PD-AAP-697

CLASSIFICATION

PROJECT EVALUATION SUMMARY (PES) – PART I

Report Control Symbol U-447

1. PROJECT TITLE	2. PROJECT NUMBER	3. MISSION/AID/W OFFICE
CANAL MAINTENANCE	263-0035	USAID/Cairo

4. EVALUATION NUMBER (Enter the number maintained by the reporting unit e.g., Country or AID/W Administrative Code, Fiscal Year, Serial No. beginning with No. 1 each FY) 84-5

☐ REGULAR EVALUATION ☒ Final EVALUATION

5. KEY PROJECT IMPLEMENTATION DATES	6. ESTIMATED PROJECT FUNDING	7. PERIOD COVERED BY EVALUATION
A. First PRC-AG or Equivalent FY 77 B. Final Obligation Expected FY 80 ; C. Final Input Delivery FY 84	A. Total $ 30 million B. U.S. $ 30 million	From (month/yr.) September, 1978 To (month/yr.) December, 1983 Date of Evaluation Review March, 1984

8. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR

A. List decisions and/or unresolved issues; cite those items needing further study. (NOTE: Mission decisions which anticipate AID/W or regional office action should specify type of document, e.g., airgram, SPAR, PIO, which will present detailed request.)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
This project has been completed; therefore, no project specific recommendations are appropriate. However, the report does recommend one follow-up action for USAID attention: Urge the contracting agency to identify the additional supplies and/or attachments required for project funded equipment. Assist in identifying a source of funding for the required supplies, e.g., residual loan funds or CIP.	USAID	March 31, 198

9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS

☐ Project Paper ☐ Implementation Plan e.g., CPI Network ☐ Other (Specify)
☐ Financial Plan ☐ PIO/T
☐ Logical Framework ☐ PIO/C ☐ Other (Specify)
☐ Project Agreement ☐ PIO/P

10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT

A. ☐ Continue Project Without Change
B. ☐ Change Project Design and/or ☐ Change Implementation Plan
C. ☐ Discontinue Project

11. PROJECT OFFICER AND HOST COUNTRY OR OTHER RANKING PARTICIPANTS AS APPROPRIATE (Names and Titles)

Roy Robieson, DRPS/IDPS
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12. Mission/AID/W Office Director Approval

Signature: M.P.W. Stone

Typed Name: M.P.W. Stone, Director

Date: 5-17-84

AID 1330-15 (3-78)

NEAR EAST EVALUATION ABSTRACT

PROJECT TITLE(S) AND NUMBER(S)	MISSION/AID/W OFFICE
CANAL MAINTENANCE (263-0035)	USAID/Cairo

PROJECT DESCRIPTION

The stated project purpose is "to increase agricultural productivity by restoring and maintaining canals" in the Egyptian irrigation system.

AUTHORIZATION DATE AND U.S. LOP FUNDING AMOUNT	PES NUMBER	PES DATE	PES TYPE
1977 $30 million	84-5	May, 1984	☐ Regular ☐ Other (Specify) ☐ Special ☑ Terminal
ABSTRACT PREPARED BY, DATE	ABSTRACT CLEARED BY, DATE		
Emily Baldwin, DPPE/PAAD EB May 7, 1984	Roy L. Robieson, DRPS/IDPS RLR		

This was a final evaluation to document the success of the project in achieving the objectives as originally stated. The evaluation team was comprised of three individuals: two USAID staff members (an economist and an agriculturalist) and one Egyptian irrigation engineer. As a part of their evaluation, the team interviewed a number of officials in the Minsitry of Irrigation and in the dredging companies that received project equipment; in addition, they made a number of site visits to irrigation canals and dredging company workshops.

The project helped to speed irrigation canal maintenance, leading to improved water availability for farmers; this, in turn, has meant a direct benefit to farmers in higher productivity (therefore, presumably, higher income) and indirect benefit to Egypt as a whole in increased agricultural production. In its description of actual project performance, the team is quite favorable: "Having been supplied with new, more efficient equipment, the excavating capacity of the public companies involved is now much improved." This additional capacity is judged by the team to have lead to achievement of the project's purpose: to increase agricultural productivity by restoring and maintaining canals. "In addition, some unexpected benefits accrued. U.S.-financed equipment is being used to assist in excavation of the new Peace Canal and for dredging in Lake Bardawil. Both operations are assisting in development of agriculture and fishing in Sinai." The team reports that "most, but probably not all, of the work would have taken place without U.S. assistance. However, without this aid some needed work would have been postponed and fewer resources would have been available in Egypt for other uses."

The project was not without some problems, particularly in the initial stages of implementation, when disagreements over the provision of consulting services lead to delays. Another significant problem was in design rather than implementation; according to the team, the initial project analysis of benefits to be realized from the project were based on "faulty estimating techniques" that overestimated actual project returns. Given the primarily physical infrastructure nature of the project, the team had to make a number of assumptions and leaps of faith in order to attempt to document the economic impacts of the project as anticipated in the original design.

Lessons Learned:

1) Logical frameworks that establish clearly articulated, logically linked objectives and reasonable, achievable end-of project-status indicators are essential to effective and efficient evaluations. (This project had no logframe, and the team often had to guess at what the objectives and indicators were meant to be.)

2) Economic analyses included in project designs should ensure adequate attention to the sensitivity of the estimated rates of reutrn to the pricing and production projections of the products in question.

3) A clear understanding of the terms of delivery, warranty, on-site training, and so on among the host country, consultant and suppliers is critically important to successful and timely implementation.

EVALUATION OF CANAL MAINTENANCE PROJECT

USAID
Cairo/Egypt

March 1984

Summary

The Agricultural Canal Reconstruction and Maintenance Project is nearly complete and its purpose - to increase agricultural productivity by restoring and maintaining canals - has been achieved. Both the level and distribution of benefits differ from that envisioned in the project plan, but these deviations stem from faulty estimating techniques rather than project execution or shifts in the external environment. The expected 19.2 percent rate of return likely overestimated the actual economic returns, but firm estimates of actual returns are not possible without extensive further study.

