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QUARTERLY REPORT

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EGYPT WATER USE AND MANAGEMENT PROJECT

Contract No.

AID/NE-C-1351 (Egypt)

Project No. 263-017

Consortium for International Development

Executive Office

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I. PROJECT STATUS IN EGYPT

During the first quarter of 1984 emphasis was given to preparing progress reports on all Project activities for the National Conference on Improving Egypt's Irrigation System in the Old Lands. The Conference was held on March 18, 19 and 20 with 189 persons registered. More than 200 persons attended portions of the Conference. A report was published which included the highlights of Project findings and twenty three recommendations for improving irrigation systems in Egypt. A list of persons attending the Conference is included in the appendix. Refer to the last quarterly report, dated, Oct. 1 to Dec. 31, 1983, for a complete statement on Project recommendations.

The Conference was opened by the Ministry of Irrigation. He acknowledged the important role EWUP has performed in providing Egypt with a sound basis for establishing a National Irrigation Improvement Program (NIIP). He said the Government of Egypt has started implementation of NIIP which is included in budget of the latest Five Year Plan.

The Conference was conducted in Arabic. The American staff worked with their Egyptian counterparts in the preparation of charts, pictures and outlines which were used for visual presentation. A complete set of all the visuals has been retained for future use by the Water Distribution and Irrigation Systems Research Institute and the Ministry of Irrigation.

Participants at the Conference included the Undersercretaries of State for Irrigation from throughout Egypt. These persons are the highest ranking officials from the Ministry of Irrigation outside of the central offices in Cairo. The Undersercretaries of State will be in charge of NIIP projects. From all reports they received the information presented at the EWUP Conference very favorably. They have expressed enthusiasm for starting the NIIP work in the Governorates where they supervise the irrigation systems.

The main office staff continued emphasis, this past quarter, on assisting field teams to extend their work outside the original field sites. The team at El-Minya is completing *mesqa* renovation on the Abyuha canal and providing preliminary surveys for the Serri canal which

serves 126,000 *feddans* south of Minya. The Kafr El-Sheikh team is developing a water delivery improvement program for the Daqalt canal while the Mansuriya team has extended its activities to the Nahia canal. The teams are working productively on interdisciplinary problems, utilizing training obtained through EWUP during the past six years.

The request for bids to complete construction of the El-Hammami buried pipeline has been readvertized. The bids received by two companies and evaluated in January were rejected. It is anticipated now that a contractor will be selected in May and that construction should be resumed in June.

The contractor working on *mesqa* renovation at Minya has experienced many problems working with farmers and conducting construction operations on private land. It is clear that *mesqa* renovation requires a coordinated effort that involves working closely with farmers and farm leaders. The contractor did not have the qualifications or staff to provide such coordination and had to rely on EWUP professionals. Arrangements were made to have tractors and laser leveling units on hand during the time land is fallow, between winter and summer crops, to level land and at the same time obtain soil for rebuilding *mesqas*. The Egyptian Agricultural Mechanization Project (EAMP) will provide the equipment for land leveling. A memorandum of understanding was signed between EWUP and EAMP to facilitate the joint work at the Minya site. It is expected that the work on the Abyuha canal command area (1,200 *feddans*) will be completed before June 30.

The American resident and TDY staff continued to provide assistance to the Kafr El-Sheikh team in planning the Daqalt water delivery system. Data are being gathered regarding the hydraulic and other physical characteristics of the delivery system as well as sociological, agronomic and economic information. These data are being processed and stored in an IBM personal computer system at the Kafr El-Sheikh field office. This work is progressing well and alternative improvements will soon be evaluated for consideration by MOI authorities as appropriate alternatives for implementation. This work would have been completed in March but was delayed because the Kafr El-Sheikh team was given responsibility for assisting with gathering data and

planning for improvement of Abu-Hadeed *Mesqa* in Menufiya Governorate. This project was sponsored by the Ford Foundation through the Water Research Center and Ground Water Institute.

The IBM personal computers have proven to be extremely valuable for planning and evaluating improved irrigation management systems. An additional computer was purchased. We now have one IBM personal computer at each of the three field sites and two in the Cairo Main Office. TDY personnel from Colorado State University have assisted in translating computer programs from the previously used language for the Hewlett Pakard 9825A system to BASIC which is used by the IBM personal computers.

The Professional Employees Exchange Program (PEEP) operated jointly by the Ministry of Irrigation and the Salt River Project through EWUP has sponsored two Egyptian engineers who worked for eight weeks at SRP headquarters in Phoenix, Arizona. At the same time two American engineers from SRP worked in Egypt to plan Phase II of the PEEP effort which extends through 1987. In both cases the MOI and SRP engineers traveled widely to study the respective irrigation systems and held meetings and seminars along the way. It is planned to send two Egyptian engineers to Arizona during the next quarter. In addition it is planned to send seven senior officials from the Government of Egypt to the Salt River Project at Phoenix for five days in June to participate in a management seminar. The seminar will emphasize management of large, complex organizations like the Salt River Project and the Ministry of Irrigation.

Airfreight shipments were cleared in February which had been held by the Egyptian Customs Department for nearly two years. The Ministry of Irrigation convinced customs officials that the goods in question were authorized to enter Egypt duty free under terms of the Bilateral Agreement between Egypt and the U.S.A.

Arrangements were started to get GOE permission to ship household effects and sell automobiles belonging to U.S. field staff prior to their planned departure in May and June.

Project work is organized among six pilot program groups and nine active task groups.

PILOT PROGRAMS

Kafr El Sheikh Site: Manshiya Mesqa
Hammad Mesqa

El Mansuriya Site: El Hammami Pipeline
Mesqa #10 Raised Channel

El Minya Site: Abyuha Canal Raised Channel
Mesqa Improvement

TASK GROUP

TG	1	On-Farm Water Management
TG	2	Water Distribution Systems
TG	3	Farmer Organization
TG	4	Farm Management and Planning
TG	5	Water Budget
TG	6	Land Leveling
TG	8	Soil Characterization
TG	10	Conjunctive Use of Water
TG	11	Irrigation Advisory Service

Task groups #7 and #9, Soil Fertility and Pest Control respectively, have completed their objectives and have been terminated.

A detailed report of each pilot program and task group follows.

MANSURIYA

The pilot programs of Mansuriya include the elevation of Mesqa #10, forming a lined concrete structure and construction of a buried pipeline replacing the El-Hammami Canal.

The objectives of these structures are basically to:

1. Deliver proper quantities of water to all farmers served by the system.

2. Reduce the conveyance losses which now occur.
3. Deliver water to farmers with sufficient head to allow for faster irrigations by gravity.
4. Eliminate the need for lifting water on an individual basis by providing centralized lifting.

A. Accomplishments and Future Plans for the El-Hammami Pipeline Pilot-Program:

1. The following table lists the amount of pipeline construction that has been accomplished to date. (No construction work has been completed this quarter).

	Unit	Total Amount to be installed	Pipes actually laid	
			No.	%
Pipes with diameter 60cm	meter	3084	2298	75
Pipes with diameter 50cm	meter	1667	1224	73
Horizontal pipes, 10 cm	Unit	768	176	23
Vertical Pipes, 10 cm	Unit	---	---	--
Elbow pipes	Unit	64	8	12.5
T Connection pipes	Unit	64	30	47

2. Advertisements have been made to secure new contractors. Bids will be evaluated in May.
3. No on-farm water management data were collected due to the complaints of the El-Hammami farmers with respect to the pipeline problems.
4. The farm record data are being maintained and will continue. Several new crop enterprise cost studies have been completed as well. Work is being done on farm management surveys.
5. Collection of selected water budget and water quality data will continue.

B. Accomplishments and Future Plans for Mesqa #10, Beni Madul

After succeeding in the scheduling mentioned in the last quarterly report, the farmers accepted the plans and worked successfully with schedules until early in March. Since then, problems have been encountered in operating the *mesqa* according to plans that were set up.

- . Water levels in the Mansuriya canal during turn "B" became very low after closure period in January.
- . The main pump for *Mesqa* 10 needs to be maintained better to get sufficient discharge during turns A and C.
- . The weeds increased in Beni Magdul as happens every year this time. The Irrigation Department does not control the weed growth adequately.
- . There is no pump on the well near the branch canal to provide water for *Mesqa* 10 through Beni Magdul canal.

Because of water shortage the farmers are asking for the old *Mesqa* 10 to be opened. The team feels that their request is reasonable. It would give the farmers a chance to compare the new *mesqa* 10 with old *Mesqa* 10.

C. Special Studies:

1. The water budget work is being continued in the Beni Magdul area. Full details are reported by the water budget task group.
2. The cropping sequence studies are continuing.
3. The farm record data on numerous sites and the farm management surveys in the Beni Magdul Canal area continue.
4. The soil testing program that was started by Dr. Warner has continued by the team. It consists of obtaining soil samples in the field and making consolidation and permeability tests in the laboratory. It will continue through the next quarter.

5 . Special study for the water budget on *Mesqa* #6 has been started to find out the contribution of ground water on the plant growth.

D. Training:

Agronomist Sabah Mahmoud, Engineer Tarif Zeitoun, and Sociologist Farouk Abdel-Al are in the U.S. for nine months of training. They are expected to return to the work at the Project field site in June.

Mansuriya Field Staff

I. Professional

Wadie Fahim	Team Leader	Ahmed El Atar	Sociologist
Eldon Hanson	Eng.(Half time)	Mohamed Naguib	Sociologist
Shinawy A. Atty	Economist	Sabah Mahmoud	Agronomist
Ahmed Tahoun	Agronomist	Sohair Mahmoud	Sociologist
Farouk Abdel Al	Sociologist	Mahmoud Khadr	Agronomist
Gamal Fawzy	Economist	Tarif Zeitoun	Engineer
Hossam El Naggar	Economist	Samir Ibrahim	Engineer
Ahmed Talat Abd Al	Agronomist		

II. Non Professionalsal

Ibrahim Hussein	S. Tech.	Cherifa El Yazeed	S. Tech.
Ibrahim Abdou	S. Tech.	El Said Kamal	S. Tech
Ibrahim Zakaria	S. Tech.	Mohamed Abdel Hamid	S. Tech.
Adel Abdel Moneim	S. Tech.	El Said Hamed	S. Tech.
Mohamed El-Dash	S. Tech.	Mohamed Farrag	S. Tech.
Abdel Rahim Mohamed	J. Tech.	Shawky El Awady	J. Tech. Lab.
Abdel Maaboud Ibrahim	J. Tech.	Abdel Rahman Eid	J. Tech.
Mohamed A. El Mounem	J. Tech. Lab.	Ahmed Ragab	J. Tech. Lab.
Hamed Aly Tahoun	J. Tech. Lab.	El Shimi Ismail	J. Tech. Lab.
Mohamed Rezk	S. Tech.		

