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**Report No. 8419**

**PROJECT COMPLETION REPORT**

**SYRIAN ARAB REPUBLIC**

**LOWER EUPHRATES DRAINAGE PROJECT  
(LOAN 1682-SYR)**

**FEBRUARY 28, 1990**

**Agriculture Operations Division  
Country Department III  
Europe, Middle East and North Africa**

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## ACRONYMS

CP	Cooperative Program
ERR	Economic Rate of Return
FAO	Food and Agricultural Organization of the United Nations
GADEB	General Administration for the Development of the Euphrates Basin
GERSAR	Groupment d'Etudes et de Realizations des Societes d'Amenagement Regional
GOEDEB	General Organization for Operation and Management of State Farms
GOLD	General Organization for Land Development
GOS	Government of Syria
ICB	International Competitive Bidding
LEDP	Lower Euphrates Drainage Project
LEV	Lower Euphrates Valley
MAAR	Ministry of Agriculture and Agrarian Reform
MOI	Ministry of Irrigation
O & M	Operation and Maintenance
PCR	Project Completion Report
SAR	Staff Appraisal Report
SCET	Societe Centrale por l'Equipement du Territoire (International)
SPC	State Planning Commission
UNDP	United Nations Development Program

## **CURRENCY EXCHANGE RATE**

Name of currency (abbreviation) Syrian Pound (LS)  
Currency Exchange Rate: US\$1.00= LS3.93

## **GOVERNMENT OF SYRIA FISCAL YEAR**

January 1 to December 31

Office of Director-General  
Operations Evaluation

February 28, 1990

MEMORANDUM TO THE EXECUTIVE DIRECTORS AND THE PRESIDENT

SUBJECT: Project Completion Report - Syrian Arab Republic  
Lower Euphrates Drainage Project (Loan 1682-SYR)

Attached, for information, is a copy of a report entitled "Project Completion Report - Syrian Arab Republic Lower Euphrates Drainage Project (Loan 1682-SYR)", prepared by the Europe, Middle East and North Africa Regional Office. No audit of this project has been made by the Operations Evaluation Department at this time.

Attachment

A handwritten signature in dark ink, appearing to be 'L. P. ...', is written over the word 'Attachment'.

**SYRIA**  
**LOWER EUPHRATES DRAINAGE PROJECT**  
**(LOAN 1682 SYR)**

**PROJECT COMPLETION REPORT**

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PROJECT COMPLETION REPORT

SYRIAN ARAB REPUBLIC  
LOWER EUPHRATES DRAINAGE PROJECT  
(LOAN 1682-SYR)

PREFACE

This is the Project Completion Report (PCR) for the Lower Euphrates Drainage Project (LEDP) for which Loan 1682-SYR in the amount of US\$30 million was approved on April 10, 1979. The loan agreement was signed on May 4, 1979. On June 8, 1983, the Bank cancelled US\$5.31 million of the loan. The closing date was extended four times and the final closing date was August 1987, more than three and a half years behind schedule. The undisbursed balance of US\$4.11 million was suspended on June 1, 1986 because of arrears and was finally cancelled on August 27, 1987.

The PCR was prepared by the Agriculture Operations Division, Country Department III of the Europe, Middle East and North Africa Regional Office and is based, inter alia, on the Staff Appraisal and President's Reports, the Loan Agreement, supervision reports, correspondence between the Bank and the Borrower, and internal Bank memoranda.

The PCR was read by the Operations Evaluation Department (OED) and sent to the Borrower for comments on December 7, 1989. No comments were received.

SYRIA  
LOWER EUPHRATES DRAINAGE PROJECT  
(LOAN NO. 1682 SYR)  
PROJECT COMPLETION REPORT

Basic Data Sheet

KEY PROJECT DATA

Appraisal Item	Appraisal Estimate	Actual or Estimate	Actual as % of Estimated Actual
Total Project Cost Original (US\$ Million)	52.5	60.5	115
Credit Amount (US\$ Million)	30.0	20.5 A/	68
Date of Board Approval	04/10/79	04/10/79	-
Date of Effectiveness	10/11/79	10/11/79	-
Date of Physical Components Completed	12/31/82	04/30/87	-
Proportion then Completed	100%	90%	-
Closing Date	12/31/83	08/27/87 B/	-
Economic Performance	15	NA	-
Financial Performance	-	Fair	-
Institutional Performance	-	Mixed	-
Technical Performance	-	Good	-
Number of Direct Beneficiaries (Farm Families)	23,000	NA	-