Having been supplied with new, more efficient equipment, the excavating capacity of the public companies involved is now much improved. In addition, some unexpected benefits accrued. U.S.-financed equipment is being used to assist in excavation of the new Peace Canal and for dredging in Lake Bardawil. Both operations are assisting in development of agriculture and fishing in Sinai. A few problems occurred during project execution including a lengthy delay at the outset resulting from disagreements over the provision of consulting services. Later a disagreement arose regarding equipment testing requirements. An inexplicable error occurred when trucks with eight cylinder engines were shipped rather than trucks with six cylinder engines as specified.

On balance, it seems fair to conclude that the project benefited a large cross-section of mostly poor Egyptians. Farmers who benefited directly from the project seemed pleased and enthusiastic about the improved water availability. Most, but probably not all, of the work would have taken place without U.S. assistance. However, without this aid some needed work would have been postponed and fewer resources would have been available in Egypt for other uses. A number of lessons can be gleaned from the project, mostly on improving estimating techniques and smoothing out contracting practices.

Introduction

On September 27, 1977, AID signed a $26.0 million loan agreement with the Government of Egypt (GOE) and its Ministry of Irrigation (MOI) for financing the Canal Maintenance Project to restore and maintain Egyptian irrigation and drainage canals. Funds provided under this loan, and a subsequent amendment grant of $5.2 million in 1979, financed the procurement of equipment for earthmoving, support transportation, and maintenance, as well as related engineering and management consulting services. Equipment provided was assigned to the two major canal excavating companies operating in Egypt at that time, the Egyptian Dredging Company and the General Irrigation Company. Background material on the description and history of this project is provided in Appendix F.

Evaluation Methodology

This is a final evaluation of a project nearing completion conducted by an AID economist (Paul Crowe), an AID agriculture office director (John Foster) and an Egyptian consulting engineer (Assad Fahmy). The evaluation team worked from a scope of work prepared by the AID evaluation officer, according to the suggested AID format. Approximately half of the work hours expended were in the office reviewing project documents and half were in the field, either at excavation sites or in company offices and workshops. A complete description of data collection and a list of Egyptian contacts are included in Appendix A.

External Factors

Basic agriculture methods remained unchanged during the project period and the need for canal restoration and maintenance was about as described in the project paper. This work is given a high

priority by the Egyptian people. The principal external feature influencing the project was the Camp David Peace Accord, which returned Sinai to Egypt. Some project equipment has been diverted to help meet the excavating and dredging needs in this area.

Inputs

The project (as amended) provided for loans ($26 million) and grants ($5.2 million), for a total U.S. contribution up to $31.2 million. At the time of this evaluation (March 1984), approximately $30 million had been expended, $1 million had been deobligated and the remaining funds were expected to be deobligated this fiscal year. Funds provided to the Egyptian government were reloaned to the two public Egyptian excavation and dredging companies on the terms acceptable to AID.

The main project inputs were dredging, excavating and earthmoving machinery, including support equipment such as trucks, maintenance tools and spare parts. The final report of the consulting firm states that the procurements under U.S. loans and grants had the net effect of increasing the equipment and support material inventory of the Egyptian Dredging Company by 100 percent and the General Irrigation Company by 25 percent. The machines and equipment supplied were from U.S. source and origin and are the type required to perform the work required. Details of equipment deliveries are provided in Appendix B.

The project implementation schedule was delayed in the early years, because of disagreement between the Egyptian and U.S. governments over the need for consulting services and certain testing requirements. The delay in inputs, lasting perhaps eighteen months, resulted in a postponement of benefits for an equal period and a six percent increase in cost. Although the delay appears to have aggravated some input delivery problems, there was no

indication that the delay had a compounding detrimental effect on achieving the project's purpose. The added costs were funded though a project amendment (grant) authorized in August 1979. This grant covered not only the cost increases resulting from the delay ($1.7 million), but also $3.5 million of foreign exchange expenditures that were originally scheduled to be provided by the Egyptian government. In requesting the grant, the GOE cited the delay-induced cost increase for machinery and the tight budget position of Egypt as justification for the $5.2 million increase.

The earthmoving and support equipment, with the exception of those items under repair, is now in the field functioning well. The machinery is used throughout the Egyptian canal and drain systems on the basis of need, as determined by joint planning efforts between the companies and the Ministry of Irrigation. In some cases this has required an unanticipated transfer of equipment among the four public companies engaged in canal and drain maintenance, but these exchanges likely have increased the machinery's efficiency.[1/]

A number of specific problems were experienced with the equipment. Representatives of the excavating companies stated that the draglines were often down as a result of faulty swing shaft bearings, or broken main gears. During field visits, the evaluation team verified the following: one Koehring dragline was found to be idle at the job site with a broken gear, and other Koehring draglines were in the workshops awaiting swing shafts repairs.

1/ Three public companies (Egyptian Dredging, General Irrigation and Behera) were operating when the project began. A fourth company, Upper Egypt Dredging, was formed about the time equipment began arriving in 1980. After delivery to the two project companies (Egyptian Dredging and General Irrigation), some new U.S.-financed equipment and some expendable older equipment was re-distributed to the other two companies. The sharing of equipment appeared to be based on technical requirements, i.e., what was best suited for the work to be done in the geographic areas served by each company.

For the most part, equipment problems have been resolved through agreements between the suppliers and the excavating companies; Louis Berger Engineering (the project consultant) assisted the AID staff with resolution of the problems. The most troublesome, unresolved complaints of the Egyptian companies involve shop equipment that is idle, or giving limited service. This idle equipment, which represents a small portion of the total project, has been the subject of long standing disputes between the companies and the suppliers. Now that the project is closing and warranties have expired, it would seem advisible to obtain funding for the missing parts and needed attachments from some AID source, perhaps through the remaining project funds that have not been deobligated or the Commodity Import Program (unless there are legal restrictions). This would clean up the project's few remaining problems and improve the U.S. government's image with the employees of the Egyptian companies.

The contribution of the two less tangible inputs, consulting services and training, are more difficult to evaluate. Much of the delay at the project's outset was caused by conflicts between the laws and business procedures of the MOI and its contractual commitments to U.S. suppliers. There also was disagreement over the role of the U.S. consulting firm. Delay in resolution of those issues prevented the consulting firm from completing all elements of the planned scope of work within the time and cost limits of their contract. Comments from the Egyptian companies and U.S. suppliers suggest that there were mixed feelings about the effectiveness of the consulting services provided. For example; the shipment of trucks that did not conform to contract specifications reportedly were inspected by the consultant and cleared for conformance prior to being shipped.