III. Drivers

Abdel Latif El Tawil	El-Shimi Ismail
Salah Sadek	Aly Habashy
Nagy Hassan	

KAFR EL SHEIKH

I. Summary of Progress

During the first quarter of 1984, work at the Kafr El-Sheikh EWUP site focused on activities as described below:

1. Routine data collection and analysis activities were carried-out on winter pilot program sites of wheat, sugarbeets and berseem. Applied irrigation water was measured. Observation well and irrometer readings in the sites were taken. Soil moisture samples were taken before and after irrigation and weekly.
2. Selection was made of a new cotton site (35 *feddans*) for summer trials and demonstrations of long furrow irrigation. The first irrigation was completed. Other work was started to demonstrate recommended agronomic practices.
3. Routine sociological contact records and economic farm records work continued. Additional work was done on the crop calendar study and water requirement study. Climatological measurements were taken at Karada station.
4. Routine data collection was carried out for the water budget including water levels and quality for surface and subsurface water. Meterological data and crop surveys were taken. Monitoring of irrigation practices along Om-Sen *Mesqa* (users' practice) continued.
5. Daqalt Canal data collection and analysis continued.
6. Sociological questionnaire of Daqalt Canal started.
7. Discharge measurements by current meter in Daqalt Canal continued.
8. Continued the computer training for the professional staff.
9. Abu-Hadeed *Mesqa* (in El-Menufiya) data collection and analysis was started in order to assist the Ground Water Institute and Ford Foundation with irrigation improvement plans.

10. Sociological questionnaire for Abu-Hadeed and some parts of El-Bataronia canal in El-Menufiya was finished.
11. We designed two alternatives as good solutions for Abu-Hadeed in El-Menufiya for evaluation.
12. We wrote a report about Abu-Hadeed *Mesqa*.

II. Training Status and Changes

1. Eng. Abdel Fattah Metawie finished one semester of academic training at Colorado State University and got his Master Degree (returned back on January 3, 1984).
2. Econ. Ragy Darwish is at CSU for two semesters of academic training (since August 20, 1983).

III. Work Plans for the Next Quarter

1. On-farm work will continue, including the selection of new rice sites and lining the *marwa* of the cotton site.
2. Water budget work will continue.
3. Work in Daqalt report will continue.
4. Seasonal reports will be written.
5. Computer training will continue.

IV. Personnel Assignments

1. Professional Staff

Kamal Ezz El-Din	Team Leader	Ahmed A.Monsef	Engineer
Abdel Fattah Metawie	Asst. T.L.	Esam Ezz El Din	Sociologist
Magdy Awad	Agronomist	Safaa Fahmy	Engineer
Ahmed Ismail	Agronomist	Hoda Hussein	Sociologist
Mohamed I. Meleha	Agronomist	Ragy Darwish ^{3/}	Economist
Magdi Badawi	Economist	Saad H. Zaki	Engineer
Mahmoud Moh. Said ^{2/}	Agronomist	Sobhi Elewa ^{1/}	Economist

^{1/} Vehicles

^{2/} Laboratory and Karda station manager

^{3/} On training Leave

2. Technicians

Hammad Group

Moh. Ahmed Badr
Moh. Omer Abdel Meguid
Kamal Moh. Abu-Omar

El-Manshiya Group

El-Said Abdel Hamid
Salah El Sayed Abdel Hafeez
Moheb Abdel Sama El-Sawy
Hassan El-Rafaey

Water Budget

Farag El-Masry
Ramadan Gazal

Laboratory

Atet Hamed Sayed Ahmed

Equipment & Cars

Abdel Hamid Sayed

3. Secretary & Administrative

Mohamed Ahmed Abu Omar	Admin. Assistant
Nadia Mahmoud Arafa Ali	Secretary
Esmat Mostafa	Secretary

4. Drivers

Asel Ahmed A. Aziz
Osama Moh. Sobh
Fawzy Fathi Abdel Hamid
Attia Mostafa Abdu

5. Laborers

Saber Ahmed Ismail
Ibrahim Said Ahmed
Abdel Raouf Mazal
Mohamed Mostafa Omar
Osman Abdel Rasoul Gamal
Ibrahim Moh. El-Besawy

6. Guards

El-Sayed Ahmed El-Falawi
Moh. Mahmoud Al-Mashaly
Mostafa Basyouni El-Gamal

MINYA

I. Summary of Accomplishments

During the first quarter of 1984 work at El-Minya continued to emphasize canal, *mesqa* and road improvement, according to the Master Plan for Unit Area Development.

A. Abyuha Canal Pilot Program

1. We installed all the gates at *mesqa* inlets except # 7 and # 20 which will be installed during any off-period.
2. We finished the building construction of eight direct irrigation vents from the canal on the right and left side.
3. We installed the iron head gates for these vents which are controlled by the farmer themselves.
4. We gave the keys of the head gates to the *mesqa* leaders and they agreed to take the responsibility of controlling these gates themselves.
5. We tried to control the *mesqa* head gates at the first reach from *Mesqa* # 4 to # 15 after the farmers finish an irrigation to raise the water in the last reach to irrigate by good gravity.
6. We tried to overcome the weed problem in the canal by chemical material and cleaning by laborers to decrease the loss of head of the water level.
7. We continue to sprinkle water on the left bank during the on-period to maintain the bank.
8. We painted the canal iron head gate during the winter closure and made an ordinary concrete foundation under the gate to prevent any leakage.

B. Mesqa Improvement

1. We improved the *mesqas* numbered 11, 16, 19, 25, 28, 29 and 30.
2. We took 4 to 5 cm of soil from the land by bulldozers to fill the *mesqas*. Then we plowed the land and leveled all the land from which we took the soil.
3. The Contracting Company finished the construction of the *tailescapes* at the *mesqas*' ends except for the iron gates. Also they built the check structures for the *mesqas* 28, 29 and 30.
4. The Company finished the fabrication of iron gates for the *tailescapes* and check structures but did not install them until now.
5. We collected the soil from the land on *mesqa* 27 for banks and are now ready to improve this *mesqa* during the harvesting time.
6. Due to the request of the farmers we finished the construction of the road on the border between *Mesqas* 25 and 26. This construction was facilitated by eliminating *Mesqa* 24.
7. The farmers on *Mesqa* 29 requested a road on the right bank after improving this *mesqa* and are ready to give part of their land for the road.
8. The sociology discipline is still working with the leaders and the farmers to arrange for the plan of improving the other *mesqas* during this harvesting time.

C. Canal Leveling

1. We leveled all the area served by the *Mesqas* 27, 28, 29 and 30, about 80 *feddans*.
2. We filled most of the lowest parts adjacent to *Mesqas* 11 and 16 from which we took soil before improving.

3. We continue leveling any fallow land inside Abyuha area as requested by the farmers.

D. Other Activities

1. We cleaned all the observation wells and recorded water levels from these wells every day during the winter closure.
2. We installed four peziometric wells inside the area and started to record the water level in these wells.
3. During installing these peziometric wells we took soil samples on different levels and sent it to Cairo for soil classification.
4. We continue the water budget work in the Abyuha area.
5. The economics discipline continues to:
 - a) Maintain up-to-date farm record books both in Arabic and English.
 - b) Measure the water applied to the selected farm on *Mesqa 13*.
 - c) Review the farm record books and prepare farm record surveys with personnel from the main office.

II. Plans for Next Quareter

1. Complete improving the *mesqas* during this winter harvesting time.
2. Level all lands adjacent to these *mesqas* from which we will take the soil to fill these *mesqas* during improvement.
3. Complete construction of the check structures on all *mesqas* which are improved.
4. Continue making water rotation schedules on the *mesqas* and raise the water in the canal to cover the area in the last reach by good gravity.

III. Personnel Assigned to Minya

Professionals

Abdel Raouf Hassan	Team Leader	Abdalla Saber	Sociologist
Tim Gates	Eng.(half time)	Mohamed Awad	Agronomist
Farouk Hassanein	Sociologist	Nabil Farag	Economist
Ahmed Abdel Naim	Engineer	Elia Sorial	Economist
Esmat Wafik	Engineer		

Technicians

Drivers

Laborers

Abdel Kany Hafiz	Khalaf Moh. Khalaf	Khalaf Saad
Nashat Younis	Farouk Hassan	Kamel Ahmed
Mahmoud Noman	Mohamed Esawy	Hemid Said
Bekhit Nazer		Said Abdel Fattah
Mohamed Allah		

TASK GROUP 1 : ON-FARM WATER MANAGEMENT

Objectives

1. Develop criteria for the proper frequency and amount of irrigation and develop an acceptable procedure for implementing the criteria in the pilot areas.
2. Determine the impact of various on-farm water management practices on soil properties, water table, and crop production.
3. Evaluate the cost and benefits associated with the changes in delivery system for selected sites.
4. Evaluate the sociological changes brought about by the various changes in *marwa* delivery systems and on-farm water management practices.
5. Evaluate the on-farm water management practice of long furrows and/or borders as compared to conventional basins.

Work Completed During The Quarter

The major activities pertained to preparation for the National Conference, March 18 to 20, and to the finalizing or writing of the following technical reports relating to Task Group No. 1.

TR # 41: "The Influence of Farm Irrigation System Design and Precision Land Leveling on Irrigation Efficiency and Irrigation Water Management,"

TR # 54: "Criteria for Determining Desirable Irrigation Frequencies and Requirements, and Comparisons with Conventional Frequencies and Amounts Measured in EWUP".

TR # 57: "Infiltration Studies on Egyptian Vertisols,"

TR # 61: "The Relation between Irrigation Water Management and High Water Tables in Egypt,"

TR # 71: "Impact of Turnout Size and Conditions on Water Management on Farms".

TR 61 contains information describing how upward flow of capillary water from the water table at Beni Magdul and Abu Raya varies with depth of water table. This information was obtained by analysing a continuous record of the rate of daytime and nighttime lowering of the water table which was recorded at one observation well in each area.

The data show that when the water table depth becomes shallower than 75 cms, the upward flow may be as much as 3 to 5 mm/day. Computations with these data reveal that as much as one-third of the evapotranspiration needs of crops of Beni Magdul and Abu Raya areas may be contributed from the water table. This information and the method used to obtain it should be of significant importance to experiment stations in the MOI and MOA where evapotranspiration of crops is being measured. Where high water table exist at experiment stations, this method which has been identified and used by EWUP, should be of value in determining more accurately consumptive use values for all crops. The conventional method of soil sampling before and after irrigations to determine consumptive use can not measure the water table contribution to evapotranspiration.

TR 71 describes the feasibility of using legal turnouts for long-basin irrigation. Findings indicate that these turnouts will be impractical to use with long-basin irrigation in any of the irrigated areas of Egypt. The rates of flow through the turnouts are too small for efficient application of water in long basins.

In irrigation systems designed with larger turnouts for irrigating basins, gates should be provided to prevent flow through turnouts during non-irrigation periods. Without gates on the larger turnouts, the problem of getting water deliveries to tail ends of irrigation systems would be considerably greater than the problems which exist currently with legal turnouts.

Personnel Presently Assigned to the Task Group:

Mona El-Kady, Hanson, Salah, Semaika, Assia, Taher, Farouk and Nadia.

