELOPMENT FUND MODEL

### A. The Model

The Model is based on the experiences and successes of the Fundacion Chile, a research and investment foundation formed by the Government of Chile and the International Telephone and Telegraph Corporation of the U.S. in 1976. However, the proposal in this annex is uniquely adapted to the developments initiated by the **Irrigation Improvement Project**, Egypt's geographical location in the Mediterranean, and, in addition, to the particular supportive relationship the Government of Egypt (GOE) enjoys with the U.S. Government. This support is critical in the design of the Egyptian program because of the new guidelines issued by the U.S. Congress pertaining to the use of PL 480 reflow funds received and jointly owned, administered and/or approved for distribution by the U.S. and GOE.

### B. Historical Background and Current Operations of the Fundacion Chile

#### 1. History

In the mid-seventies the Government of Chile (GOC) decided to nationalize several industries, one of which was the tele-communications sector including the telephone company which was 70 percent owned by the International Telephone and Telegraph Corporation (ITT). During the negotiations, ITT was facing a $50,000,000 loss when the idea of forming a Research and Development Fund arose. The two parties organized an arrangement whereby each party contributed $25 million to create a semi-private foundation to develop "mutually beneficial activities" designed to "promote the transfer of new technologies, methods or systems which can contribute to the development of productive activities in the country". The mandate was to "transfer new, proven technologies to Chile's productive sectors to assist with the nation's development", and to avoid the duplication of research and development done elsewhere in the country. Although the original selection of sectors in which research and development were to be conducted included nutrition and telecommunications, the real comparative advantage for the Chileans with ample unexploited potential was in the fruit and vegetable sectors.

#### 2. Governance

The Governance of the new foundation was divided between the GOC and Directors of the ITT Corporation. A ten-member Board of Directors was created to take an active role in generating ideas, to solve potentially divisible issues, and to plan implementation strategies. Both the GOC and ITT appointed five members of the board and five alternates. The President was Chilean, and the Vice-President was from ITT.

The uniqueness about the Fundacion Chile is the way the Foundation develops and spins off projects. When the Foundation conducts research or technology transfer, it sets up a viable enterprise to carry out production and marketing of the final processed products, with the objective of economic gain coupled with social well-being. The companies formed may be jointly or wholly-owned by the Foundation, or may be "sold off" during the pilot, demonstration or commercial trial period. The private sector may be invited to join in right from the start. Consulting fees and contracted research also generate revenues for the Foundation.

The Foundation currently has a cranberry production joint venture operation, wholly owns a grape wine facility, and packs apples from its own production company. Joint ventures also are operating in fisheries, fruit and vegetable processing and fresh marketing, and a forestry service enterprise. Quality control is an integral part of the seafood, forestry, and fruit and vegetable industries. The Foundation operates several quality control laboratories and offers product certification to export standards and grades for Europe and the U.S.

The principal focus of the Foundation's enterprise group has been in high-valued crops, post-harvest handling facilities and processing plants, seafood activities and forestry products; and new exploration is currently underway Chile's main sectors with export potential.

Special emphasis has been placed recently on crop sanitation and environmental protection projects, which include the production and marketing of hygienically clean fruit and vegetables in the Santiago Metropolitan Region, the cultivation of depurated shellfish, the replanting of native tree species in Tierra del Fuego, and the development of a wood products training center to encourage the manufacturing of furniture components and finished pieces.

4. Finances

The Foundation was initiated with a $50 million dollar endowment. Eight million was made available each year for the first three years; the following six years had $4 million each; and $2 million for 1985. In 1991, the Foundation had $56 million in assets, was selling $6 million a year in services with an annual budget of $11 million. Other income was generated from the sale of businesses initiated and returns to equity investments. By 1991, 32 businesses had been formed for $18 million dollars, 20 subsidiaries and 12 affiliates. Five businesses have been sold, one to Japanese interests for $25 million.

Semillas Marinas and Campos Marinos produces and markets California red abalone;

Salmones Huillinco and Salmotec produce and market salmon and salmon smolts, and conducts ocean farming.

c. Forestry

Constructora 2000, a wood construction company builds and markets wood-based "energy thermic" homes throughout the country and Lumber Ram promotes the intensive use of wood in housing;

Tecnoplant Tree Nursery distributes pine and eucalyptus seedlings;

Centec and Ignisterra manufacture and commercialize wood furniture and parts for export.