A/ Disbursements at time of cancellation

B/ Cancellation date

CUMULATIVE DISBURSEMENTS

FY	79	80	81	82	83	84	85	86	87
Appraisal Estimate (US\$ million)	5.2	11.1	20.7	27.7	30.0				
Actual (US\$ Million)	-	-	-	1.2	2.3	3.0	4.02	11.80	17.13
Actual as % of Estimate				6	8	10	14	39	68 1/
Date of Final Disbursement	06/30/86								

1/ US\$ 4,114,602.72 was canceled on 08/27/87

MISSION DATA

Mission	Date (mo/yr)	No. of Persons	Man-days in Fields	Specializations Represented a/	Performance Rating b/	Trends c/	Types of Problems d/
Identification	Early 1970s						
Preparation I	1973						
Preparation II	05/21/77	2	34				
Appraisal	10/22/77	3	57	A,C,D	-	-	-
Supervision 1	10/12/80	1	2	D	2	1	T
Supervision 2	003/27/81	1	12	B	2	1	M
Supervision 3	06/03/82	1	7	B	3	1	M
Supervision 4	09/09/82	1	6	B	3	1	M, O
Supervision 5	10/21/83	1	5	B	3	1	M
Supervision 6	06/12/84	1	6	B	2	1	M
Supervision 7	11/20/84	1	6	B	2	1	M
Supervision 8	05/27/85	1	4	B	2	1	M
Supervision 9	12/02/85	1	5	B	2	1	M
Supervision 10	06/05/86	2	11	A,B	1	1	M
Supervision 11	04/01/87					NA	NA
Total (SPN)		16	155	A,B,C,D			
		==	===				

Completion

a/ A=Agriculturalist, B=Irrigation Engineer, C=Contract Specialist, D=Financial Analyst

b/ 1=Problem Free or Minor Problems; 2=Moderate Problems and 3=Major Problems

c/ 1=Improving 2=Stationary and 3=Deteriorating

d/ F=Financial, T=Technical, M=Managerial O=Other

OTHER PROJECT DATA

Borrower	Syria
Executing Agency	General Administration for the Development of the Euphrates Basin (GADEB)
Fiscal Year	January 1 to December 31
Name of Currency (abbreviation)	Syrian Pounds (LS)
Currency Exchange Rate:	US\$ 1.00 = LS 3.95
Appraisal Year Average	US\$ 1.00 = I/.3.95
Intervening Years Average	US\$ 1.00 = I/.3.95
Completion Year Average	US\$ 1.00 = I/ 3.95

BASIC DATA SHEET (Cont'd)

STAFF INPUT

PROJECT NAME	ACT	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88 TOTAL
SYMPHOIS CUMMINGS DRAINAGE I	PREAPPRAISAL	.	1.2	1.5	2.5	15.0	5.9	.	.	.	.	.	.	.	.	.	26.1
	APPRAISAL	.	1.0	.	.	.	72.5	6.5	.	.	.	.	.	.	.	.	79.9
	IDENTIFICATION	.	.	.	.	.	1.4	15.5	.	.	.	.	.	.	.	.	16.9
	SUPERVISION	.	.	.	.	.	.	.3	1.6	4.3	6.3	3.5	7.5	7.5	10.6	13.6	2.2
	OTHER	.	.	.	.	.1	1.9	.0	.	.	.	.	.	.	.	.	2.0
TOTAL PROJECT SYMPHOIS		.0	2.2	1.5	2.5	15.0	81.7	22.4	1.6	4.3	6.3	3.5	7.5	7.5	10.6	13.6	2.2

SYRIA  
LOWER EUPHRATES DRAINAGE PROJECT  
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PROJECT COMPLETION REPORT

EVALUATION SUMMARY

Introduction

This was the first phase of a long-term project aimed at rehabilitation and development of the lower Euphrates Valley. It has been the Government's policy to reduce the dependence of the country on rainfed agriculture by measuring the irrigated areas and reducing the area planted in zones of low rainfall. During the Second Five-Year Plan (1966-70) there was an increase in emphasis towards development of the Euphrates Basin, accompanied by the establishment of the Ministry of the Euphrates Dam in 1969. In the Third Five-Year Plan (1971-75) more than 75% of the total public sector investment for the plan period was directed towards irrigation development of the Euphrates Basin where the main potential for increasing the area under irrigation in Syria is.