TASK GROUP 2 : WATER DISTRIBUTION SYSTEMS

Objectives

1. Prepare and evaluate procedures for designing gravity distribution systems through canals and *mesqas*. Along with hydraulic principles consider aspects of minimum and maximum stream sizes required at the field inlet, and delivery by continuous flow, rotation, and demand schedules for peak demands and period of reduced demands.
2. Organize and evaluate operation and scheduling procedures for the El-Hammami pipeline.
3. Describe how farmers are organized around their present distribution systems and analyze how different types of farmer organizations may be established in response to changes in those distribution systems.
4. Measure and evaluate seepage losses in the El-Hammami Canal and in improved *mesqas* (lined and/or elevated) and other selected *mesqas*. Evaluate the effect of the improvements on seepage losses.

5. Using data obtained in seepage tests, evaluate the aspects of *mesqa* maintenance with respect to the efficiency of water delivery.

Activities During the Quarter

In addition to the activities involved in preparing for the National Conference for March 18 to 20, the following technical reports have been written:

TR # 46: "Hydraulic Design of a Canal System for Gravity Irrigation,"

TR # 55: "Design and Evaluation of Water Delivery System Improvement Alternatives,"

TR 51 pertaining to "Structural Specifications and Consumptive of a Canal System by Gravity Irrigation" is almost completed.

Work on TR 59, "Management Plan for a Distributary Canal System" will be commenced next quarter. Alan Early will work on this technical report in April as a TDY assignment.

These reports will be prepared for publication next quarter after reviewers comments have been considered by improving the reports.

The computer program for "hydraulic analyses of a gravity delivery system" has been rewritten for use with IBM computers.

At Abyuha the contractor has completed the construction of tail escapes on most of the *mesqas* and the check structures in some of the *mesqas*. Construction of *mesqa* channels has been held up until the harvest period next quarter.

Personnel Assigned to Task Group 2:

Mona. Hanson, Gates, Layton, Tinsley and Gamal.

TASK GROUP 3: FARMER ORGANIZATION

Objectives

1. To define the purpose and nature of a farmer organization.
2. To examine the existing organizational capabilities of the farmers.
3. To develop and analyze strategies for implementation of specific farmer organizations.
4. To analyze the procedures and administrative structure encompassing the farmer organizations at the specific field sites.

The work of this task group involves three major forms of activities: (1) the actual development and sustaining of various farmer organizations. (2) the documentation of this process, and (3) the documentation of the existing situation of which the organization is part. Activity 1 is designed to accomplish objective 3 while activity 2 is designed to complete objective 4. Activity 3 is matched with objectives 1 and 2.

Work Completed During The Quarter

A. Developing and Sustaining Farmer Organization:

1. Minya

The development of both the *mesqa* and the canal organizations continued with respect to the progress made on the physical renovations. The sociologists further strengthened the developed organizational structures and procedures by continually working with the leadership of the area in terms of solving problems, proposing activities, and encouraging farmer feedback and participation.

2. Mansuriya

Farmers along *Mesqa* 10 continued to schedule irrigation turns. For the winter season, the schedule has proceeded smoothly and preparations are being made to work with the farmers on a

summer season schedule. In El-Hammami, the farmers were visited by the sociologists to discuss the problems of the pipeline.

B. Documentation of Farmer Organization Work.

The final report pertaining to work in establishing a Water Users' Association is being completed. The text of the report is organized into the following sections:

1. The Irrigation System is Context: A discussion of the parameters making up an irrigation system and how a WUA fits in this system.
2. Purpose and General Description of Water Users' Associations: A general discussion of what a WUA is.
3. Establishing Water User's Associations: A specific discussion of the steps and procedures used by EWUP to develop a WUA. Included in this discussion is a delineation of the parameters needed to be addressed and worked on in order to develop a viable WUA.

C. Documentation of the Existing Situation.

A study was performed looking at the relationship between the authority of farmers along a *mesqa* and their respective ability to control their irrigation practices. A report is being written at this point in time.

Work to be Performed Next Quarter:

A. Developing and Sustaining Farmer Organization.

The present work in Minya and Mansuriya will continue with respect to the circumstances in each area.

B. Documentation of Farmer Organization Work.

A final report on water users' associations will be completed.

C. Documentation of Existing Situation.

A report about authority and irrigation control will be completed.

Personnel Assigned

Mohamed Naguib, Jim Layton, Farouk Abdel Al and Eldon Hanson.

TASK GROUP 4: FARM MANAGEMENT AND PLANNING

Objectives

Farm Management and planning task group objectives are to evaluate alternative farming systems on Egyptian farms, to evaluate current agronomic practices as contrasted to recommended practices, and to evaluate the farmers' ability to implement improved agronomic practices.

Activities Completed During Past Quarter

Completed Farm Record Summary and Analysis for Abyuha, Abu-Raya and Mansuriya sites for the 1982/1983 year. Next table represents the most important findings at EWUP sites.

Item Findings	Abyuha	Abu Raya	El Mansuriya	
			Hammami	B. Magdul
Crop Density	1.74	1.95	3.04	2.0
Crop production percentage (%)	68	65	64	61
Livestock production, percentage (%)	32	35	36	39
Ratio of livestock production to livestock expenses	1.44	2.20	1.71	1.56
Net farm income per fed. (LE)	549.4	436.6	620	1818
Net farm income per person (LE)	320.8	345.2	181	390
Ratio of farm production to working capital assets	1.59	1.31	1.16	1.63
Ratio of crop production value to crop expenses	3.13	3.17	2.09	4.86

- . Worked on "Farm Record Manual" (Part II).
- . Worked on the "Farm Management Survey Analysis for El-Hammami Area."
- . Worked on the Proposed Technical Report "Farming System of Egypt with Special Reference to EWUP Study Cases."
- . Completed revision on Proposed Technical Report Nos. 45 and 50 "Irrigation Practices of EWUP Study Cases at Abyuha and Abu-Raya Sites" and "Farming System Economic Analysis."
- . Completed revision for the "Farm Record Survey and Analysis."
- . Worked on the Proposed Technical Reports Nos. 75, 76, 77 and 78 "Farm Record Survey and Analysis for EWUP Sites - Abyuha, Abu-Raya, El-Hammami and Beni Magdul."
- . Worked on second year of crop calendar report for Kafr El-Sheikh and Mansuriya.
- . Completed revision on farm land accessibility report.

Plans for Next Quarter

- . Continue work on farm management survey for El-Hammami and complete its analysis.
- . Continue to keep farm record-books with the selected farmers to evaluate alternative farming systems.
- . Complete all final reports assigned to the Task Group 4 and push them to be printed (TR Nos. 45, 49, 50, 63, 75, 76, 77 and 78).
- . Complete the "Farm Record Manual." (Part II)

Names of personnel presently assigned to Task Group 4.

Farouk Abdel Al and Richard L. Tinsley.

TASK GROUP 5: THE WATER BUDGET

Objectives

The objective of the water budget work for the remainder of the project are as follows:

1. To continue to collect complete water budget data (surface inflow and outflow, precipitation, weather station data for evaporation and evapotranspiration, water table elevations, specific yield, hydraulic conductivity, water quality, surface outflow) at each of the project sites.
2. To conduct regular periodic analysis of water budget data for each site with subsequent reports of results.
3. To produce an annual water budget report for each site.
4. To produce a final comprehensive report of the water budget work.

Activities and Progress this Quarter

- . Technical Report No. 4/, "Water Budgets for Irrigation Regions in Egypt" was approved for publication by the discipline leaders and submitted to the directors for final approval.
- . A first draft was completed of Technical Report No. 60, "Hydraulic Conductivity and Vertical Leakage in the Clay-Silt Layer of the Nile Alluvium in Egypt."
- . Soil core samples were extracted from seven additional locations in Abyuha. Analysis was completed on samples from ten of these locations for determination of vertical saturated hydraulic conductivity of the clay-silt layer.
- . Four deep observation wells intersecting the lower coarse sand and gravel aquifer were installed in Abyuha and daily recording of water levels initiated.

Plans for Next Quarter

- . Continue analysis of soil samples from Abyuha.

- . Complete analysis of soil samples from Abyuha.
- . Complete collection and analysis of soil samples for hydraulic conductivity from ten locations at Abu Raya.
- . Publish Technical Report No. 47.
- . Complete and publish Technical Report No. 60.

Personnel Presently Assigned

Main Office Professional Staff:

M. Helal- Coordinator
M. Ibrahim - Engineering, Data Analysis
A. Nasr - Computer Programming, Data Analysis
M. Semaika - Consumptive Use Calculations
T.K. Gates - Co-coordinator, Engineering, Computer Programming

Main Office Support Staff

Iman Saber - Computer Technician

Field Professional Staff

Ahmed Abdel Naim - Water Budget Coordinator, Abyuha
Wadie Fahim - Water Budget Coordinator, Beni Magdul
Ahmed Ismail - Water Budget Coordinator, Om Sen

TASK GROUP 6: LAND LEVELING

Objectives

To collect and analyse all EWUP information on land leveling and:

1. Evaluate farmers acceptance of new standards and practices.
2. Analyse costs of precisions land leveling.
3. Assess the impact of leveling on on-farm water management.

4. Establish training for farmers to improve their own land leveling skills.

Activities and Work Completed this Quarter

Forty one *feddans* have been leveled at Abyuha this quarter. This has been accomplished in cooperation with people of the Egypt Agricultural Mechanization Project (EAMP) who provided laser leveling equipment.

At Kafr El-Sheikh, three and one-half *feddans* of cotton and land were leveled with conventional equipment.

Plans for Next Quarter

At Abyuha, fifty *feddans* will be leveled with the aid of EAMP and laser equipment. At Kafr El-Sheikh, four *feddans* of rice land will be leveled with conventional equipment.

Personnel Assigned to Task Group # 6

Bayoumi, Hanson, Assia and Gamal

TASK GROUP 8: SOIL CHARACTERIZATION

Objectives

1. To determine what soil management techniques are needed for best use of soil and improving water management.
2. To develop water management recommendations based on soil characteristics.

Accomplishments

- Submitted the draft of the final report (proposed TR # 64) to the Technical Editor for distribution to EWUP's staff.
- Reviewed the draft with Dr. Schmehl.

Plans for Next Quarter

Review the comments of EWUP's staff on the draft of the final report.

Personnel Presently Assigned

Ahmed Taher, Richard L. Tinsley, Assia El-Falaky and Moheb Semaika.

TASK GROUP 10: CONJUNCTIVE USE OF WATER

Objective

1. Evaluate water collected from the main drains, canals and irrigation wells from the three project sites.
2. Classify the water from various sources for its suitability for irrigation.
3. Determine the consequences of using drainage water for alternative soil and crop situations.
4. Indicate special management practices necessary for using water of different qualities.
5. Determine the effect of using different combinations of water on the leaching requirements for alternative soil-crop situations.

Work Completed During The Quarter

1. The report titled "Conjunctive Use of Water" has been typed in Davis and returned to the Project. It has been revised and submitted to the editorial office.
2. A summary of the quality of irrigation drainage & shallow groundwater in the three Project sites has been prepared and presented in the EWUP National Conference.
3. Monthly analysis of Water Samples by the laboratory is continued.

4. The mechanical analysis of soil samples collected from deep wells in Abyuha was also carried out for the completion of the work objectives of Task Group 5.