# III. AGRICULTURAL PRODUCTION POTENTIAL ON EGYPT'S IRRIGATED LANDS

## A. The Irrigation Improvement Program (IIP)

USAID has assisted the Government of Egypt to improve its irrigation delivery system by developing continuous flow canals and mesqas. These will ensure the flow of irrigation water without daily interruptions, and allow an adequate amount of water to reach the distant ends of each mesqa system. The mesqa and canal improvement program has already contracted to reach an area covering 150,000 feddans (approximately one acre per feddan), and over 90,000 feddans of improved mesqa systems. The majority of the mesqa improvement construction has already been contracted and much of it has now been completed. The World Bank is considering the financing of additional mesqa improvements in the Delta region. In developing its construction program, IIP has promoted a working relationship with indigenous Water User Associations (WUAs) who are in charge of managing the pumping of the water to all areas covered by the mesqas.

## B. Water User Associations as Producer Organizations

The WUAs are one of the five key elements to this agricultural export promotion strategy. The farmers in these WUAs have already shown that they will move to more high-valued crops when their irrigation water is more secure. This has been indicated by all those interviewed. By organizing the farmers into WUAs, IIP has created a farm level system that can respond easily to the market indicators that the new strategy will produce. Also, the new system's extension services will have ready-made farmer recipient groups for the innovative technologies that will be introduced. The degree of willingness, cohesiveness and responsiveness of these WUAs as production entities is critical to the success of the program.

Evidence exists to suggest that these WUAs have been formulated around traditional water users' groupings. This means that they naturally cooperate to solve mutually dependent water distribution problems. It can be expected that they could take up the challenge of producing quality produce for the export market as well, as further incentive to enhance the well-being of their WUA. This expectation is based on their current high level of production technology exhibited in their production system, and by their sense of cooperation and responsiveness to new incentives and extension guidelines.

Remaining in the production of basic grains and other traditional crops is a second best solution and should only be promoted as a first phase measure until high-valued cropping systems and financial/marketing institutions can be established.

It should also be pointed out that the U.S. Government, through USAID/Cairo and the USDA's foreign currency collaborative research program, has financed the development of new agricultural technologies in Egypt for over twenty years, with the participation of hundreds of U.S. researchers, in addition to the Egypt-Israël-U.S. tripartite research program established in the late 1980's. This last program pioneered the development of the solarization process for horticulture production jointly with researchers from Riverside, California, for use on citrus and other annual field crops. The process induces a sterilization of the soil before seeding by covering the ground with dark plastic to "bake" the soil, which kills most of the fungi, nematodes and insects that may be harboring there prior to cultivation. The U.S.'s involvement in the agricultural development of Egypt has been one of profound cooperation for several decades, at even a higher level than perhaps with any other country in the world, and at least equal to that carried out with India, Israël, Pakistan, Yugoslavia and Poland, where similar foreign currency programs were established. On the basis of these experiences, the consultants feel confident that this proposal is sound with little chance of misfiring.

## IV. INTERNATIONAL AND REGIONAL MARKETS

### A. Background

The Fundacion Chile opened up the U.S. market to Chilean Thompson's seedless grapes in the winter months. Now Chile markets these grapes year-round. Chile now exports almost $7 billion dollars of produce in one form or another and only half of this amount goes to the U.S. Nevertheless, the original notion of off-season fruit and vegetable production for U.S. and European markets was pioneered by the Chileans and other Central American/Mexican producers, often with USAID assistance[5].

Once again, SRD Research has developed an analytical technique for determining which crops have potential in several foreign markets. This type of analysis has been attempted in the past within USAID's Small Farmer Marketing Access Project but was unsuccessful in determining crop potential and viability, principally because of the lack of computer access to sufficient information. SRD Research has on-line over 150 markets with 130 crops or processed horticulture products, on a weekly price and volume basis. The analysis which they conduct captures the last four years of price information in each of the targeted markets, and then looks at the volume of product produced locally (i.e. in the foreign countries' local producing areas) and the amount imported on a weekly basis.