Objective of the Project

The project aimed at: (i) increasing agricultural production in the Euphrates Valley and publicizing the farm level technology; (ii) developing a strategy for the irrigation in rehabilitation and land reclamation phases; and (iii) halting the processing of salinization by lowering the level of groundwater in the area.

Implementation

The project had a slow start due to reluctance by the borrower in applying ICB procedures for procurement as stipulated in the Loan agreement. Project implementation later improved and by June 1986, when disbursements were suspended due to arrears, much of the physical works were complete.

The technical aspects of the project were well designed. The original design emphasized an integrated approach, although neither the GOS management nor the Bank followed through with this integration. The implications of these missing links and their impact on the beneficiaries have not been evaluated since the drainage systems were not fully operational at the time of cancellation. However, there was some indication that farmers used saline water from the tubewells for irrigation. Without improved extension services, it is reasonable to assume that more farmers will employ such inappropriate practices in the future. This would not only be detrimental to the achievement of the project objectives but it also would jeopardize development of the agricultural sector.



### Project Impact

In addressing the activities aimed at strengthening the management capability in medium- and long-term planning for an integrated irrigation project, the project design failed to make adequate provisions for a training program. In retrospect, the project design was not fully consistent with its objectives. The Bank also was inflexible in refusing to approve a modification to meet recognized specific training needs. The Bank was aware of the management weakness but took insufficient measures to build management skills during the life of the project. At the time of loan cancellation the project ERR could not be recalculated for lack of data on production. The ERR is however estimated below 10%.

### Lessons Learned

Several important lessons are drawn from the experience of implementation of this project as follows:

- (1) The introduction of a long-term integrated project requires sophisticated management and specific technical skills. Thus, the adaptation of new technologies to the borrower's needs should be carefully examined by the Bank. Furthermore, the project evaluation should include a suitable lag period to allow for this adjustment.
- (2) The impact of the covenants on the project objectives should be assessed, and when covenant non-compliance threatens project success, provisions should be made to strengthen management.
- (3) A design that involves high technology and technology transfer should include tailor-made training programs to address the need at three levels of decision making and management:
  - (a) policy and strategy makers and long/medium-term planners;
  - (b) mid-level managers and medium/short-term decision makers;
  - and
  - (c) grassroots decision makers and producers (technology users and daily decision makers).
- (4) The borrower's history vis-a-vis the Bank's philosophy should be accurately assessed so that appropriate measures can be taken to reverse unsatisfactory trends such as inadequate auditing reports, part-time managers, and lengthy procurement procedures, and
- (5) The project design should spell out the specific supervising expertise and skills needed for a sophisticated and integrated irrigation project, taking into consideration the borrower's weaknesses that were identified at the time of the appraisal. Integrated projects are very complex and demand dedicated, multidisciplinary specialists.

SYRIA  
LOWER EUPHRATES DRAINAGE PROJECT  
(LOAN 1682 SYR)

PROJECT COMPLETION REPORT

I. INTRODUCTION

1.01 The agriculture sector plays an important role in the Syrian economy through its contribution of about 25% to the GDP. Although this share fell to 19% in the mid-1970s, agriculture remained a crucial sector in the total economy because of the direct and associated employment of one-half (4.4 million) of the total population.

1.02 Syria has a total land area of 18.5 million ha, of which 6 million ha were cultivated at the time of the project. Irrigated agriculture accounted for about 550,000 ha and the rest (90% of the total cultivated area) was rainfed. Agricultural production from rainfed lands varies greatly from year to year as the result of a highly erratic distribution of rainfall. Cotton and wheat were the main crops produced in irrigated areas; secondary crops included olives and fruits.

1.03 Agricultural production has failed to keep up with population growth since the early 1970s. The relatively low rate of growth in agricultural output from 1967-1974 (2% annually) was reflected in declining agricultural exports. Cotton accounted for three-fourth of the agricultural exports.

1.04 The broader economic environment has constrained the growth of Syrian agricultural production. Three interrelated sectoral issues, however, were key depressors for agricultural development:

- (1) The relationship between physical production targets and pricing policy was inconsistent. Price intervention policies, designed to attain social and income equities, inadvertently depressed the growth of agricultural production.
- (2) The institutional capabilities for planning and implementation were weak. The State Planning Commission (SPC) based their agricultural strategies mainly on ad hoc judgments without the feasibility studies and agronomic, technological and climatic databases necessary to justify them.
- (3) The allocation of public investment did not reflect the overall objectives. The pervasive public intervention and rigid regulation of private investment discouraged agricultural investors from pursuing viable investments.