Plans for Next Quarter

- Monitoring of water quality will be continued over a minimum of three years as recommended by Dr. Verne Scott.

Personnel Presently Assigned

Assia El-Falaky, Eldon Hanson, Taha and Ikram.

TASK GROUP 11: IRRIGATION ADVISORY SERVICE

The Irrigation Advisory Service (IAS) task group has focused on two major areas of analysis in order to examine the existing situation in terms of establishing such a service. First, there is the need to document how EWUP presents its different pilot programs to the farmers with the purpose of describing how a possible prototype to an IAS may actually perform. Next, an examination of the organizational environment into which the IAS must implement its objectives needs to be described. From these two areas of analysis, the objectives of the task group have been created and the work activities have been designed.

Objectives

1. To examine how technical advice and assistance to farmers and farmer organizations is extended and developed into viable programs.
2. To Develop criteria and procedures for establishing a countrywide IAS. This requires that the purpose and parameters of a IAS be defined and that a discussion on how the organization may be institutionalized be presented.

Tasks Completed

- Evaluation studies of the Kafr El-Sheikh work concerning EWUP interaction with the farmers have been completed into the final report.

- The Project's work with the farmers on *Mesqa* #10 in Mansuriya has been documented for the past year through a special study examining how an innovation is presented to a receiver group. Data from that study are now being tabulated and analyzed and a report is being written.
- Analysis has begun on a study concerning objective #2. The report to be completed from this analysis focuses on how MOI and the MDA officials look at specific organizational strategies designed to extend their policies to the farmers.

Future Tasks for Next Quarter

- The major report describing an IAS will be completed. Included in the report will be analyses of the evaluation studies, the Project's work with the farmers, and the organizational environment of the IAS.

Personnel Presented Assigned

Mohamed Naguib, Jim Layton, Moheb Semaika and Gamal Awad.

TRAINING

The following individuals were enrolled at CSU for 9 months of academic training:

Sabah Mahmoud Ahmed El Sayed
Mohamed Ragy Salah El-Din Darwish
Tariief Ali Fahmy Zaitoun
Farouk Ahmed Abdel Al Omar

Economist Shinawi Abdel Aty Shinawi returned early in February after spending five weeks at Colorado State University enrolled in a course on Project Evaluation.

Moheb Semaika will visit Western United States irrigation systems in May to observe irrigation scheduling programs and work with managers responsible for such programs. Ahmed Bayoumi will visit engineering firms in Arizona, Colorado and Washington State to review technology for renovation, modification and cleaning of small distributary canals.

EWUP assisted the MDI to host two engineers from the Salt River Project for three weeks in Egypt. The two men, Edib Kirdar and Don Womack worked on plans for Phase II of the Professional Employees Exchange Program (PEEP) which will run to 1987.

Arrangements were made for Engineers Kamal ZAKI and Fathy EL-SHAER to travel to Colorado State University and the Salt River Project in February as part of the PEEP project. Also Engineers Saweres and El-Kashef were processed to participate in the exchange during the months of May and June.

PUBLICATIONS REPORT

The work in the Editorial Office during the past quarter was mainly concentrated on polishing and printing EWUP Final Report "Improving Egypt's Irrigation System in the Old Lands." This was widely circulated in the National Conference held by EWUP on March 18-20, 1984.

As for the work schedule during the next quarter, the Editorial Office has prepared a status report of all the proposed technical reports in progress. The plan is to complete the editing and typing of all those manuscripts, whether in Cairo or in Fort Collins, before June 30, 1984.

The status report of publications follows:

STATUS REPORT (April 10, 1984)

LIST OF PROPOSED EWUP TECHNICAL REPORTS

(Titles are preliminary)

Proposed TR No.	Title	Author	Status	
14	Administering an Interdisciplinary Project: Some Fundamental Assumptions upon which to Build	J.B. Mayfield & M. Naguib	With J. Layton for review. To be typed in F.C.	Layton
16	Irrigation System Improvement by Simulation & Optimization, I. Theory II. Application	J.M. Reddy & W. Clyma	To be printed in F.C. 50 copies are requested for dist. in Cairo.	E.V.R.
17	Optimal Design of Border Irrigation System	J.M. Reddy & W. Clyma	To be printed in F.C. 50 copies are requested for dist. in Cairo	E.V.R.
18	Population Growth and Development in Egypt: Farmers' and Rural Development Officials' Perspectives	M.S. Sallam, E.C. Knop & S.A. Knop	Printed in F. C. 50 copies are requested for dist. in Cairo	E.V.R.
21	El-Hammami Pipeline Design	Fort Collins Staff Team	Printed in F.C., 50 copies are requested for limited dist. in Cairo.	E.V.R.
25	Problem Identification Report for El-Minya	R. Brooks & W. Schmehl	With Dr.Schmehl for final review To be typed and printed in F.C.	E.V.R.
27	Alternative Approaches in Extension & Rural Development Work: An Analysis of Differing Perspectives	M. Sallam & E.C. Knop	Being retyped in F.C. 50 copies are requested for distribution in Cairo.	E.V.R.
31	Analysis of Farm Management Data from Abyuha Project Site	E. Sorial, M. Skold, R. Rehnberg & F. Abdel Al	Being retyped in F.C. (c/o Skold)	E.V.R.
32	Accessibility of EWUP Pilot Sites	A. El-Kayal, S. Soleh, A. Bayouni & R.L. Tinsley	Rewritten by Dr. Tinsley. Needs approval of P. Directors	Tinsley E.V.R.
36	Discharge & Mechanical Efficiency of Egyptian Water-Lifting Wheels	R. Slack, H. Wahby, W. Clyma, & D. Sunada	Printed in F. C. Ready for printing in Cairo.	Completed

Proposed TR No	Title	Author	Status	
37	Allocative Efficiency and Equity of Alternative Methods of Charging for Irrigation Water: A Case Study in Egypt	R. Bowen & K.A. Young	Printed in F.C. 50 copies are requested for limited dist. in Cairo.	E.V.R.
39	On-Farm Irrigation Practices for Winter Crops at Abu Raya	A.F. Metawie N.L. Adams & T.A. Tawfic	With Eng. A.F. Metawie for review. To be re-typed in Cairo	G.Q.
40	A Procedure for Evaluating Crop Growth Environments for Optimal Drain Design	D.S. Durnford E.V. Richardson & T.H. Podmore	To be printed in FC 50 copies are requested for dist. in Cairo.	E.V.R.
41	The Influence of Farm Irrigation System Design and Precision Land Leveling on Irrigation Efficiency and Irrigation Water Management	T.W. Ley, M. El-Kady, E. Hanson, W.S. Braunworth, K. Litwiller, A. El-Falaky & E. Wafik	With Eng. K. Litwiller for final review To be processed in Cairo.	K.L.
42	Renovation Report	N. Illsley & A. Bayoumi	Rewritten by N. Illsley, needs re-editing and processing in Cairo.	Hanson
44	Conjunctive Water Use - The State of the Art and Potential for Egypt	V. H. Scott & A. El-Falaky	With Project Directors for approval	G.Q.
45	Irrigation Practices of EWUP Study Cases - Abyuha and Abu Raya Sites for 1979-1980, 1980-1981 and 1981-1982	F. Abdel Al D. Martella & R. L. Tinsley	Reviewed by D. Martella, needs retyping in Cairo.	Tinsley
46	Hydraulic Design of a Canal System for Gravity Irrigation	T. K. Gates, W. O. Ree, M. Helal & A. Nasr	Approved by Project Directors. Needs few corrections	Gates

Proposed IR No.	Title	Author	Status	
47	Water Budgets for Irrigated Regions in Egypt	M. Helal, A. Nasr, M. Ibrahim, T. K. Gates, W. O. Rce & M. Semaika	Approved by Project Directors Needs few corrections	Gates
48	A Method for Evaluating and Revising Irrigation Rotations	R. I. Tinsley, A. Ismail & M. El-Kady	Needs approval of Project Directors	Tinsley
49	Farming System of Egypt: With Special Reference to EWUP Project Sites	G. Fawzy, M. Skold, F. Abdel Al & R. L. Tinsley	Being retyped in Cairo. Will be submitted to Ed. Office on May 1, 1984 (c/o R. Tinsley)	G.Q. Tinsley
50	Farming System Economic Analysis of EWUP Study Cases	F. Abdel Al, D. W. Lybecker & D. Martella	Needs proofreading & Project Directors' approval.	G.Q.
51	Structural Specifications and Construction of a Canal System For Gravity Irrigation	W. R. Gwinn, T. K. Gates, A. Raouf, E. Wafik & E. Nielsen	With T.K. Gates for review. Will be submitted to Ed. Office on May 1, 1984.	Gates
52	Zinc Fertility Status of the Soils in Project Sites.	M. Abdel Naim	Reviewed by Dr. Schmehl and retyped in Cairo	Tinsley
53	Crop Management Studies by the Egypt Water Use & Management Project	M. Abdel Naim	With Dr. Schmehl for review. To be retyped in F. C. 50 copies are requested for dist. in Cairo.	E.V.R.
54	Criteria for Determining Desirable Irrigation Frequencies & Requirements, and Comparisons with Conventional Frequencies and Amounts Measured in EWUP	M. El-Kady, J. Wolfe & M. Semaika	Reviewed by J. Wolfe and retyped in Cairo.	Hanson
55	Design and Evaluation of Water Delivery System Improvement Alternatives	T. K. Gates, J. Andrew, J. Ruff, D. Martella, J. Layton, M. Helal & A. Nasr	With T.K. Gates for Review. Not yet submitted to Ed. Office.	Gates

Project TR No.	Title	Author	Status	
56	Egyptian Canal Lining Techniques and Economic Analysis	Mona El-Kady H. Wahby & J. Andrew	With Project Directors for comments. Changes will be sent to F.C. for making a final draft	G.O.
57	Infiltration Studies on Egyptian Vertisols	K. Litwiller, R.L. Tinsley, H. Guewab & T. Ley	With Project Directors for approval	Tinsley
58	Colton Field Trials, Summer 1980, Abu Raya	Kafr El-Sheikh Team as compiled by M. Awad & A. El-Kayal	Needs approval of Engineers and Sociologists	Tinsley
59	Management Plan of a Distributary Canal System	A. Early, E. Wafik, T.K. Gates & J. Layton	Will be submitted to Ed. Office on June 5 typed on IBM (c/o A. Early)	Gates
60	Hydraulic Conductivity and Vertical Leakage in the Clay-Silt Layer of the Nile Alluvium in Egypt	J.W. Warner, T.K. Gates, W. Fahim, M. Ibrahim M. Awad & T.W. Ley	With Tim Gates, Will be submitted to Editorial Office on May 31, 1984	Gates
61	The Effect of Irrigation Water Management on High Water Tables in Egypt	K. Litwiller M. El-Kady, T.K. Gates & E. Hanson	With Hala for typing	K.L.
62	The Water Quality of Irrigation Canals, Drains and Groundwater in Mansuriya, Kafr El-Sheikh & El-Minya Project Sites	A. El-Falaky, V.H. Scott, T. Hussein, I. El-Anwar, K. Khallaf & A. Nasr	Typing completed. Needs review by Dr. Scott & Agro. Discipline	G.O.
63	Watercourse Improvement Evaluation (/ 26 & / 10)	R. McConnen, F. Abdel Al, G. Ayad, D. Martellan E. Sourial & G. Fawzy.	Circulated to 4 Disciplines for approval on March 4, 1984. (Agronomists approved)	E.V.R.
64	Influence of Soil Properties on Irrigation Management in Egypt	A.T. Moustafa & R.L. Tinsley	Needs approval of Engineers (on Osborne Word Processor)	Tinsley
65	Experiences in Developing Water Users' Associations	J. Layton and Sociology Team	Being typed in Cairo. Will be submitted on May 20, 1984	Layton