When the product price in the final destination market is greater than the production cost in the country attempting to export, plus the cost of handling, processing, packaging and transport, then the product is viable for export. A second criterion measures the size of the market in terms of total volume moved into the weekly markets. If the volume absorbed in a specific market is not substantial, then it is determined that the market is fairly thin, large volumes cannot be absorbed, and hence exporting to that market would not be feasible nor sustainable.

In general, the viability of a crop to meet the demand in the final destination markets is viable when production costs are less than 25 cents of a dollar per kilogram (kg) of marketable product, with packaging around 12 cents and transportation running between 45 cents to 95 cents from Egypt for air transport. The evaluation of the IIP showed that per kg production costs were around 15 cents for all of the crops analyzed. The analysis of 50 products for the Bangladesh Horticulture Export Foundation (designed by SRD Research based on the Fundacion Chile model) showed that at least 25 of these products had markets of over $1.50 per kg in Europe, well above the costs that would be incurred in Egypt. Market prices of over $1.00 appear to be sufficient to assure regular profits. Moreover, it has been determined that barging from Alexandria to Italy could reduce the transport costs to under $0.30 per kg and make most of these products even more viable. A tremendous potential exists in Egypt for developing this kind of a marketing scheme.

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[5] (See K. Swanberg, CDIE Agribusiness Evaluation of the PROEXAG Project, December, 1993).

## V. "THE AGRICULTURAL DEVELOPMENT AND TRADE ACT OF 1990"

### A. Governing Laws

The law which governs the use of proceeds from the sale of Public Law 480 food commodities has new guidelines as of 1990. Some of these guidelines have direct implications with regard to the potential for financing the types of activities envisioned in this proposal. A review of that law, the Agricultural Development and Trade Act of 1990, is presented below.

Section 2. United States Policy

"It is the policy of the United States to use its abundant agricultural resources to promote the foreign policy of the United States by enhancing the food security of the developing world through the use of agricultural commodities and local currencies accruing under this Act to:

(1) combat world hunger and malnutrition and their causes;

(2) promote broad-based, equitable, and sustainable development, including agricultural development;

(3) expand international trade;

(4) develop and expand export markets for United States agricultural commodities; and

(5) foster and encourage the development of private enterprise and democratic participation in developing countries."

The Act goes on to state that the United States will provide agricultural commodities for sale in dollars on credit terms or for local currencies, for use under Title I - Trade and Development Assistance, which would allow for the following activities:

Section 104. Use of Local Currency Payments

"(2) for Agricultural Development
to support

(a) increased agricultural production, including availability of agricultural inputs, with emphasis on small farms, processing of agricultural commodities, forestry management, and land and water management;

(b) credit programs for private-sector agriculture development;



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The Food for Development section, Title III, allows the U.S. Government to donate these food commodities under certain conditions of eligibility of a least developing country or for emerging democracies. Within this section, it states that--

<u>Section 306</u>. Use of Local Currency Proceeds.

"(a) In General - The local currency proceeds of sales pursuant to section 304(2) shall be used in the recipient country for specific economic development purposes, including

"(1) the promotion of specific policy reforms to improve food security and agricultural development within the country and to promote broad-based, equitable and sustainable development; ...

"(5) support for United States private voluntary organizations and cooperatives and encouragement of the development and utilization of indigenous nongovernmental organizations."

"(b) Support of Indigenous Non-Governmental Organizations

To the extent practicable, not less than 10 percent of the amounts contained in an account established for a recipient country under section 305(a) shall be used by such country to support the development and utilization of indigenous non-governmental organizations and cooperatives that are active in rural development, agricultural education, sustainable agricultural production, other measures to assist poor people, and environmental protection projects within such country;

"(c) Investment of Local Currencies by Non-Governmental Organizations

A non-governmental organization may invest local currencies that accrue to that organization as a result of assistance under subsection (a), and any interest earned on such investments may be used for the purpose for which the assistance was provided to that organization without further appropriation by the Congress."