Project training plans were poorly executed, and the training inputs that were provided were not well organized. The project paper envisioned that a requirement of 48 weeks of training would be given to Egyptian company personnel in U.S. factories or factory-related schools. However, execution of the training plan and the training inputs were poorly coordinated (USAID did not closely monitor this facet). As a result, there was no training in the U.S., and only limited training in the field from U.S. factory representatives. The dredging companies felt that the principal problem was the absence of opportunity for Egyptian engineers to train in U.S. factories. Such training, they thought, would have reduced the problems that minor manufacturing design changes and part substitutions caused when the equipment arrived in Egypt.

In their final report, the U.S. consultant recommended a much broader role for training of Egyptian personnel (apparently believing a deficiency existed), especially for management techniques and equipment maintenance. Except for training required for operating the unused shop equipment noted elsewhere, the evaluators believe that financing of further training is not now required.

Outputs

Based on the increase in cubic meters of spoil excavated from canals and drains between 1977 and 1982, Egypt has a better maintained irrigation and drainage system at the present time. The following table lists maintenance work performed in cubic meters of spoil and weeds excavated. Data were not collected from the Behera

Company, and no private contractors have been used by the Ministry of Irrigation since 1980.[1] (See production charts - Appendix C.)

TABLE I
WORK EFFORT
(Million Cubic Meters)

Company	1976*	1977	1978	1979	1980	1981	1982
Egyptian Dredging Company	27.7	37.4	42.5	40.5	45.7	54.9	59.0
General Irrigation Company	12.0	15.1	17.3	22.0	32.0	40.0	42.3
Subtotal	59.7	52.5	59.8	62.5	77.7	94.9	101.3
Behera Company	5.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Upper Egypt Dredging	-	-	-	-	n.a.	n.a.	n.a.
Private Contractors	20.0	20.0	20.0	20.0	-	-	-
Total	64.7	72.5	79.8	82.5	77.7	94.9	101.3

* Project Paper, Table V-3, page 15; private contractors' work effort assumed constant 1976-1979.

The project equipment began arriving late in 1980 and was placed in service beginning in 1981. As indicated in Table I above, total work performed by the two Egyptian companies initially receiving U.S.-financed equipment increased by about 39 million cubic meters (62%) from 1979 to 1982.

1/ Some day laborers are still hired by excavating companies for digging in areas not suitable for machine digging and for making paths for dragline movement. This would be equivalent to the former category of private contractors, but no estimates are available of this work effort separate from that of the company totals. Many of the contractors previously involved in excavating work are now working in the higher paying construction industry, while others are building water regulators and other canal-related projects. There is no clear indication of how many existing, or potential, private contracting firms were displaced by U.S.-financed equipment, although some such substitution undoubtedly took place.

Volumes of discharge before and after clearing were collected from the MOI on eight canals excavated by project equipment. Table II gives the percentage increase in discharge at the end reach of selected canals. Percentages given were provided by the consulting engineer. In the evaluation team's opinion the percentages are conservative. In actuality, the bed level likely was lower after excavation, which would increase the volume of discharge and, subsequently, the percentage increase.

TABLE II

CANAL	DISCHARGE INCREASE
Balamoun 5th. parallel branch	90%
Bishkariet el Salmania	57%
Bishkariet el Hazania	24%
El Fashaghna	15%
Gams	61%
Ein Shams	92%
Khashab	38%
Kome el Ahmer	79%

Note: Discharge calculated using the Manning Formula

Purpose

The project's stated purpose was to increase agricultural productivity by restoring and maintaining irrigation canals. The project plan provided no formal statement of End-of-Project Status conditions, or means for verification of how well this purpose was achieved.

The Egyptian five-year plan for dredging/excavating requirements, which calls for maintenance of canals and drains equal to 50 million cubic meters per year of spoil removal, was accepted as the target figure for the project. Total dredging and excavating requirements, including new work, and widening and deepening of drains, were placed at 81.5 million cubic meters by 1981, according to the five year plan. Although actual work performed was not

broken down into maintenance versus new work, the total work effort for the Egyptian Dredging Company, combined with that of the General Irrigation Company, amounted to 95 million cubic meters in 1981. The bulk of this work was maintenance work. As these spoil removal figures suggest (and company officials confirm), all the five-year targets were exceeded, in part because the companies and the MOI tend to use conservative estimates when the targets are formulated.

There were no quantitative targets established for increases in agricultural productivity in the project plan, but on-site discussions with farmers provided evidence that the purpose was achieved.

— One farmer reported that prior to excavation he could not pre-plant irrigate so he had to delay planting. He farms at the tail-end of the canal and, because of insufficient water levels, had to wait until farmers nearer to the canal intake had finished their pre-plant irrigation. After excavation with project backhoes, he was able to plant normally.

— Another farmer reported that, prior to excavation, the water supply was so limited that his cropping pattern was restricted and some land was left fallow. All land was brought back into production following excavation this year.

— Farmers visited in two areas reported that prior to recent excavation of the distributary canals serving their lands with project financed equipment, they had experienced insufficient water supply. Water supplies are now adequate. They added further that it had been two or three years since the distributary canals had been excavated. Their opinion was that the shorter maintenance cycle made possible by the new equipment would prevent canal or drain problems from developing between maintenance cycles.

— One farmer commented that the old machines dumped the spoil indiscriminately, and he had to remove it from his land. The project financed machines control the spillage, and he was able to use the spoil to build a road adjacent to the canal.

— Farmers reported that, prior to distributary canal excavation, the time required to lift water with the saqia was extended. The saqia is fixed and the lift level cannot be adjusted; as the water level drops, less water is lifted with each turn and animals used to turn the saqia are required to work longer hours. If hired labor is necessary during the lifting period, then an increase in irrigation time also becomes an added cost to the farmer.

— Some farmers found that before the project equipment was available, it was necessary to use wells, or to rent portable pumps, to obtain adequate water where water flow was restricted by poorly maintained canals.