Proposed TR No.	Title	Author	Status	
66	The Irrigation Advisory Service: A Proposed Organization for Improving On-Farm Irrigation Management in Egypt	J. Layton and Sociology Team	Not yet submitted to Editorial Office. To be typed in F. C.	Layton
67	Sociological Evaluation of the On-Farm Irrigation Practices Introduced in Kafr El-Sheikh	J. Layton, A. El-Attar, H. Hussein, S. Kamal & A. El-Masry	Needs retyping in Cairo. Will be submitted on May 15, 1984.	Layton
68	Developing Local Farmer Organizations: A Theoretical Procedure	J. B. Mayfield & M. Naguib	Not yet submitted to Editorial Office. To be typed in F. C.	Layton
69	The Administrative and Social Environment of the Farmers in an Egyptian Village	J. B. Mayfield & M. Naguib	Not yet submitted to Editorial Office. To be typed in F. C.	Layton
71	Impact of Mesqa Intake Size and Condition on Water Management on Farms	E. Hanson, M. El-Kady & K. Litwiller	With Hala for typing. Not yet submitted to Editorial Office.	Hanson
72	Baseline Data for Improvement of a Distribution Canal System.	K. Ezz El-Din K. Litwiller & Kafr El-Sheikh Team	With Hala for typing. Will be submitted to Ed. Office on May 15, 1984.	K.L.
73	Considerations of Various Soil Properties for the Irrigation Management of Vertisols.	C. W. Honeycutt & R. C. Heil.	Reviewers' comments sent to Authors in F.C. Will be printed in F. C.	E.V.R.
74	Farmers' Irrigation Practices in El-Harmani Sands.	T. A. Tawfic R. L. Tinsley	Not yet submitted to Editorial Office. (Part of T. Tawfic's M.Sc. Thesis).	Tinsley
75	Abyuha Farm Record Summary and Analysis over years (1979/1983).	D. W. Lybecker, F. Abdel Al, E. Sorial & N. Farag	Sent with Dr. Skold for retyping in F.C.	E.V.R.
76	Kafr El-Sheikh Farm Record Summary & Analysis		Sent with Dr. Skold for retyping in F. C.	E.V.R.

Proposed TR No.	Title	Author	Status	
77	El-Hannani Farm Record Summary & Analysis.	M. Haider	to be typed in F. C. (c/o M. Haider)	G. Q.
78	Beni Magdul Farm Record Summary & Analysis.	M. Haider	to be typed in F. C. (c/o M. Haider)	G. Q.

MAIN OFFICE

The technical work of the main office is done through eleven task groups. The work is performed by 27 professional staff members with TDY assistance as indicated in the "Backstopping" portion of this report. The main office and TDY staff work with field team personnel at each of the three Project sites to conduct demonstrations and field tests, collect data, and carry out plans for interaction with farmers and local government officials.

The following is a complete list of personnel assigned to the Main Office as of Sept. 30, 1983.

Hassan Wahby	Project Director
Gene Quenemoen	Technical Project Director
Farouk Abdel Al	Economics Discipline Leader
Gamal Ayad	Senior Economist
Ahmed Taher	Agronomy Disc. Leader
Richard Tinsley	Agronomy Disc. Counterpart
Assia El-Falaky	Senior Agronomist
Moheb Semaika	Senior Agronomist
Mona El-Kady	Engineering Disc. Leader
Eldon Hanson	Engineering Disc. Counterpart
James Layton	Sociology Disc. Counterpart
Mohamed Naguib	Sociologist Disc. Leader
Mohamed Helal	Computer Engineer
Azza Nasr	Computer Engineer
Tim Gates	Engineer-Water Budget
Mahmoud Ibrahim	Computer Engineer
Iman Saber	Technician
Ahmed Bayoumi	Farm Mechanization Engineer
Nadia Wahby	Senior Eng. Water Requirements
Abdel Atti Allam*	Engineer - Water Requirements
Wadie Ragy	Engineer - Water Requirements
Mohamed Nabil Naguib	Engineer - Water Requirements

* On leave without pay.

Farida Abdel Meguid *	Engineer - Water Requirements
Mohamed Ahmed Salem	Senior Adminis. Personnel
Abdel Aziz El-Kady	Senior Adminis. Expeditor
Ahmed Zaki	Junior Adminis. Expeditor
Salah El-Din Salem	Junior Adminis. Secretary
Sayed Sakr	Junior Adminis. Storekeeper
Zeinab Abdel Ghany	Junior Adminis. Inventory
Ekhlas Abdel Ghaffar	Junior Adminis. Secretary
Magda Yassin Mahmoud	Junior Adminis. Arabic Typist
Ashgan Abdel Zaher	Junior Adminis. Photocopier
Bamba Shaarawy	Junior Adminis. Photocopier
Ibtesam El-Shatter	Junior Adminis. Photocopier
Nahed El-Husseiny	Junior Adminis. Photocopier
Iman Abdel Gaber	Junior Adminis. Accountact
Maher Attallah	Junior Tech. Mechanical Work
Abdel Naby Youssef	Techn.-Mechanical, Motor Pool
Ahmed Soliman Abdallah	Techn.-Mechanical, Motor Pool
Ahmed Ibrahim	Junior Administrative, M.P.
Said El-Said Elwi	Junior Administrative, M.P.
Imam Sayed Washba	Technician
Osman Shaker	Junior Admin.
Shaaban Mohamed Abdou	Telephone Operator
Ahlam Abdel Rahman *	Junior Admin. Accountant
Taha Moustafa	Eng.-Water Laboratory
Ikram Mohamed *	Eng.-Water Laboratory
Ahmed Ghanem	Techician-Water Lab.
Abdalla Gad	Techician-Motor Pool
Ahmed	Guard-M.P.
Moustafa Mahmoud Mahran	Electrician-M.P.
Saad Mansour	Management Ass. for Finance
Nawal Abdallah Ahmed	Accountant - Main office
Magda Moh. Mahrous	Ex. Secretary - Main Office
Mervat Hassan	Secretary - Main Office
Hannan Samuel	Secretary - Main Office
Hala Mokhtar Awad	Secretary - Main Office
Mary Halim	Editor - Main Office
Hamdi Ahmed Hamdi	Translator- Main Office

* On leave without pay.

II. BACKSTOPPING

Planning and Coordinating Committee

The Planning and Coordinating Committee (P&C) continued to work with the project staff summarizing the project findings and preparing the National Conference Report. Efforts to effect the implementation of the project findings continued and the ongoing transfer of the project activities to the Water Distribution and Irrigation Systems Institute in the Ministry of Irrigation (MOI) proceeded smoothly.

This quarter all P & C members attended the National Conference in Cairo except Dr. Wayne Clyma and Dr. E. V. Richardson. The findings of the project were officially presented at the conference to members of the MOI, the Ministry of Agriculture, members of the Egyptian academic community and the Egyptian public. While in Cairo, P & C members in consultation with the Cairo staff developed work plans for the final TDY assignments, reviewed the plans for the termination of the project and helped review and edit project technical reports.

The committee members continued their training and advising activities for the Egyptian professionals who are participating in non-degree graduate training programs at Colorado State University. Specifically, courses were selected and independent study programs were developed for the four long term Egyptian trainees at Colorado State University this quarter.

A 12-day training tour of irrigated agriculture in California was provided for the four long term trainees during the semester break. The trainees visited irrigation research centers, irrigation equipment manufacturers, irrigation districts and private irrigated farms. During this tour, the long term trainees were exposed to a wide range of irrigation techniques in California.

Long term planning for the International On-Farm Water Management Conference to be held in Cairo in 1985 continues.

Fort Collins Staff

The training, advising, reviewing and publishing activities of the Fort Collins staff continued this quarter. Dr. Dan Sunada, Bob Vandenberg and Henry Horsey continued to provide support for the IBM software and hardware sent to Egypt last quarter.

The publishing activities of the Fort Collins staff has been reorganized. The editing and publication responsibilities for 21 project technical reports were assigned to the Fort Collins staff this quarter. Additionally, the staff will also be responsible for recopying and distributing outside of Egypt all project reports. It is unlikely that this task will be completed prior to June 30, 1984, the termination date of the project contract.

Editing, reviewing and retyping of Fort Collins draft reports continued as did the reviewing of draft technical reports from Cairo. Four papers were prepared for presentation at the annual

meeting of the Irrigation and Drainage Division of the American Society of Civil Engineers. Additionally, Omnia El-Hakim's doctoral dissertation "Quality Parameter Functions for Border Irrigation and Their Water Management Applications" was completed and printed this quarter. Abstracts of these papers are included in the appendix.

Travel arrangements for the TDY's continue to be handled by the Fort Collins staff. Airline and hotel reservations, insurance arrangements, visa requirements, per diem checks and orientation were all handled by the Fort Collins staff along with the engendered administrative and accounting tasks.

Travel and shipping arrangements are being made for the return of the American staff, their dependents and personal effects from Cairo.

An IBM personal computer was hand-carried to Egypt by Dr. Sunada this quarter. This computer is to be used for word processing at the main office in Cairo. At the request of Cairo, additional hardware and software products have been reviewed and/or tested, purchased and shipped. A math co-processor chip and related software for the IBM PC was purchased and shipped this quarter. This chip will significantly improve the execution of the CADEP program which is being completed in Cairo.

Long term Training

Four trainees are continuing their long term training at Colorado State University. A list of the trainees and the courses they took follow.

<u>NAME</u>	<u>COURSE</u>	<u>COURSE #</u>	<u>CREDITS</u>
	<u>Economics - (Young)</u>		
Ragy Darwish	Economics of Water Resource Planning	EC542	3
	Micro Economic Analysis I	EC506	3
	Introduction to Econometrics	EC335	3
	Agricultural Production Economics	EC505	3
	<u>Engineering - (Sunada)</u>		
Tarif A. Zaitoun	Thesis Research El-Hammami Pipeline	CE695	12
	Computers in Business	BD140	3 (Audit)

Dr. Sunada reports that Tarif's work is unsatisfactory and must improve significantly.

	<u>Sociology - (Knop)</u>		
Farouk Abdel Al Omar	Introduction to Social Research	S210	3
	Quantitative Social Analysis	S310	3
	Independent Study with Dr. Knop	S695V	3

Dr. Knop reports that Farouk continues to make excellent progress. Farouk has completed an extensive literature review on extension for irrigation pump operators in Egypt. Farouk is responsive to suggestions and his work is of good quality and timely. Additionally, Farouk conducts his personal affairs in an exemplary fashion.