## VI. THE PROPOSED "EGYPTIAN AGRIBUSINESS TRADE AND DEVELOPMENT TRUST FUND"

Given this background and the current situation, it has been determined that the creation of an institution similar to that formed in Chile but with unique modifications designed to fit the Egyptian circumstances would be appropriate for the U.S. Government and the Egyptian Government to consider. The structure and operating procedures for such a Fund are presented below.

### A. Structure and Operating Procedures

#### 1. Production

The WUA farmers will be expected to create production units capable of producing a portion of their mesqa areas for the export crops according to the indications of the chosen marketing strategy. Because these units are non-government/non-profit organizations, they could qualify for receiving PL 480 reflow funds in local currencies. However, it would be stipulated that each WUA would receive the PL 480 local currency funds under the condition that they agree to invest (deposit) a portion, from say fifty to seventy-five percent of the amount they receive annually for three to five years, in the Agribusiness Development Fund that would be created to stimulate the horticulture exports. The investment/deposit would be in interest bearing, ten-year bonds, at 10% interest rates (adjusted annually to market conditions in Egypt but maintaining the spread with the Fund's sale of bonds to the processor/marketers).

This strategy would create a mini-endowment fund for each user group that would provide a steady income to their association to cover irrigation and pumping maintenance costs on an annual basis as long as the bonds are vigilant. In addition, it could be agreed as well that each association contribute matching funds (some percentage of the grant amount) to increase their "purchases" of interest bearing bonds in the Agribusiness Development Fund in order to ensure a full commitment on behalf of each WUA to the success of the program. In this way, the PL 480 funds would be able to leverage an equal amount of liquidity for the growth of the Agribusiness Trust Fund, thus allowing it to expand more rapidly in the financing of the agribusiness processing/marketing firms.

Once the WUAs initiate the program, they would agree to enter into a contract growing arrangement with one of the agricultural processing, packing, cooling or marketing firms that would be established with the funds invested by the user groups. However, this contractual arrangement would not be automatic nor binding if one or the other parties fails to honor any specific contractual agreement.

production. The overall effect of this development strategy would be to increase exports, significantly raise agricultural and agribusiness sector employment and income, and improve in-country nutrition by the availability of more food products and higher incomes.

## B. Establishing the Egyptian Agribusiness Trade and Development Trust Fund

### 1. Financing

As described in the section on the Agricultural Development and Trade Act of 1990, non-government institutions are allowed to take their PL 480 local currency grants and invest them in interest bearing accounts, such as the proposed Agribusiness Development Fund "deposit" bonds. In this way the WUAs will endow themselves over a few short years to ensure their own incomes in perpetuity (or until the bonds mature). In addition, the WUAs will have sufficient capital to cover the cost of their pumps and the costs associated with mesqa and canal water maintenance, and to provide their members with working capital for modern irrigation development and agricultural inputs. There may be a desire to require the WUAs to match the grant funds over time as mentioned above, so that the farmers end up replacing the funds that are originally offered as a grant, or simply to force the WUAs to make a commitment to the system being introduced.

Grants of roughly $10,000 per WUA could be developed, on a one-year basis, or repeated over three to five years, with a total PL 480 allocation of $100,000,000. With this amount, $25 to $50 million dollars U.S. would go to develop the WUA production facilities and $50 to $75 million dollars U.S. would go into the development fund. Any lesser amount assigned from the PL 480 program could be allocated in the same way with the only effect being a smaller initial development endowment fund.

On the other end, the Agribusiness Development Fund would establish a credit/investment fund with the money received for the sale of the bonds to the WUAs, by issuing "investment" bonds or by purchasing bonds issued by processing, handling and marketing firms. An investment strategy and eligibility criteria would be established so that the firms created and financed would offer the greatest benefit to the original WUAs. The bonds issued to or purchased from the agribusiness firms would carry a fixed return rate of 15% and each bond issued or purchased would be linked to some form of equity participation in the firms created.

In addition to selling bonds and issuing or purchasing bonds, the Agricultural Development Fund would create several services that would function in support of the investment activities. The first would be the market analysis department that would identify agricultural products that have market potential, as described in the comments about SRD Research's market analysis work in Bangladesh. This department would analyze markets in the European Common Market, Eastern Europe and the Newly Independent States, as well as major Near East markets, markets in the Pacific Rim and elsewhere wherever opportunities may arise.