— in some Governorates, the widening and deeping of the main and branch canals allowed additional land to be put into production. The Giza Irrigation Directorate reported that after the Mansouria Canal was excavated, the land area served by the canal increased from 27,000 feddans to 32,000 feddans.

Regardless of the technologies available, or the dynamics of the sector (e.g., two or three crops growing together or three to four crops per year), the level of production is dependent on an adequate water supply available at the proper time in the crop cycle. Though not specifically discussed with the farmers interviewed, there is a known tendency to overirrigate when there is uncertainty about the delivery of sufficient water. If water is scarce during an "on"

period, the farmer may overirrigate to alleviate the possibility of plant stress from an even shorter supply during the next "on" period. Proper canal maintenance guarantees an adequate supply of water, decreasing this tendency to overirrigate. This reduces the demand on the drainage system and helps combat the salinity problem that was described in the project plan's environmental analysis.

Maintenance work is an on-going process the year round, and the MOI has both a 5 year plan and an annual plan for this work. In the past, it appears that canals and drains were not routinely maintained, but deferred until either inspection or farmer complaints necessitated maintenance. Although work today is still influenced by farmer's requests, there appears to be much better adherence to the maintenance schedule. Also, the project machines are able to maintain the canal bank slope much better than old machines. Since the slope of the cross-section is a major element in the canal design, this further improves the water flow through the system.

Based on the above, the evaluation team concluded that the project has contributed to an increased level of canal maintenance and, consequently, improved water security. This, in turn, has increased agriculture output in some areas and prevented further production losses in others.

Goal/Subgoal

The project's goal and subgoal were not stated explicitly. Based on the statement of the purpose, it can be assumed that the implicit goal was the increase of farm income through increased agricultural productivity. An appropriate subgoal would be the increased availability and lower price for Egyptian food products.

Based on indirect evidence provided by spoil removal data and field visits, the increased farm income goal almost certainly was achieved, but the average gain likely was quite small. The project had little effect on the price and availability of farm products, although the food subsidy costs of the Egyptian government may have declined slightly (and agriculture-derived government revenues increased slightly) as a result of small increases in agricultural productivity.

Beneficiaries

When the project paper was prepared in 1977, it was assumed that canal maintenance would improve water flows and raise the productive capacity of the land through an increase in cropping ratios; i.e., the added water would permit more intensive use of the land. The project paper assumed that cropping area was a linear function of water supply and the land area reserved for perennial crops. The equation used estimated that cropping ratios would increase an average of 1.8 percent.

While there is little direct evidence to support the specific project estimate, it is plausible that the increased water flow resulting from better canal and drain maintenance permitted higher cropping ratios, on average.[1/] The benefit stream derived from

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1/ There are some data that show a general increase in production per feddan in districts served by canals and drains cleared with U.S.-financed equipment. The percentage of increase was not uniform and for one crop (wheat) yields actually declined. (see Appendix D). Of course, many factors affect yields other than the presence of the new equipment; and, in most areas, U.S.-financed equipment work alongside a variety of older equipment, so that it is impossible to pin-point its marginal contribution.

this increase is, however, quite sensitive to the distribution of crops grown. The highest net value per feddan is cotton, which yields about LE 482 per feddan using world prices as a proxy for the crop's economic value (actual prices paid to farmers are only about one-half of this). The lowest net value, in contrast, is sorghum at only LE 8 per feddan.

The sensitivity of the projected benefit stream to developments in cotton cropping is clear from the project paper's derivation of project benefits (see Project Paper Annex L-included in Appendix E of this report). Because of the extremely high net value per feddan, cotton crop increases generate LE 11.9 million of the LE 14.6 million annual benefits estimated to result from the project. The 82 percent contribution by cotton, which constitutes only about one-fourth of total cropping area, should have triggered a more extensive study of the expected future acreage devoted to this crop, as well as a more intensive investigation of the role of water security in cotton production.

The project paper determined the cropping area distribution by averaging the Ministry of Agriculture (MOA) crop area estimates for the old lands for the years 1972 - 1974. Closer examination of available cotton area and production data should have forewarned the authors to be more conservative in projecting benefits from increased cotton production. One of their resource documents, the World Bank Report for the Drainage II Project (Annex 9, Table 3), listed unginned cotton production in thousands of metric tons as follows:

1965	1970	1972	1973	1974	1975
1,501	1,404	1,422	1,368	1,285	1,204

These data indicated a downward trend in production in the ten years prior to 1975. Moreover, the agriculture price policy of Egypt, which effectively discourages cotton growing by taxing cotton heavily, was well established at the time the project was planned.

Ministry of Agriculture reports, summarized in the table below, show that cotton acreage never reached the levels estimated in the Project Paper.

Table III

Area Harvested

(Thousand Feddans)

	1979	1980	1981	1982
COTTON				
Actual	1196	1246	1178	1066
Projected	1346	1351	1356	1361
Actual/Projected	89%	92%	87%	78%

Over the period of the project for which data are available (1979-82), the constant dollar value of cotton production averaged some seven percent below its average of ten years earlier. Productivity per feddan of cotton increased, but not enough to offset the reductions in area harvested. And even this gain

probably reflects better pest and weed control, rather than improvements in water security.[1/]

The project paper estimated that the new equipment would benefit two percent (74,000) of the small farm families, raising their annual net income by an average of $124. The field investigations and discussions with MOI officials suggest that the benefits probably were distributed much more widely among the rural poor, in part because the equipment was distributed more widely than originally assumed. Because of the overestimation of the value of benefits from increased cotton production, the average increase is net farm income likely was much lower than expected.

There was no mentior in the project paper of the distribution of the benefits to Egyptians who are not farmers. Calculations of the income effect on the rural poor correctly used the local (not world) price of cotton to estimate benefits to farmers. The difference between on-farm prices and world prices are, in essence, a source of tax revenue. Any increase in this tax revenue resulting from higher cotton production would benefit the population at large, which in Egypt is about one-half urban. Since the estimated benefits based

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1/ A complicating factor is that the cotton yield per feddan figures used in projecting project benefits were too high for lint cotton (to which the world price would apply) and too low for unginned cotton. This error almost certainly led to a significant overstatement of the benefits that could be expected, even if the marginal contribution of water security to cotton yields had been established correctly. Finally, the world price of cotton has increased sharply since the estimates were made, and this would tend to raise the level of benefits, thus redeeming some portion of the estimate. All these variations, although not completely predictable, were given far too little attention, considering the dominant role of cotton production in determining the project's rate of return.

on world prices for cotton were in excess of LE 5 million annually (or more than one-third) higher than those based on domestic prices, this difference should have raised the question of who benefited from this project besides the farmers. The distribution of the "tax" benefits were not considered by the project paper, but it is likely that the GOE passed along this portion of the benefits to virtually the entire population via a variety of subsidies.