Agronomy - (Schmehl)

Sabah El-Sayed	Irrigation	AG370	3
	Soil Physics	AG470	3
	Soil Physics Lab	AG471	1
	Salinity and Soil Water Management	AG666	4
	Advanced Soil Microbiology	AG755	3

Dr. Schmehl reports that Sabah is working very hard.

Short term trainees

Abdel Aty Shinnawi attended a 3-week course at Colorado State University titled Agricultural Project Analysis (January 3 - 20, 1984). Shinnawi then worked with Dr. Skold for two weeks on an independent study program. Dr. Skold reports that Abdel Aty is to be commended for the quality of his work and his effort during the training tour.

American TDY's

A list of the TDY's in Egypt this quarter follows.

Mohamed Haider, Economist, (March 9, 1984 - April 22, 1984) to assist Task Group #4 with economic studies of irrigation and water management.

Ed Kirdar, SRP, (March 12, 1984 - April 2, 1984) and Don Womack, SRP, (March 10, 1984 - April 2, 1984), to participate in Phase II of the Professional Employees Exchange Program (PEEP) which is administered by the Ministry of Irrigation (MOI) and the Salt River Project (SRP).

David Molden, Computer Specialist (February 3, 1984 - April 5, 1984) to assist with the conversion of existing HP programs to the IBM Personal Computer system. These computer programs are the foundation of the computer aided mesqa design and evaluation activities of the project.

Rex Rehnberg, Economist (January 30, 1984 - March 30, 1984) to help Task Group 4 complete a technical report evaluating the economic aspects of Mesqa #10. To review and edit reports on the farm management surveys of El-Hammami and the farming systems analyses of Project sites.

Bill Schmehl, Agronomist (March 10, 1984 - April 10, 1984) - a member of the P & C Committee, to work with the EWUP long term staff, review and edit PTR's 25 & 53 and attend the EWUP National Conference (March 18 - 24, 1984).

John Andrew, Engineer, (December 2, 1983 - February 15, 1984) - to work with Task Group #2 to complete reports describing the "Computer Assisted Mesqa Design and Evaluation Procedures" (CADEP). To provide guidance to professionals responsible for developing plans for water delivery system renovation.

Jim Warner, Engineer, (December 27, 1983 - January 26, 1984) to assist with the surface and groundwater work of Task Groups #2 and #5.

Don Lybecker, Economist, (January 8, 1984 - February 22, 1984) to assist Egyptian economists with the preparation of the farm record summary and analysis for the crop year 1982-83.

John Wolfe, Engineer, (January 21, 1984 - February 28, 1984) to consult with Task Groups #1 and #2 and assist with drafting final reports.

Jim Ruff, Engineer, (February 5, 1984 - March 21, 1984) to assist with the preparation of TR#55 titled "Procedures for Design and Evaluation of Water Delivery System Improvement Alternatives."

Dan Sunada, Civil Engineer, (March 16, 1984 - March 25, 1984) to work with EWUP long-term staff, advise several Egyptian Project staff working on Ph.D. dissertations from Egyptian universities and attend the EWUP National Conference (March 18 - 20, 1984).

Bernie Henrie, CID Deputy Director, (March 11, 1984 - March 21, 1984) an official from the Consortium for International Development attending the National Conference (March 18 - 20, 1984). Also helping on details for Project end.

Dean Jaros, Dean, Graduate School, CSU, (March 16, 1984 - March 23, 1984) visiting official from CSU to attend the National Conference (March 18 - 20, 1984).

Fred Smith, Associate Dean for Research, CSU, (March 11, 1984 - March 22, 1984) visiting official from CSU to attend National Conference (March 18 - 20, 1984) and to visit EWUP field sites.

Mel Skold, Economist, (March 16, 1984 - April 2, 1984) to work with EWUP long-term staff, review and edit PTR's #49 and 76 and attend EWUP National Conference (March 18 - 20, 1984).

Egyptian TDY's

There were no Egyptian TDY's this quarter.

Salt River Project Exchange Program (SRP)

Kamal Zaky and Fathi El-Shaer trained at the Salt River Project (SRP) this quarter (February 20 - April 20, 1984). The 8-week training tour was designed to increase the professional competence of the participants. A one week orientation program at Colorado State University preceded the SRP training program. Specific

subject areas included water operations, construction and maintenance of irrigation delivery systems and water resources and services.

Ed Kirdar and Don Womack from SRP travelled to Cairo this quarter (March 12 - 31, 1984) to finalize the Phase II program of the Professional Employees Exchange Program. While in Cairo, assignments and schedules were finalized and specific programs and procedures were developed to convey the SRP experience in training and management technological practices to the Ministry of Irrigation.

Equipment

All of the equipment and supplies for the mobile soil lab, except the soil grinder were shipped to Egypt on January 16, 1984. The soil grinder was held for missing parts and left CSU on February 8, 1984.

Two spare CDC disk drive units for the IBM personal computer systems were hand carried to Egypt by TDY personnel.

The fifth IBM personal computer was received in March and it was hand carried to Egypt by D. K. Sunada.

The HP 9885M disk drive unit for the HP9825 computer system was repaired and it was hand carried to Egypt by M.D. Skold.

A spare Terado inverter for the IBM PC units was tested at CSU and then hand carried to Egypt by W. R. Schmehl.

One Chinon 35mm camera for El Minya site was hand carried to Egypt by W. R. Schmehl.

We have received approval to ship the diesel generator for El Hammami and are contacting the shippers for packing information and price quotes. The generator will be shipped during the next quarter.

Work Plans

Efforts to facilitate the smooth transition of the projects research and implementation activities to the Water Distribution and Irrigation Systems Institute in the Egyptian Ministry of Irrigation will continue.

To maintain Project momentum, the Project staff plans to remain in the field until May 31, 1984. Consequently, the writing and editing of Project Technical reports will be delayed.

Review of the Project Summary Reports and Project Technical Reports will continue. The publication and distribution of the majority of the project technical reports will be completed this quarter. However, some of the publication activities will have to continue past the termination date of the project contract.

Advisory services, short courses and special study plans will be provided to the Project personnel studying at Colorado State University this next quarter.

The computer support for the project will continue. The focus of the computer activities this quarter will be to provide both the technical support and supplies necessary to maintain the computer capabilities of the Water Distribution and Irrigation Systems Institute for the next several years.

Efforts to effect the successful implementation of Farm Water Management in Egypt will continue.

III. PERSONNEL

Field Staff

There were no changes in the field staff this quarter.

Campus

The following people will be in Egypt TDY next quarter:

Alan Early	April 4, 1984 - June 1, 1984
Bill Ree	March 31, 1984 - April 30, 1984
E. V. Richardson	June 8, 1984 - June 23, 1984

APPENDIX

IRRIGATION STUDY TOUR

January 10 - 22, 1984

Participants

Tarif A. Zaitoun
Sabah El-Sayed
Farouk Abdel Al Omar
Ragy Darwish

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AGENDA

- JANUARY 10- ARRIVAL- FRESNO AIR TERMINAL.
(Tues) .United Air Lines Flight #493
Arrival--11:35am
To Hotel Sierra
- January 11- Fresno Farm Equipment Show
(Wed) All day
- January 12- TOUR
(Thur) 9:00am Peabody-Flouay, (Mike Obermeyer 442-4000)
2494 S. Railroad Ave.
10:30am Irredelco Manf. (John Riddering 485-7171)
3081 E. Hamilton
1:00pm Febco Manf. (John Brewer 252-0791)
2:30pm Claude Lavel Inc. (Doug Bruce 255-1601)
1911 N. Helm
- January 13- Center for Irrigation Technology
(Fri) Cal State Univ, Fresno
9:00am Tour of the Test Center & College Farm
Discussion with the Director and others
regarding the testing of pumps, filters,
valves, sprinklers, drip emitters etc.
Viewing of different irrigation systems and
related research projects including Photo-
voltaic powered vineyard drip system,
computer automated irrigation system, Lateral
move systems, buried drip systems on
vegetables, etc.
- * 1:00pm Tour of Friant Dam (Dept. of Reclamation)
George Hunter or
Rosalie Falbian
822-2211
Reservoir and Canal system for Friant /Kern
water transfer system.
- January 14 Weekend on their own
January 15 " " " " " "

January 16
(Mon)

To Bakersfield
(overnight)

- * am Tour of USDA Research farm in Shafter
- * pm Tour of Metzger Farms (Matarol 4000)
- * To Motel

January 17
(Tues)

Bakersfield

- * Wheeler Ridge Pumping Station
- * Superior Farms irrigation systems (Joe Lima
(805-322-2041))
- * Tulare Lake (Hoswell Farms)

January 18
(Wed)

Fresno

- * Tour of Royal Coach, Buckner
(Vince Boletti 275-0500)
- * Crop Care Inc. (Ron Brase 221-1476 or
228-0892)
- * Swanson co. (Ron Parisi 486-1840)

January 19
(Thur) 9:00am

Fresno

- Bureau of Reclamation (Mr. Willaford 487-5116)
1130 D st. Room 2215
Fresno
- 10:30am Dept. of Water Resources (445-5443)
3374 E. Shields
Fresno Mr. Lou Beck
- * 1:00pm Westlands office in Fresno (Brian Stienhart
224-7030)
- * 3:00pm Fresno Irrigation District (233-7161)

January 20
(Fri)

Los Banos and Area

- 9:00 am Drive from Fresno through the Golden Westside
of the San Joaquin valley viewing the varied
canal and water delivery systems.
- * San Luis Reservoir (Head waters of the Central
Valley Water Project.) and Pumping Station
Dwayne Knittle
(209) 826-0710
- * New State Desalination plant
(call Lou Beck to set time 445-5443)
- 5:00pm Head for San Francisco area

January 21
(Sat)

Tour the San Francisco area
Fishermans Wharf, etc.

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January 22
(Sun)

Leave San Francisco airport for Denver.
United Air Lines Flight # 178
Departure at 12:15pm

A Technical and Economic Analysis of Low Lift Irrigation Pumping

By Henry R. Horsey,¹ E. V. Richardson,²
M. D. Skold,³ and D. K. Sunada⁴

An analysis of the operating costs of a low lift axial flow (propeller) irrigation pump designed by the International Rice Research Institute indicates that this pump is both economically and financially preferable to the present low lift irrigation pumps (animal powered waterwheels, man powered Archimedes screws or diesel powered centrifugal pumps) used in Egypt. The size, high efficiency, simplicity of construction and low cost of this pump suggest that it could be successfully used in many developing countries and in tail water pump back systems in the United States.

INTRODUCTION

Irrigated agriculture in many developing countries requires lifting surface water 0.5 to 3 m with discharges ranging from 14 to 75 L per second to irrigate relatively small fields. Currently a wide range of pumping devices are used for low lift irrigation pumping in the developing world.(1) These include: traditional human powered devices such as counterpoised lifts and Archimedes screws; animal powered devices such as the water wheel (sakia) and mechanically driven devices which are typically centrifugal pumps. Little information is available comparing the technical and economic aspects of the pumps designed for these pumping conditions. In response to a significant increase in the use of diesel powered centrifugal irrigation pumps in Egypt a study was undertaken to analyze low lift pumping alternatives.