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The fourth function would be a consulting service to the processing and handling firms, similar to an "incubator" service found in the U.S. commercial sector connected with many industrial parks[12]. Consultants for this service could come from an IESC or VOCA program or through a designated consulting firm contracted to the Fund for these services. This activity would earn fees for the Fund as well as provide the necessary impetus to create the new companies that would be needed to market and contract grow the new products. This model is advocated by the MTAP project of the former PRE Bureau and the new AMIS II agribusiness and marketing project in the new Global Activities Bureau.

2. Management

A Management Unit would be created to manage the Fund, to solicit participating WUAs or other farmer producer organizations to purchase bonds, to create companies that would market, process, handle and contract grow the products, and to provide all of the service functions as indicated above. The farmer groups would buy bonds at 10% interest rates, the companies would be issued bonds at 15% fixed return rates plus an equity share, and the services would charge fees. If the endowment fund were to be established at $50 million dollars, the Fund's operating budget would be five percent or $2.5 million dollars per year plus consulting fees. The management unit would have a board of directors similar to that of the Fundacion Chile, with GOE and U.S. directors, selected from the public or private sector of the respective governments. A management consulting firm from the U.S. would be contracted to establish and manage the fund for the first five years[13]. During this time, management training would take place in order to prepare for Egyptians to take over the management of the entire operation. Funds for the initial grants to the WUAs would come from PL 480 local currency reflows or from a direct USAID grant for the creation of the endowment fund. After the initial installation period the Fund's management would be paid out of the interest spread on the bonds and the consulting fees mentioned above.

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12 See discussions of this concept in the PRE/MTAP project's reports and the proposals included for funding in the Global Bureau's new agribusiness project, AMIS II.

13 See the Bangladesh HORTEX Project design and the Fundacion Chile experience as precedence for this procedure

## VII. RECOMMENDATIONS

### A. Conduct Irrigation Technology Transfer Study

The accompanying appendix 12-1 discusses the potential for significantly improving Egypt's irrigation technology using drip, subsurface, trickle and other improved irrigation systems. The viability of these new technologies could be verified through a short technical study to determine their adaptability to Egyptian conditions in the improved mesqas of the IIP.

### B. Identify Potential Market Windows for Egypt's High-valued Crops and Products

The consulting firm mentioned in the marketing analysis section could identify the most promising fifty crops or products that could be produced in the project area. Other marketing analysis firms could do the same. A selection of European, Near East, U.S. and South Asian markets should be included. Market windows could be determined for the most viable products, along with the basic information on production costs, packaging costs and transportation costs[14].

### C. Determine Feasibility of PL 480 Funds for NGO's to Invest in Interest Bearing Accounts

The 1990 Trade and Development Act states that this is authorized but it would be wise to check this out through legal channels within the Agency. Unfortunately, legal counsel in Government Bureaucracies generally react negatively to inquiries about new, innovative approaches, and usually pass these interpretations on to the contracts office in order to avoid future conflict of interest and responsibilities for potentially unfavorable interpretations. It is only through an aggressive proposal laid on the table for action and implementation can the Mission be assured of a just analysis by the legal and contracts staff[15].

### D. Investigate Potential for Use of PL 480 Funds for U.S. Agribusinesses in Egypt

The above referenced law states that PL 480 funds generated in a host country can be used to support U.S. agribusiness or cooperatives improve their trade and other operations in the host country. This clause may be used to help U.S. firms or cooperatives act as joint venture partners to establish the marketing and processing firms that are desired in Egypt. It could also be used to obtain new or used processing machinery for these operations.

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[14] This type of analysis was recently (1992) contracted to SRD Research by the World Bank in Bangladesh to create the Bangladesh Horticulture Export Foundation.