The project plan noted that some additional benefits might accrue from improved transportation and from added availability of excavated spoil for enriching the soil. Inquiries in the field suggest that these benefits were very small. Navigation on the canals is limited more by the existence of man-made barriers (bridges and watergates) than by clogged or shallow canals. Some improved transportation may occur when the El Salaam canal is finished, but the net contribution will be minimal. Excavated spoil is redistributed to the fields and used for fill dirt, but this is not in short supply in most areas.

There was some concern in the project plan that the project might add to the incidence of Bilharzia since the disease is more common in areas with perennial irrigation of the type supported by the use of the new equipment. This concern appears unwarranted since the project equipment did not alter the existing irrigation practices. Improved water flow, in fact, may have reduced the incidence of Bilharzia slightly.

Unplanned Effects

Some of the U.S.-financed equipment has been redirected toward improving water flows in Sinai, a use that was not specifically anticipated by the project, although it was assumed that the equipment would be used in part for new canals and drains. Water

will be brought to the Sinai via the El Salaam Canal[1/]. It will be some years before the canal is completed, land developed and production raised beyond a marginal level. This is a departure from the project's assumption that economic returns would generally phase in over a five year period, increasing 20 percentage points annually. Also, when the lands in Sinai are in production the cropping pattern in this area will vary from that assumed in the project benefit estimates.

One of the five project dredges is now being used to maintain the water exchange between the Mediterranean Sea and Lake Bardawil to permit continued fishing in the lake. The Israelis withdrew their equipment serving a similar purpose when Sinai was returned to Egypt. It is anticipated that the dredge will be stationed permanently in the lake.

Lessons Learned

There are several lessons to be learned from the project and the

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1/ After the project was underway, the Ministry of Irrigation began construction of a large canal (El Salaam Canal) to irrigate 600,000 feddans of new land, 200,000 of it west of the Suez Canal and 400,000 east of the Suez Canal (in Sinai). Originally this project was to run for five years (1980-1985), but this schedule has slipped by at least two years. The water needed east of the Suez Canal will cross the canal through a large siphon. The canal crosses land in some reaches and Lake Manzilah in other reaches, requiring eight million cubic meters of excavation and one and one-half million cubic meters of dredging for embankment. Dredgers are being provided by several companies, in some cases using equipment that is now available as a result of the new U.S.-financed dredgers working in the existing agricultural canals. U.S.-financed support equipment (trucks, bulldozers) also is being used on the new canal. The canal will be 82 kilometers from its beginning at the Damiatta branch of a Nile river to the Suez Canal siphon.

evaluation, some methodological and some practical.

The project paper was prepared without reference to a log frame that would have forced explicit statements of goals and end-of-project status. This made the evaluation more difficult than would have been the case if the project paper has been prepared according to the more formal standards in effect today.

The economic analysis overlooked a number of estimating problems that should have received more attention, some of which have already been discussed. The estimate's disproportionate contribution from cotton should have been recognized as having the potential for large variations in expected project benefits. The sensitivity analysis that was provided on the estimated economic rate of return did not really explore the sensitivity of this estimate to the pricing and production projections for cotton. The analysis merely stated what would happen if benefits and/or costs changed by certain increments. This is a mathematical exercise, not an exploration of the sensitivity of the results to certain critical assumptions (e.g., cotton area planted and the net return to cotton).

On the practical side, the review of the project's implementation highlighted the need for a clear understanding of the terms of delivery, warranty, on site training, etc. among the host country, consultant and the suppliers. Many hours of valuable time were lost in resolving differences over the terms of the contracts. The Egyptian Dredging Company seemed to be most displeased with the suppliers' service after delivery, and the loss of production time during periods of equipment repair. The U.S. suppliers generally were unhappy with the Egyptian companies reluctance to release retainages and performance bonds even after disputes seemingly had been resolved.

LIST OF ATTACHMENTS

Evaluation of
Canal Maintenance Project

Appendix A

Methods of Collecting Agricultural Data Data sources for the irrigation system were the Irrigation Directorate offices of Giza, Menoufia and Dakhalia. Information was collected through interviews with farmers, Ministry of Irrigation field staff, and field visits to areas where maintenance work was underway or had recently been completed.

The stated purpose of the Project to "Increase Agricultural Production by Restoring and Maintaining Irrigation Canals" was not tested by calculating the social and economic impact at the farm, regional or national level. Section VII., Economic Analysis, of the project paper did not identify specific sites so it was not possible to revisit those areas. Farmers interviewed were not asked to provide cost/return data before and after canal clearing; they were asked what effect the maintenance had on the availability and quantity of irrigation water.

Background: The Ministry of Irrigation (MOI) is responsible for the maintenance of both irrigation canals and drains. Except for isolated cases, all maintenance work is contracted to one of the public sector companies responsible for dredging, and canal maintenance and construction.

The irrigation system is a series of canals that deliver the water to the farm and drains (canals) that remove the unused or excess water from the system.

Delivery System: Irrigation water is delivered to the farms through an extensive systems of canals that have a combined length

of 30,309 KM. Canals are classified according to size and function as follows:

(1) Principal canals receive water directly from the Nile.
(2) Main canals receive water from the principal canals.
(3) Branch canals receive water from the main canals.
(4) Distributary canals receive from the Branch.
(5) Private ditches (mesqas) receive water from the distributary canal.

The MOI is responsible for maintenance in the first four canals listed above. The maintenance is primarily excavation on both the sides and bottom of the canal by either a dragline or a backhoe. The machine used is determined by the size of the canal and the accessibility of the area. Maintenance on distributary canals is limited to those canals that serve 200 feddans or more. The farmer is responsible for maintenance of the mesqas. Mesqa maintenance is almost entirely by hand labor; some cooperative societies own equipment which is needed for mesaq cleaning but their effort would account for only a limited amount of maintenance.