¹Research Associate, Department of Civil Engineering, Colorado State University.

²Professor, Department of Civil Engineering, Colorado State University.

³Professor, Department of Economics, Colorado State University.

⁴Professor, Department of Civil Engineering, Colorado State University.

BORDER IRRIGATION PERFORMANCE PARAMETER FUNCTIONS BY DIMENSIONAL ANALYSIS

Omnia El-Hakim, A.M. ASCE, W. Clyma, E. V. Richardson, F. ASCE¹

ABSTRACT: A set of design functions that relate system performance to design variables in graded border irrigation was developed and verified. A dimensional analysis approach is used to combine the independent variables into a reduced number of independent dimensionless parameters. A computer simulation model is used to obtain the variation of the dependent performance parameters with the independent dimensionless parameters. Dimensional analysis techniques are used to obtain functional relationships between each of the dependent parameters and the independent dimensionless parameters. Field data and Soil Conservation Service's design charts were used to verify the developed quality parameter functions.

INTRODUCTION

A function that relates system performance to design variables in surface irrigation is an obvious need. Until now, no complete functional design for irrigation with graded borders has been developed. The existing design procedures are based on the design charts presented by the Soil Conservation Service, (S.C.S., 1974). Hydraulic models describing irrigation flows have been developed for border irrigation systems using the basic continuity and momentum equations (Strelkoff and Katopodes, 1977). The zero-inertia model of Strelkoff and Katopodes (1977) has been used to develop performance parameters of border irrigation by a process of simulation and regression (Reddy, 1980). Reddy and Clyma (1981) have demonstrated the use of the functions in optimal on-farm application system design. The objective of this paper is to present a set of relationships between the basic design variables necessary to describe the irrigation conditions and the performance parameters describing system performance of any particular field in dimensionless terms.

A dimensional analysis approach combines independent variables into a reduced number of independent dimensionless parameters. A computer simulation model is used to obtain the variation of the dependent performance parameters with the independent dimensionless parameters. Dimensional analysis techniques proposed by Murphy (1950) are used to obtain a functional relationship between each of the dependent quality parameters and the independent dimensionless parameters.

¹ Research Assistant, Department of Civil Engineering, Colorado State University; Professor of Agricultural and Chemical Engineering, Colorado State University; Professor of Civil Engineering, Colorado State University; respectively.

IMPROVEMENT OF IRRIGATION OUTLETS ¹

Rashwan M. Ibrahim, Mona El-Kady,
J. F. Ruff, M. ASCE, and A. R. Robinson, F. ASCE ²

ABSTRACT: In most irrigated areas of the World, irrigation outlets (turnouts) have received little systematic design study. Rather, outlet structures have developed haphazardly and usually do not give satisfactory delivery of water, control of channel erosion or provide water measurement with the same structure. In the USA, the common turnout is a pipe through the channel bank with the flow controlled by an upstream pipe gate.

This paper reports on the past use of irrigation turnouts in Egypt and the development of an improved design utilizing pipe with an upturned downstream elbow. A flow analysis is made utilizing both laboratory and field tests.

INTRODUCTION

Irrigation outlets (turnouts) as defined here are structures or openings for delivering irrigation water from a canal or irrigation ditch to another canal or directly to the farm. These outlets have many forms such as open bank cuts, open flumes, adjustable weirs and orifices, constructed headwalls with controlled openings and closed conduits such as pipe and orifices (5). The pipe conduits have many variations and are usually equipped with either upstream or downstream slide gates and with structures to control bank and/or bed erosion. On most irrigation systems there is a need to control and adjust the flow through individual turnouts and also to measure the flow. Except in highly developed areas, it is unusual to actually measure the flow, only to estimate it. However, as development progresses and as more efficient irrigation practices are stressed, there is a need for more positive control and measurement. Therefore, structures are needed where both control and measurement functions are incorporated in the same structure. Very few designs exist that combine both of these functions. Usually two structures are used, one for control and one for measurement and this is expensive to construct and difficult to operate and maintain.

Egypt has a long history and experience with irrigated agriculture. During the 20th century, two types of outlet structures have been used, the Fayoum

¹ Based on studies made under a U. S. AID Contract with Colorado State University, Ft. Collins, Colorado through the Consortium for International Development and the Ministry of Irrigation, Cairo, Egypt. All opinions, conclusions & recommendations are of the authors and not of the U. S. or Egyptian Governments.

² Respectively, Graduate Assistant, Civil Engineering Department, Colorado State University; Engineering Discipline Leader, Egypt Water Use and Management Project; Associate Professor, Civil Engineering Department, Colorado State University; Consulting Engineering, Oxford, Mississippi.

SUMMARY REPORT
to
Egypt Water Use and Management Project (EWUP)
by
Verne H. Scott*

This report includes my objectives, summary, activities, and observations while serving as a consultant (TDY) for the fourth time to the EWUP for the period of November 1 to December 3, 1983.

OBJECTIVES

1. Review progress on the EWUP Water Quality Sampling and Analysis Plan and water quality data including an evaluation of the hazard to crops.
2. Analyze water sources and potential for use in irrigated agriculture.
3. Assist in preparation and completion of reports on water quality and conjunctive water use.
4. Develop information on conjunctive water use including potential, leaching requirements, drainage, types of crops and economics.

SUMMARY

The following is a brief summary of my activities and recommendations which are expanded upon in the sections that follow:

1. Considerable progress has been made by Dr. Assia and with the assistance of other EWUP personnel on the objectives set forth in the "Water Samples and Analysis Plan" outlined in my 1981 Summary Report.
2. The field sampling and laboratory analysis of water quality samples has improved substantially since 1981.
3. Additional improvements in field monitoring and laboratory analyses can be made, and recommendations were outlined in a memorandum to Dr. Assia (Attachment 1 of Activity No. 3).
4. Progress has been made in utilizing the computer for storing, retrieving and graphically representing the water quality data.
5. Considerable progress was made on a proposed EWUP TR No. 64, Water Quality in Abyuha, El Minya; Beni Magdoul and El Hamamy, Mansouri; and Abu Raya, Kafr El Sheikh--1982-83. This report summarizes the systematic and more comprehensive effort to establish baseline water quality data. The evaluations of water quality with reference to crop suitability should be considered preliminary and tentative. The report will be under joint authorship and is expected to be submitted soon for technical review and publication (see Activities No. 2).

*Professor of Water Science and Civil Engineering, University of California, Davis, California, and consultant to EWUP (Ministry of Irrigation/Colorado State University/USAID).

6. The progress in monitoring water quality is a major step in coupling a "salinity budget" to the "water budget" for the three project sites. Additional work is needed to consider the soil salinity within the rooting zone above the fluctuating shallow water table and the leaching requirements necessary to maintain the soil salinity below the "increasing" or "severe" problem levels.

In time an objective of optimizing the monitoring network should be established.

7. Comments by the Discipline Leaders were considered in revising the draft of the paper "Conjunctive Water Use--The State of the Art and Potential for Egypt." A revised draft incorporating revisions and EWUP data will be submitted in December 1983. (See Activities No. 4.)

8. The development of a conjunctive use objective within the current EWUP does not appear feasible or practicable. The Groundwater Research Institute, Ministry of Irrigation, is engaged in an intensive field study on the feasibility of conjunctive use, consequently coordination with that Institute could be the best approach.

9. Greater progress could be made on the water quality aspects of the Project if Dr. Assia could participate in a post-doctoral training program. If financial assistance could be arranged, I would be willing to aid facilitating arrangements at the University of California, Davis.

ACTIVITIES

The principal activities were the following:

1. Water Quality Section, National Conference Report--The section on "Water Quality" was reviewed and revised in consultation with Dr. Assia. Some additional results were included.

2. Proposed EWUP TR No. 62: Water Quality in Abyuha, El Minya; Beni Magdoul and El Hamamy, Mansouri; and Abu Raya, Kafr El Sheikh--1982-83. Considerable time was devoted to reviewing a draft report prepared by Dr. Assia. The data was analyzed, new information inserted, and assistance provided in summarizing the results.

After typing and preparing figures, a second draft will be sent to me in the near future for review and comment.

The report will be submitted under joint authorship of Dr. Assia and the writer.

This report will be the first summary of baseline water quality data of canals, drains, shallow and deep groundwaters. A qualitative evaluation of these waters is included with reference to the use of the water for irrigation of crops. These should be considered preliminary and tentative.

The cost of equipment installation, sample collection and analysis, and data processing is extremely high, therefore in time it is important to optimize the monitoring network in order to achieve savings.

Optimization means establishing and maintaining a network that will provide sufficient information on the system at minimal costs. It is an iterative process, extending over a rather long period of time.

It involves establishing a specific objective of monitoring effectiveness and relating it to variables to be optimized, such as sample frequency, number and location of monitoring stations, and the number and kind of measured variables.

Research by Lettenmaier (1976 and 1979) and Schilperoort and Groot (1983) provide information on the optimization approach to water quality monitoring. This research and others may be of value to the EWUP in time.

Recommendations

1. Monitoring of water quality should be maintained at about the same level, but modified as recommended under Activity 3, EWUP Water Quality Plan. Monitoring needs to be continued over a minimum of three years.
2. Water quality data for 1983 should be summarized as soon as possible, combined with the 1982 data, analyzed for inconsistencies and trends, and averages developed for the two years. This process should be followed for successive years.
3. As more monitoring data is developed, the analysis should proceed with more quantitative evaluations including the correlation with soil salinity and calculation of leaching requirements and development of a salinity balance such as outlined by Rhodes (1976).
4. The Discipline Leaders and Dr. Assia should take more initiative to facilitate coordination of field monitoring and analysis of water quality data, particularly as it relates to soil salinity and crop production.
5. Anticipate incorporating an objective of optimizing the water quality monitoring network.

3. EWUP Water Quality Plan--The writer's "Summary Report" submitted in 1981 included two memoranda that pertained to water quality and monitoring. The first, Conjunctive Water Use/Water Quality Analysis, included immediate and long term action recommendations which were intended to improve the quality of data as an essential part of the EWUP.

Action on these recommendations were reviewed with Dr. Assia, the staff of the Water Quality Laboratory, and with others.

Considerable progress and improvement was noted in the period of little over a year. Details are included in a memorandum to Dr. Assia (Attachment 1).

It is clear that the EWUP Project Director and associates recognized the importance of placing a higher priority on water quality and salinity and directed resources to achieving some specific objectives.

Dr. Assia is commended for her initiative, organization and follow-up in a relatively short period of time after she was assigned responsibilities for this area.

Discussions were held on how further improvement can be made. Dr. Assia will follow-up by working with the laboratory and field personnel.

Recommendations

1. The EWUP continue to support the water quality monitoring program as an essential part of the Project.
2. Favorable consideration be given to the recommendations given in my memorandum to Dr. Assia (Attachment 2) concerning laboratory equipment.
4. Proposed EWUP TR No. 44: Conjunctive Water Use--The State of the Art and Potential for Egypt: The preliminary draft of this report was submitted in September 1982 and referred to the EWUP Discipline Leaders for review.