1.05 Aware of the seriousness of this situation and facing the problems of scarce cultivated land, rapidly growing population (3.5% annually) and an unfavorable trade balance, the Government of Syria (GOS) adopted new

agricultural policies in the 1970s to promote self-sufficiency. The Government strategies emphasized increasing the irrigated cultivated land, mainly in the Euphrates Basin; more than 75% of the total public investment were allocated for the development of irrigation systems.

1.06 It became evident shortly after the installation of the irrigation systems in the Ghab region, Orontes River, and in the middle and lower Euphrates Valley (LEV) that the newly developed irrigated areas had severe drainage problems. The Government of Syria consequently examined this new problems and identified economic priorities to halt the deterioration of irrigated areas. The GOS emphasized the development of cost-effective drainage systems for the lower Euphrates to preserve the newly cultivated lands and to attain optimal agricultural production. Comprehensive analysis of the Euphrates Basin showed that the rehabilitation and development program deserved to be an urgent and long-term economic priority.

## II. PROJECT FORMULATION AND DESCRIPTION

### Project Identification and Preparation

2.01 Preparation of the Lower Euphrates Drainage Project was launched by the Syrian Government in the early 1970s, with the assistance of a consulting firm that prepared a comprehensive study of the entire Euphrates Valley. The study highlighted the rapid spread of salinity in the irrigated lands, which curtailed agricultural production in the region. Farming was becoming unprofitable and land abandonment was becoming increasingly common as yields declined. The study pointed out the need for a long-term plan for rehabilitation and development in the LEV and recommended the following actions be implemented in two phases:

- (1) immediate arrest of the spread of salinity and the deterioration of about 300,000 ha of irrigated lands in the lower Euphrates Basin
- (2) reclamation and rehabilitation of already deteriorated and abandoned lands, concomitant with the establishment of technical infrastructure and supportive services aimed at improving farming technology and demonstrated the danger of continued use of poor irrigation techniques to farmers, and
- (3) the installation of new, well-drained irrigation systems to improve total production and restore about 85,000 ha of under-cultivated lands in the valley.

2.02 An IBRD/FAO/CP mission visited Syria in 1973. It found that about two-thirds of the arable but uncultivated area (due to salinity) in the lower Euphrates Valley could be brought back into full production. This could be accomplished by technically sound drainage systems and land reclamation. The mission assisted the Government in designing specifications for a technical and economic feasibility study. The study concluded that a drainage system comprising tubewells and electric pumps would be the most viable. Water would

be pumped from the wells and discharged through open canals to the Euphrates River, thereby lowering the groundwater table and permitting recultivation of the land.

2.03 The consultants developed a mathematical model to assist in understanding the complex behavior of the aquifer when subjected to pumping. The model was used to:

- (1) estimate the amount of water to be removed from the aquifer to halt the land deterioration
- (2) estimate the amount of water to be removed under a given irrigating and leaching regimen, and
- (3) optimize the number of wells and their locations.

2.04 During final project preparation the overall concept was broadened to include:

- (1) rehabilitation of 50,000-60,000 ha and construction of field drains and drainage channels
- (2) construction and rehabilitation of pumping stations and irrigation networks
- (3) construction of farm and feeder roads, land leveling and land planing;
- (4) construction of necessary buildings and provision of equipment for operation and maintenance, and
- (5) provision of extension services and farm machinery.

The project was to be carried out in phases, giving priority to the construction of the drainage systems to prevent further land deterioration. The second phase involved the construction of new irrigation systems and further drainage works to reclaim abandoned land.

2.05 To reduce the risk of pumps being unable to lower the water to safe levels for growing crops, additional wells were included in the project to compensate for downtime, maintenance periods, and possible sample errors in groundwater studies. Accordingly, it was proposed to increase the proposed number of wells from 139 to 170.

### Bank Objectives at Appraisal

2.06 The Bank's lending strategy was to finance selected projects that had the most potential to help the Government attain and sustain its twin

objectives of growth and self-sufficiency. The Bank had previously financed two agricultural projects: the Balikh irrigation and rural development project and the first livestock development project. Although the Balikh project suffered institutional problems in its initial stages; these were ultimately resolved, as management gained experience. Both projects were completed satisfactorily.