All of the canals are subject, to some degree, to problems with weeds, sedimentation, unstable cross sections and the dumping of debris, all of which restrict the downstream flow of water. Waterflow can be further restricted by the eroding of banks by water scouring and human and animal traffic. The closer canals are to populated areas, the greater the problem with dumping and erosion.

Water delivery to canals is primarly based on maintaining a given water surface elevation between control gates. Most of the farming areas do not have unrestricted access to water because each

area is served by one main or branch canal operating on a specific delivery schedule. Each area is divided into two or three equal areas and the water delivered by an "on/off" rotation schedule. For example, a two-turn rotation would be four days on and four days off for rice, or seven days on and seven days off for cotton.

Drainage System: Public drains in Egypt are open channels having a combined length of 17,497 km. Private drains are either small, open channels and/or closed tile drains which remove excess surface water or ground water, respectively, to the public drains. Drains are classified according to size and function as follows:

(1) Principle drains receive water from main drains for conveyance to the Nile or directly to the sea.
(2) Main drains receive water from the branch drains.
(3) Branch drains receive water from collector drains.
(4) Collector drains receive water from the fields.

Maintenance and Construction: The principal, main and branch drains are the responsibility of the MOI. These drains are subject to the same maintenance problem as the canals (e.g., weeds, sedminentation, debris and erosion).

Maintenance: For the purpose of definition, "maintenance" is the cleaning of drains or canals to allow the flow of water within the designed specifications. The scheduling of canal and drain maintenance was reported as being based on a five year plan and, subsequently, an annual schedule. However, based upon field investigation the "squeaking wheel" syndrome appeared to affect the scheduling on maintenance at the distributary canal level. The level or degree of maintenance is referred to as cubic meters of spoil removed, rather than number of canals or drains, or km of canals or drains.

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Evaluation of
Canal Maintenance Project

Principal Egyptian Contacts

1) Egyptian Dredging Company:

a) Engineer Abdel Ghany Hassan--Chairman

b) Engineer George Amin--Director of the Mechanical Department.

Their staff of engineers handles Ismailia canal, El Salaam and Abu Zabaal workshops.

2) General Irrigation Company:

a) Engineer Amin Moustafa--Chairman

b) Engineer Sayed El Banhawi--General Director

Their staff handles Sabal Drain, Nokrashia (east and west canals) and Kanater workshops.

3) Ministry of Irrigation: Dakahlia District

a) Engineer Ezzat Abdallah--Undersecretary

b) Engineer Fathy Soody--Inspector

Their staff handles Branch II of Balamoun canal (1st & 3rd) and Nizam Drain.

4) Ministry of Irrigation: Giza District

a) Engineer Ali Ezzat Mokhtar--Undersecretary

b) Engineer Ehab Rashid--General Director

Their staff handles Dahshour, Khashab and Kom El Ahmar canals.

5) Ministry of Irrigation: Kalyobia and Ismalia District

a) Engineer Mohamed Abd El Halim--Undersecretary

Evaluation of
Canal Maintenance Project

Appendix B

Table I

Estimated U.S. $ Foreign Exchange Costs (Revised)

(thousands)

Category	Equipment	1977 estimates ($)	1979 estimates ($)	1983* estimates ($)
I	Dredging Equipment	1,880	3,058	2,800
II	Earthmoving Equipment	2,975	2,985	2,776
III	Transport Equipment	2,547	3,273	3,676
IV	Draglines/Backhoes	13,072	11,243	10,288
V	Shop/Field/Maintenance	1,485	3,465	3,017
	Spare parts I-IV less draglines	2,838	2,230	6,022
	Spare parts - draglines	276	352	
	Spare Parts - V	74	202	882
	Freight	3,772	3,882	incl. above
	SUB-TOTAL EQUIPMENT	28,919	30,690	29,461
	Training Services	38	105	0
	Consultant Services	575	429	600
	TOTAL	29,532	31,214	30,061

*Final accountancy incomplete; $1 million had been deobligated by February 1984.

TABLE 1I

STATUS OF A.I.D. FINANCED EQUIPMENT

EQUIPMENT	QUANTITY		
	ORDERED	RECEIVED ON-SITE	PERCENT PROCURED ON-SITE
Koehring model 535 dragline	36	36	100%
Koehring model 305A dragline	8	8	100%
Koehring model 305 dragline	12	12	100%
Koehring model C266 backhoe	40	40	100%
John Deere model JD762 self loading scrapers	14	14	100%
John Deere model 850D bulldozers	12	12	100%
International Harvester model TD20E bulldozer	10	10	100%
Ford LTS 9000 chassis trucks	7	7	100%
Ford LTS 9000 fifth wheel truck tractor	8	8	100%
Ford LTS 9000 fifth wheel truck tractor	7	7	100%
Dodge D200 two door pickup trucks	9	9	100%
Dodge D200 four door pickup trucks	7	7	100%
Dodge W300 pickup trucks	23	23	100%
Dodge W400 pickup trucks	12	12	100%
Thirty ton low bed trailers	8	8	100%
Sixty ton low bed trailers	6	6	100%
Sixty ton high bed trailers	1	1	100%
Towed 8 ton trailers	3	3	100%
Forklifts	9	9	100%
Lubrication sets, stationary	6	6	100%
Steam cleaners	6	6	100%
Sandblaster	2	2	100%
Mobile 15 ton cranes	5	5	100%
Dredges	5	5	100%
Tender	5	5	100%
Crew Boats	2	2	100%
Intrade Tool Order	235	235	100%
Crawler - Tractor D-4	2	2	100%
1HC Flat bed trucks 4x4	9	9	100%
Bus 44 passenger 1HC	2	2	100%
Lubrication trucks 1HS 4x4	14	14	100%
Welding rod 1/4 & 3/16 inch rods (feet)	40,000	40,000	100%
Air Compressors 2-85, 3-60, and 2-125 CFM	7	Cancelled	
Toyomenka shop equipment and tools	152	152	100%