[15] Examples are the Lautenberg interpretation for Cone Mills in Swaziland; the Uganda Seed Company TA contract to a U.S. investor; the Cargill investment study on Vemonia in Kenya, and USAID Togo's request for A.I.D. assistance to help an Asian textile firm gain "country of origin" status in Togo's Free Trade Zone

# Appendix 12-1

## I. INTRODUCTION

### A. Background

Plan for an Egyptian Agribusiness Trade and Development Trust Fund in Annex 12 counts on the production of new, high-valued, export-oriented crops and products using improved irrigation techniques that will boost production with the optimal amount of water and fertilizers. Egypt's current irrigation techniques are not conducive to the Plan's maximum potential achievement. One way of reducing agricultural consumption of water is to utilize these proven modern irrigation technologies that have been designed for this particular purpose. These practices will materialize in financial rewards not only to the farmers themselves, but also to the GOE in the capitalization of foreign exchange.

Judging by field trials currently being undertaken in experiment stations in Egypt, the evaluation team concluded that the drip irrigation technology is not well understood there. Therefore, this appendix describes Egypt's current irrigation practices and the basic technique requirements for drip and subsurface irrigation implementation. Adoption of the later practices are essential to the long-term success of the proposed Egyptian Agribusiness Trade and Development Trust Fund.

### B. The Egyptian Current Irrigation Techniques

The Egyptian farmer in the "old lands" utilizes one of three irrigation methods :

#### 1. Flood Irrigation

Flood irrigation is the easiest, and at the same time, the most wasteful way of applying water to a field. When there is a perception of abundance of water, flood irrigation can only be justified for rice production. However, flood irrigation creates soil compaction, increases soil erosion, asphyxiates and deteriorates the soil, and leaches away costly fertilizers and also sodic salts which may contaminate water supply downstream. Gravity flow techniques, widely practiced there, albeit discouraged where continuous flow is to be implemented, is highly wasteful of water. Although some of the water is recovered downstream from the drains, quite often this water is contaminated and deleterious to crop growth. To the WUA farmers where mesqas have been installed, the cost of pumping is minimal and the increase in yield justifies this approach, but the deleterious ecological effects reveal themselves after several years. Tillage, crop rotation and/or leaving the fields fallow between crops are practiced to mitigate to some extent the rate of soil deterioration.



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## C. The Drip Irrigation Technology

Drip irrigation is a technique whereby the amount of water delivered per unit area of soil and directed to the plant root system can be accurately measured and delivered. Fertilizers can also be exactly monitored to produce optimum yields. In order to achieve the uniformity of application and distribution of these two essential parameters (water and nutrients) necessary for adequate plant growth, a proper design and installation of the irrigation equipment are required.

The drip and trickle subsurface irrigation with polyethylene tubings are fairly new techniques that have been introduced in Israël and the U.S. in the late 1960's. During the last two decades, there has been substantial progress in drip irrigation technology that now warrants its adoption in third world countries for increased agricultural production of high cash crops under water conservation measures.

The transfer of drip irrigation technology to developing countries is not an easy task. Basically, it implies the installation of a system that the farmer has perhaps never heard of. Because knowledge of the engineering and agronomic specifics of the various available systems and the benefits that can be derived therefrom is usually rather scanty within the scientific community of several developing countries, farmers are usually made to believe that the technology is perhaps too sophisticated to be adopted by the farming community at large. Some research is now being carried out on drip irrigation systems in the new lands of Egypt. At the Agricultural Research Center in Esna, the evaluation team's agronomist/drip irrigation engineer had the opportunity to make an assessment of a field trial on sugarcane. Unfortunately, the designers of that system were not trained to do a proper design, and the field trial is deemed to be a total flop. The unfortunate outcome of this field trial (which was started six months earlier), if allowed to continue, will undoubtedly lead to the conclusion that drip irrigation systems do not work under Egyptian conditions. The obvious conclusion from this evaluation's team perspective is that drip irrigation technology transfer to Egypt's agriculture has not occurred and is not occurring.

Examples of a similar state of affairs have been noted in various countries where "experts" in drip irrigation sprout like mushrooms, viz. Ivory Coast, Kenya, Malawi, Philippines, Indonesia, India, Mauritius, Reunion, to name but a few. However, with proper designs and adequate agronomic packages, drip irrigation systems have increased yields by two-fold or more in sugarcane, potatoes, tomatoes, pineapple, bananas, to name but a few crops, in some of these same countries.

Egypt will be no exception. Being confronted with a situation of water scarcity in the near future, and the possibility of adopting a system that conserves water, the GOE will pressure the farmers to adopt a system that has water conservation measures. The farmers will in turn expect the scientific community to provide them with answers to solve their dilemma.