Comments of the Discipline Leaders were collected by Mary Halim and conveyed to me on arrival for the 1983 TDY assignment. Three of the reviewers suggested that the paper lacked EWUP data. I concurred and responded to all Discipline Leaders with a memorandum that included tentative additions and revisions (Attachment 3). The revisions were reviewed with Dr. Assia.

A revised draft of this paper will be typed in Davis and returned to the Project by December 31, 1983. The proposed report will be coauthored by the writer and Dr. Assia.

5. Pumping Plans for Conjunctive Use: At the request of Dr. Hassan Wahby, a memorandum was prepared (November 24, 1983) which presented the advantages and disadvantages of designing and operating wells to discharge: (1) into main canals and/or into mesqas, or (2) into a local mesqa only.

The analysis indicated that the two plans had similarities in some respects. Plan 1 was recommended in view of the advantages that could give greater operational flexibility both in the short and long term.

6. Field Trips: Two field trips were made. One was to the Mansouri field site with Drs. Assia and Dunada. Discussions and field observations were held with Engr. Watlie Fakim and the field technician concerning water sampling of observation and deep wells, canals and drains and field measurement of E.C. Construction of a deep observation well was also observed.

The second trip was to Zagagig University and the Mashtul Pilot Area of the Drainage Research Institute. The trip was arranged and conducted by Dr. Mohamed Hassan Amer, Director, DRI. Also participating were Dr. Lyman Willardson, Professor of Agricultural Engineering, Utah State University, Dr. Abd Elwahab Amer, Professor of Irrigation and Hydraulics, Cairo University, and Engr. Mohamed Safwat, DRI. Details of drainage tile installations were discussed with Engr. Abdul Azim Refaie, Chief, Drainage Project Department, Ministry of Irrigation, Zagagig. We also observed construction of concrete drainage tile and the installation of a drainage collector line in the Mashtul area.

7. Consultations: Several EWUP personnel and others were consulted concerning various aspects of water quality, drainage and conjunctive use. Project personnel included: Hanson, Gates, Ree, Tinsley, Taher, Semaika, Wadie Fakim and Ted Wilson and Ron Groch of the Salt River Project.

Discussions were held with Dr. Mohamed Amer, Director, DRI, and Dr. K. Hefney, Director, GRI.

Dr. Amer also arranged a discussion with Mr. Rodney Vissar, Fred Gunthi and other senior staff, UN Master Water Plan. An update of activities was received.

Several technical reports on drainage reuse were provided by Dr. Amer.

Time was spent at Cairo University on invitation of Dr. Elwahab to review and comment on the Ph.D. research project of Engr. Safwat. Other members of the Irrigation and Hydraulics faculty were introduced.

A discussion was held with Dr. Hosny, Director, and Dr. Mostafa Solemon, Professor, Environmental Institute, Ain Shams University, concerning teaching and research of the Institute.

8. University Linkage Project: Dr. Sunada and I discussed with Dr. Abu Zied the idea of a linkage project in the area of water management related to water quality, conjunctive use and high water tables. This proposed project was also mentioned to Dr. Wahby. Both were receptive and supportive of the idea.

Details concerning involvement of Egyptian principal investigators and others will be pursued.

OBSERVATIONS

Water Budget--The draft of the report on this subject was reviewed. It is apparent that considerable progress has been made during the past two years. Measurements and quantification of values have improved. The budgets for each of the project sites look reasonable with small "unaccounted for" quantities. Personnel involved should be commended for a significant contribution.

REFERENCES

- Lettenmaier, D. P. Detection of trends in water quality data from records with dependent observations, Water Res. Research, V. 12, No. 5, pp. 1037-1045, 1976.
- Lettenmaier, D. P. Dimensionality problems in water quality network design, Water Res. Research, V. 15, No. 6, 1979.
- Rhodes, J. D. Potential for using agricultural drainage waters for irrigation.
- Schilperoort, T. and Groot, S. Design and optimization of water quality monitoring networks. Delft Hydraulics Laboratory, Delft, The Netherlands, 1983.



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Egypt Water Use & Management Project

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Phone (303) 491 8655, TWX 910-930-9000

AGR/071/83

November 30, 1983

TO: Dr. Assia

FROM: V. H. Scott

SUBJECT: Water Samples And Analysis Plan

You are commended for the progress that has been made in the past 21 months in following up on the recommendations included in my memorandum of November 10, 1981, concerning the improvement in water quality sampling and analysis.

My observations are:

1. Field samples are processed more carefully, identified and transported to the Laboratory more expeditiously.
2. "Recommended Sampling Locations" were established and monitored monthly.
3. Samples are being logged by Laboratory personnel.
4. More complete analyses are being made with greater care and accuracy.
5. Monthly tabulations of the complete analyses were made with averages and standard deviations for 12 months of records.
6. The computer was used to calculate averages, store data and graphically plot EC vs time for Kafr El-Sheikh monitoring locations.

Some improvements can be made as follows:

IMMEDIATE ACTION RECOMMENDATIONS

1. Field monitoring and Sampling
 - a. Encourage and instruct all field technicians to:
 - (1) Be more careful in marking legibly the water quality collection bottles.



- (2) Remove one sampling volume of water from each observation well, discard that water sample, take a second one as soon as possible and put the second sample in the collection bottle for transportation to the Laboratory.

- b. Consider the feasibility of having the field technicians measure and record the EC of each sample when they take it in the field.

- c. Modify or maintain the current field sampling program as follows:
 - (1) Reduce monitoring the main canals (Ibrahimia, Mansouriya and Daqalt) from monthly to twice a year.
 - (2) Reduce monitoring the main drains (Moheet, No. 4 & 7, Raghama) from monthly to twice a year plus during closure.
 - (3) Reduce monthly monitoring of all interior canals also drains of the project sites to the head for canals and tail for drains only.
 - (4) Maintain the monthly monitoring of all observation wells currently sampled.
 - (5) Increase the monitoring of deep pumping wells including private and public wells.

2. Laboratory Analysis

- a. Encourage and instruct the Laboratory personnel to:
 - (1) Compare the analysis results of each sample with previous results for the same location and note any significant changes.
 - (2) If the results for the same location are significantly different, repeat the analysis to verify the analysis.

- b. Twice a year subdivide at least three (3) water samples and send one to the Water Quality Laboratory, Drainage Research Institute the Soil and Water Laboratory, Ministry of Agriculture. Results obtained by the two laboratories should be compared and any discrepancies resolved.

3. Data Processing and Analysis

- a. Continue to process all data through the computer.
- b. Calculate the average and standard deviation of all quality characteristics on a continuous basis, excluding the analysis of samples taken during closure.
- c. Plot the EC results as a function of time on a continuous basis and analyze for trends.
- d. Attempt to correlate shallow groundwater salinity with the position of the water table with soil salinity.

cc: Dr. Hassan Wahby
Dr. Ahmed Taher
Dr. Richard Tinsley

VS/hm



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AGR/073/83

December 1, 1983

TO: Dr. Assia

FROM: V. H. Scott

SUBJECT: Water Quality Laboratory Equipment

I appreciated the opportunity to review the processing of samples and equipment of the EWUP Water Quality Laboratory with you.

Improvements have been made since my last visit in 1981.

In reviewing the laboratory equipment that could improve the efficiency of the Laboratory, you recommended two items as follows:

1. Water Distiller

Rationale - At present the distilled water is not dependable and sample processing stops when it is not available. Also its quality is of questionable consistency which may account for variability in analyses which is being experienced.

2. Flame Photometer With Digital Readout

Rationale - The Gallencamp photometer is old and slow in accommodating the volume of analyses being made by the laboratory.

My recommendations are as follows:

Item 1. I concur that a self contained still should be purchased. One possibility would be: Aqua-Still M-6, Water Distiller, Model A5 240V, 50 Hertz, 7amps, 1650 watts.

Item 2. I believe that the need for this item should be explored further with Dr. Soltanpour or others more familiar with the functions of flame photometers. I will make some inquiries on this matter.

cc: Dr. Wahby
Dr. Taher
Dr. Tinsley

VS/rm



Attendees at the National Conference

March 18, 19 and 20, 1984

Abdalla Saber	Abdel Hady Rady
Abdel Aziz El-Noweshi	Abdel Hady Samaha
Abdel Badie M. Abou El-Hoda	Abdel Halim Awad Nasser
Abdel Fattah Metawie	Abdel Malek S. Ghebreyal
Abdel Gamil Aly El-Hak	Abdel Meguid Badran
Abdel Raouf Abdel Hamid	Ahmed Abdel Monsef
Abdel Raouf Hassan El-Salahy	Ahmed Abdel Naim
Abdoun Boules Salib	Ahmed Aly Kamel
Adel Abdel Meguid	Ahmed Bayoumi
Adel Zaki Makary	Ahmed El Attar
Adly Barsoum Michael	Ahmed Fakhry
Ahmed Ismail	Aly Aly El-Deib
Ahmed Sawky Makram	Aly Ezzat Mokhtar
Ahmed Taher	Aly Rafie
Ahmed Talat Abdel Al	Aly Serry
Aly Abdel Rahman	Assia El-Falaky
Atef Ghaly	Bernie, Henrie
Atiya Omar Atiya	Berty Fahmy Besada
Aziz Ezzat Tawidrous	Carmack, Joe
Azza Nasr	Creed, Harold
Bahaa El-Din Mahmoud Kandil	El-Sayed Abdel Aziz El-Noueshy
Elia Sorial	Ezzat Mohamed Abdulla
Ely. Ray	Faris Gorgy Michael
Esam Ezz El-Din	Farouk Abdel Al
Esmat Wafik	Farouk Hassanein
Ezzat El-Far	Farouk Shahin
Fathy Abdel Halim	Gamal Ayad
Foster, John	Gamal Fawzy
Fouad Mousa Ramadan	Gamiel El-Sayed
Fouad Zaki Abdel Mesih	Gates, Timothy
Gamal Abdel Samie	George Ibrahim Meleka

George Ilyas Sedawy
Haider, Mohamed
Hamed El-Hebel
Handly, Arthur M.
Hanson, Eldon

Hossam El-Naggar
Hussein Ahmed Lashin
Hussein Kamal Mahgoub
Hussein M. Bader Bekheit
Ibrahim Anter

Kamal Ezz El-Din
Kamal Hefny
Kamel Hindi
Kamal Oweda
Khalil Ibrahim El-Sayed Omar

Magdy Awad
Magdi Badawi
Mahmoud Abdel Halim Abu Zeid
Mahmoud Ibrahim
Mahmoud Khidr

Mohamed Abdel Latif
Mohamed Abdel Meguid Osman
Mohamed Abdel Monem El-Zeftawy
Mohamed Amin Makhoulf
Mohamed Amin Mohamadein

Mohamed Hassan Amer
Mohamed Hassan Hammad
Mohamed Hassan Hassanein
Mohamed Helal
Mohamed Hussein Mahgoub

Mohamed Wafai Abdel Salam
Moheb Semaika
Mokhles Abu Seeda
Molden, David
Mona El-Kady

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