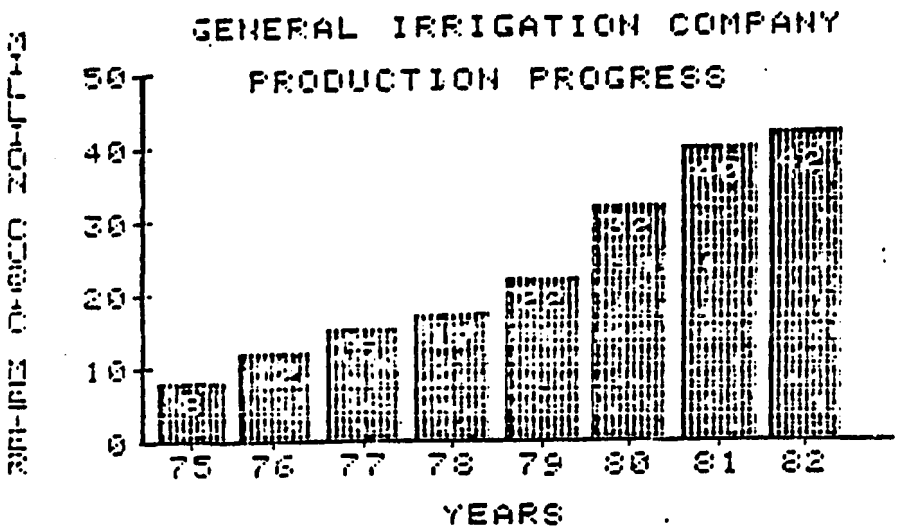
TABLE III

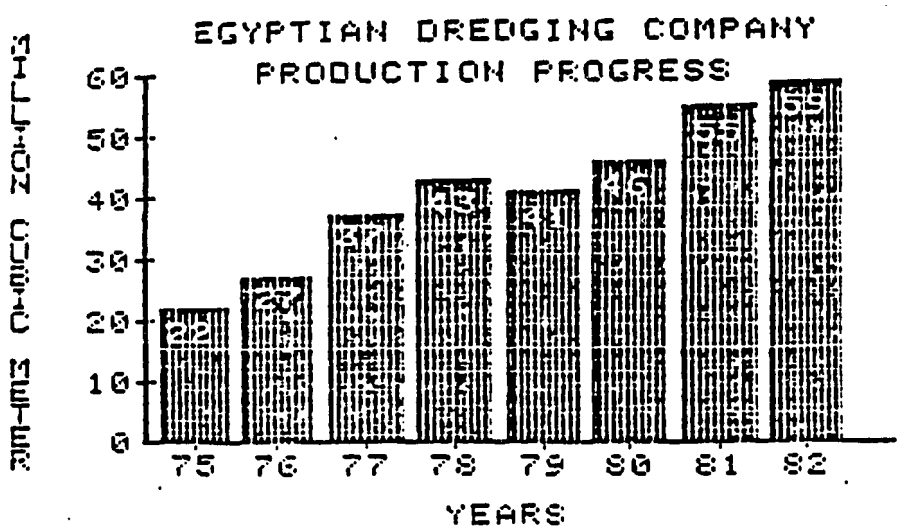
DISTRIBUTION OF A.I.D. FINANCIED EQUIPMENT
TO PROJECT COMPANIES

EGYPTIAN DREDGING	EQUIPMENT	GENERAL IRRIGATION
19	Koehring model 535 dragline	17
8	Koehring model 305A dragline.	0
0	Koehring model 305 dragline	12
21	Koehring model C266 backhoe	19
7	John Deere model JD 762 self loading scrapers	7
0	John Deere model 850 bulldozers	10
10	International Harvester model TD20E bulldozer	0
4	Ford LTS 9000 chassis trucks	3
4	Ford LTS 9000 fifth wheel truck tractor	4
3	Ford LTS 9000 fifth wheel truck tractor	4
4	Dodge D200 two door pickup trucks	5
3	Dodge D200 four door pickup trucks	4
12	Dodge W300 pickup trucks	11
5	Dodge W400 pickup trucks	7
4	Thirty ton low bed trailers	4
3	Sixty ton low bed trailers	3
1	Sixty ton high bed trailers	0
3	Towed 8 ton trailers	0
5	Forklifts	4
3	Lubrication sets, stationary	3
3	Steam cleaners	3
1	Sandblasters	1
2	Mobile 15 ton cranes	3
5	Dredges	0
5	Tender	0
2	Crew Boats	0
20	Intrade Tool Order	115
All	Welding Rod 3/16 20,000 ft.	All
All	Welding Rod 1/4 20,000 ft.	All
	1 HC, 4x4, Cargo, Flat-bed Trucks	
2	Caterpillar D-4 Bulldozers	0
4	International Harvester Flat bed Trucks	5
0	International Harvester Buses	2

Appendix C

Output of Project Companies





Appendix D
CROP PRODUCTION IN SELECTED AREAS

Region		Mean Feddan Production							
		Wheat (Arab)		Cotton (Kintar)		Maize (Ardab)		Rice (Ton)	
		1976	1982/83	1976	1982/83	1976	1982/83	1976	1982/83
Damietta	Kafr Saad	8.00	9.78	4.93	5.57	6.91	10.08	2.02	2.380
Dakahlia	Mansouria	13.34	11.15	5.86	8.03	14.18	13.46	2.149	2.270
Monofia	Ashmoun	12.00	9.20	6.38	8.15	11.80	12.67	2.813	-
"	Menouf	12.51	11.42	5.09	9.05	13.77	14.62	2.875	-
Sharkia	Bilbeis	11.46	10.90	5.77	6.74	10.96	11.69	2.070	2.760
Kaliobia	Khanka	12.90	10.70	6.06	7.57	11.71	13.64	2.795	2.680
Giza	Imbaba	11.44	12.05	-	-	11.97	10.13	2.890	3.000
"	Badra-shein	10.03	10.75	-	-	13.05	14.61	1.383	-

Note:

Ardab = 150 kilogram (for wheat)
Kintar = 157.5 " (for cotton)
Ardab = 140 " (for maize)

1 kintar - 157.5 kg = 56 kg Lint, 100 kg Seed, 1.5 kg Lintens.

Source: Ministry of Irrigation. Data for canals excavated by U.S-financed equipment.