- o Optimum N, P, K fertilizer amounts, and an understanding of the beneficial effects of micro-elements without ignoring the harmful effects of excessive dosages of boron, aluminium and iron.

Irrigation efficiency, together with an adequacy of water supply and good growth conditions, are prerequisites for production of high yields. Irrigation tubing placement, crop and variety selection, cultural and planting practices, crop control, soil management, planting configuration, pest control, and fertilizer management are all important components of successful agriculture.

The basic theory of drip irrigation is to provide an optimum amount of water to the plant root zone on a daily or alternate-day basis. Irrigation controls will be at the WUA farmer's finger tips whereby he can saturate his soil, keep it at field capacity on a daily basis, or withhold irrigation for as many predetermined days as planned, and saturate the soil again to promote deep rooting.

Plant growth and yield are directly related to, and conditioned by, the amount of water that is absorbed by the roots and transpired by the leaves. This can only happen if soil aeration and other growth parameters are not limiting.

Evapotranspiration is essentially a physical process, a function of solar radiation energy, and will take place only if water is available in the stomatal inter-cellular spaces of the leaves. Radiated heat increases the temperature of the leaves it strikes. This heat has to be dissipated by the cooling effect of evapotranspiration. If adequate water is not available through the root system, leaf temperature starts to rise and may reach a level deleterious to plant growth, and the leaves eventually dry up. If there is excess water because of over-irrigation, a physiological drought sets in. However, before this happens, the plant has already responded by stomatal closure, triggered by a decrease in water potential of the leaf tissues. When stomata are closed, carbon dioxide absorption and assimilation cease ; photosynthesis is restricted or reduced to nil. When this takes place, the turgor pressure of the growing meristem has already been reduced to a level affecting leaf expansion growth, which in turn affects future yields. In order to allow the plant to grow at its maximum rate, the water supply to the root system should be just sufficient to replace the water lost by evapotranspiration on a daily basis. Without any constraints on water supply, an adequately designed drip irrigation system is expected to do just that.

## E. Definition of a Drip Irrigation system

Each and every person has his own perception of a drip irrigation system and how it should function, according to what he has read or has been told, or perhaps as a result of limited experimentation. Because many people do not know or have preconceived or misconceived ideas, it bears describing here that drip irrigation systems essentially consist of :

5. Submain risers

These risers with pressure regulators are needed to control system pressure for every 0.5 to 1 hectare if the field to be irrigated is greater than one hectare.

6. Lateral tubing

The lateral distributor system should preferably be a line-source tubing buried at least 30 cm below soil surface or shallower depending on depth of the crop root system and soil type. In-line and on-line laterals, and/or mini-sprinklers can also be used on the surface for orchard crops.

7. A flushing system

The flushing system will connect the distal ends of all laterals to a 32 mm pipe with a gate valve. Individual flushing of each lateral is laborious and time-consuming.

## F. Designing a Drip System

Qualified and trained personnel, knowledgeable not only in hydraulic engineering but also versed in crop agronomy, should perform the complex design work and draw up the equipment specifications, while keeping in mind the cost-effectiveness of the system. Cost has been, and still is, a great impediment towards the adoption of the drip irrigation technology in third world countries.

It bears repeating that a cheap system may not perform, and expenses incurred may not be recuperable. Both the initial cost and expected increases in yield, and return on investment (i.e.FIRR) should be considered before adopting any system. In some cases, it would not make any economic sense to implement a drip irrigation system.

The line-source tubing that runs alongside or between crop rows has created a revolutionary concept in irrigation. A drip system requires a hydraulic head of only 0.5 to 1 $kg/cm^2$ in the laterals and it delivers low quantities of water per orifice. Because there is a choice of orifice spacing from 5 cm up to 60 cm between adjacent orifices, and water flow rate per orifice increases with increasing pressure in the laterals, the water supply per unit area to satisfy the high summer evapo-transpiration demand plus a leaching fraction can be programmed in the design.

- o Even water distribution in the root zone will provide for uniform growth throughout the field, which in turn, will result in increased yields.

- o The amounts of water delivered daily can be precisely controlled during the germination and growth phases to conserve water and pumping costs on the one hand, and ensure adequacy of supply on the other. Water supply to the field can also be regulated to improve deep rooting depth.

- o Use of the subsurface system will allow flat surface cultivation and thereby improve harvesting ease and efficiency.

In summary, because of excellent growing conditions made possible by ease of control of several growth parameters, higher yields are to be expected and usually obtained.

## G. Drip Irrigation is not a panacea

A drip/subsurface irrigation system that is perfectly designed, implemented, managed and operated, is only a partial solution to better agricultural production. To obtain high yields that will make subsurface irrigation a financially rewarding proposition, other growth parameters have to be reckoned with. If not, the return on investment will be negligible or perhaps negative; as a consequence drip/subsurface irrigation usually takes the blame.

### 1. Soil Salinity

The soil chemical conditions in the Delta regions where drainage water is extensively utilized are reportedly appalling. No detailed and accurate information on soil chemical status, except that alkalinity (never mind sodicity) has increased over the years and that the soil has gradually deteriorated over the years. The soils are highly variable from area to area, sometimes over a distance of only several meters, as to type, texture and degree of salinity. Many soils are saline, and in some fields surface accumulation of salts turned the soil surface completely white.

It has not been established if leaching of saline soils is practiced in Egypt, and if so what is the average soil conductivity that establishes the criterion for leaching requirements. Crops are usually sensitive to a reduction in total water potential (which is the sum of matric and solute potential) in the root zone.

If a crop is started in a soil where electrical conductivity EC x $10^3$= 2, the total water potential decreases below -1.5 bar where the matric potential at field capacity is only -0.3 bar ; at an EC x $10^3$ of 3 the total water potential is less than -2.1 bar; and at an EC x $10^3$ of 4, it decreases below -2.7 bars. If water is not applied daily (as in furrow irrigation), the soil in



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A second obstacle is the lack of proper training of engineers and agronomists in the synergistic effects of a properly designed subsurface irrigation system with the essential and concomitant application of agronomic principles. Without the basic foundation of knowledgeable engineers and agronomists to help farmers in their endeavors, errors will creep in. Mistakes learned and corrected elsewhere twenty years ago will be learned again at very high costs unless proper steps are taken to avoid the same mistakes. Therefore the training of IIP personnel and field agents should be properly financed and organized as they will be the driving force in the establishment and acceptance of any new technology.

3. System costs

The cost of a drip irrigation system will of course depend on its component parts. On the one hand, if essential components are not included in an installation, the system will not work properly and the blame will be put on the already proven, and financially successful, drip/subsurface irrigation technology in other parts of the world. On the other hand, when necessary components are eliminated in a design and installation with the sole purpose of reducing cost, chances are that problems will arise, and if these are not dealt with promptly, expected results will not be achieved.

The cost of a drip/subsurface irrigation system varies with the crop being grown and area to be implemented. The cost per feddan decreases when the size of the field increases from 15 feddans up to 60 feddans, after which the cost per feddan remains constant. In general, the total cost will lie between US $1,200 to $1,500 per feddan which includes pumping, filtration, chlorination and fertilizer equipment, PVC pipes for mains and submains, and the polyethylene laterals. In the pipeline mesqas, the PVC mains which constitute about 30 percent of a drip irrigation system would already have been installed. The HP of the pumps designed for the mesqas needs to be increased to provide the required hydraulic head, but the volume required will be much less. The difference in the cost of the pumps would be negligible. In addition, the rather expensive concrete water towers needed to provide the hydraulic head for the flood irrigation can be eliminated. In summary, the difference in cost between pipeline mesqas and the installation of a drip irrigation system may be less than $500 per feddan, but the return on investment would be substantial with the right crop choices.

4. Cost effectiveness of the Drip Irrigation technology

Obviously, one has to do a financial analysis under a specific set of conditions to determine the cost/benefit ratio pertaining to each installation system.

In a narrow sense, the cost/benefit ratio is often expressed as the Financial Internal Rate of Return (FIRR) which is the rate of return on money invested by the farmer to produce a commodity sold at farm-gate prices. The Economic Internal Rate of Return (EIRR) is the benefit