Appendix E

DERIVATION OF PROJECT BENEFITS

Crop	Current Cropping Area in Feddans (Tab.II-2)	Marginal Increase in Crop. Area after Canal Restoration (Feddans)	Average Yield MT/Fed. (Tab. II-1)	Average Farmgate Price in LE/MT (Tab.II-1)	Total Revenue Per Fed. in LE (4x3)	Total Cost Per Fed. in LE (Appen.4-1)	NET REVENUE LE/FEDDAN (5-6)	NET REVENUE from increased Cropping Ratio, in LE 000 (7 x 2)
	1	2	3	4	5	6	7	8
MAIZE	1,830,000	33,700	1.57	50.8	79.76	59.00	20.76	699.61
SORGHUM	377,000	6,943	1.36	47.5	64.60	55.66	8.94	62.01
RICE	1,061,000	19,541	2.04	42.2	86.09	70.13	15.96	311.87
COTTON	1,346,000	24,789	0.81	722.0*	584.82	103.30	481.52	11,936.39
GROUNDNUTS	32,000	589	0.71	191.6	136.04	63.39	72.65	42.79
SESAME	33,000	608	0.50	185.0	92.50	39.80	52.70	32.04
VEGETABLES	585,000	10,774	6.60	33.9	223.08	84.50	138.58	1,493.06
TOTAL	5,264,000	96,944						14,578.00

*International price for cotton used

Appendix F

Background:

On September 27, 1977, AID signed a $26.0 million Loan Agreement (AID Loan263-K-040) with the Government of Egypt and its Ministry of Irrigation for financing approximately 88% of the foreign exchange costs of the Canal Maintenance Project 263-0035.

The purpose of the Canal Maintenance Project is to assist the GOE to restore and maintain the irrigation supply and drainage canals which are crucial to maintaining required levels of agricultural productivity throughout the country. Technical assistance and equipment provided under the Project will enhance the canal maintenance capability of the principal public sector entities engaged in this work under the aegis of the GOE Ministry of Irrigation.

Funds provided under this loan of $26.0 million provide for procurement of earthmoving equipment, principally draglines, backhoes, scrapers and hydraulic dredges, supporting transportation equipment, and shop and field maintenance equipment. Funding provisions are also made for related engineering and management consulting services and for the training of Egyptian operating staffs. Equipment provided will be assigned to the Egyptian Dredging Company and to the General Irrigation Company for Mechanical Dredging by the Ministry of Irrigation for utilization on irrigation canal maintenance projects throughout Egypt.

The Project Implementation Schedule of the 1977 PP estimated that shop/transportation/service equipment awards would be made in July 1978, excavation equipment awards in September 1978 and, equipment deliveries would be completed before August 1979.

Delays incurred in obtaining a consultant engineering contract, in fulfilling CP's, and in approval of IFB/s, have caused a one-year delay in the estimated implementation schedule, and as a result there has been considerable escalation of costs for equipment.

These delays were primarily attributed to the need to reconcile various points of issue, such as the provision of consulting services and certain testing requirements, which arose during Project execution from the incompatibility of traditional Egyptian legal and procurement practices with current U.S. legal and procurement requirements.

Consultant contract negotiations were initiated in December 1977. Due to delays in coming to an agreement with the Ministry of Irrigation on scope of services and form of contract, the contract was not signed until April 12, 1978. CP's of the Loan Agreement were fulfilled on April 26, 1978. The host country contract services of Louis Berger International, Inc. were mobilized and implementation started in June 1978.

Draft IFB's were prepared by the consultant in June 1978, but did not receive host country approval until all issues concerning the IFB's were resolved in a meeting on December 16, 1978 among the Ministry of Irrigation, Egyptian Dredging Company, consultants, and USAID/Egypt. The principal point of issue concerned the Ministry's desire to require productivity testing with related penalties for test results lower than manufacturer's guaranteed output and the USAID reluctance to see such a requirement incorporated as a condition of tender. The compromise solution involved the dropping of the testing requirement and the substitution of a prequalification of manufacturers as a prerequisite for invitation for bid.

Once the issues had been resolved, procurement procedures were initiated and procurement implementation proceeded at a normal pace. Nevertheless, the delays already incurred have caused the Project Implementation Schedule to be revised. We estimate shop/transport/service equipment awards will be made in July 1979; excavation equipment awards will be made in August 1979, and equipment deliveries will be completed by the end of September 1980. (See revised Annex C, attached.)

The amount finally reserved for consultant services from AID Loan 263-K-040 has been fully expended. The 1977 Project Paper estimated $500,000 for consultant services, however, the Ministry of Irrigation insisted upon reducing consultant services to an absolute minimum and made a lump-sum contract amounting to $178,692 for a limited number of person-months of specialist services. The difference was then attributed to contingency availabilities. Under the contract the time allotted for person-months to provide contract specialists (with the exception of the economist) are expended and, therefore, under present arrangements the consultant will not be participating in future bid analyses and related services. USAID/Egypt is not staffed to assume the consultant workload. Therefore, the Committee perceived a need for consultant services to complete the present scope of work of the contract by funding the person-months of work needed to assist in bid analyses, awards, inspections, setup and testing services, to provide a timely completion of the Project. We estimate that these services could cost up to $250,000. No funding available for these services remains under the Loan.

As indicated above, the foreign exchange procurement planned for the Project cannot be accomplished with the U.S. dollar funds now available. Project costs have escalated substantially in the two years since the original estimates were prepared, making the shortfall even more striking.

June 14, 1984

TO: NE Bureau Personnel

All are invited to view two films discussed in the June 13 staff meeting, they are entitled:

(1) "You Are What You Were When"

Shown: June 19 (Tuesday) 12:30 PM - 2:00 PM
June 21 (Thursday) 11:30 AM - 1:00 PM
Room 4440A (Near East Conference Room)

(2) "Meetings, Bloody Meetings" by Monty Python

Shown: June 26 (Tuesday) 12:30 PM and 1:15 PM (two showings)
June 28 (Thursday) 12:30 PM and 1:15 PM (two showings)
Room 4440A (Near East Conference Room)

Please be prompt as shows will begin on time.

For details, call Suzanne Majors - 632-5783