2.07 Syria has limited potential for expanding the area under irrigation. Within the irrigation subsector, this project and the proposed subsequent irrigation and rehabilitation project in the Lower Euphrates Valley would permit full use of the existing irrigation infrastructure and would improve farm technologies and inputs through supporting extension and research.

2.08 The institutional performance in implementing the Balikh project was of concern to the Bank. But, it was concluded that the designated implementing agency, GADEB, had gained sufficient experience with the Balikh project to successfully implement this project. Furthermore, this project continued a heavy input of consultant services for supervision, technical assistance and monitoring (about 60 man-years).

### Project Description

2.09 The project focused on promptly halting the process of salinization by installing an effective drainage system to lower the groundwater. The drainage system to be completed in Phase I, is described below:

- (1) installation of 170 tubewells with electric pumps and associated equipment
- (2) construction of 450 Km of open drains to return saline drainage water to the Euphrates River, to intercept surface water from adjacent areas and to collect surface water from the project areas
- (3) construction of 200 Km of access roads to tubewell pumping stations
- (4) construction of 240 Km of 22KV power transmission lines for pumping stations, and
- (5) monitoring of salinity.

The project also included a provision for buildings and equipment for extension, operation and maintenance services, and consultants to assist extension and agricultural research, undertake hydrological investigations and provide engineering design services.

### Project Cost and Finance

2.10 The total estimated project cost was US\$58.9 million including physical contingencies and allowance for expected price increases. The

foreign exchange component of the project was estimated at US\$29.5 million or about 56% of the total project cost. Total project cost is detailed in Table 1.

### Appraisal and Negotiation

2.11 The project was appraised in October 1977. At appraisal, the following major issues arose:

- (1) The Government of Syria was skeptical about the proposed increase in the number of drilled tubewells to be installed in the first phase. While the proposed additional wells would increase costs by 15%, it would provide three major benefits as discussed in paragraph 2.05. It was finally agreed to include the additional 31 tubewells in the first phase.
- (2) The GOS was indecisive on the form of land tenure on abandoned lands after reclamation, whether private farms, cooperatives or state farms. Since this issue had more to do with the second phase than the first, it was felt that the Government's indecision would not influence the project viability.
- (3) Concerns were raised over pumping saline water into the Euphrates River, thus increasing the salinity of downstream water for users in Iraq. In the absence of international agreements, it was vital to ensure that the project would not seriously impair the quality and the salinity of the Euphrates. It was felt that the GOS should reduce pumping when the salinity of the Euphrates rose by more than .04 gram/liter. The Bank withheld approval of this project pending the establishment of a unit that was to monitor the salinity of the river during the life of the project. Although the GOS eventually signed a commitment to monitor the river salinity, this commitment remained unfulfilled. Unofficially, the GOS felt it was an inequitable obligation, since Turkey was not monitoring the salinity of the Euphrates flowing into Syria.
- (4) An implementation agency issue arose because of the multidimensional components of this project. GADEB was given the responsibility for implementing the civil works and MAAR was assigned responsibility for the extension and research component, jointly with the UNDP program. (However, the dynamic UNDP program dissipated during the early years of the project, but the Bank failed to revitalize this crucial component. In retrospect, the Bank conditioned its loan on the commitment of the GOS to integrate the extension services with project execution, yet limited its supervision and evaluation primarily to the engineering components.)

- (5) The GOS sought alternative sources of funding with lower interest rates, however, the Government ultimately asked the Bank to finance this project.

2.12 Negotiations were held in February 1979. Three major topics discussed and agreed during negotiations were:

- (1) inclusion of agricultural extension services in the project
- (2) the use of international consultants, and
- (3) the establishment of a unit to monitor the salinity impact of the drainage program.

2.13 Board presentation took place on April 10, 1979, and the Loan Agreement was signed on May 4, 1979; the Loan became effective in October 1979.

### III. IMPLEMENTATION

#### Plan of Operation

3.01 Although GADEB and MAAR had gained considerable implementation experience during the Balikh project, implementation was delayed about one and a half years. The project management was slow in tender preparation, bid reviews and contract awards. These delays probably reflected the time required to adopt Bank's ICB procedures which differ from those of the borrower. In view of the procurement dissimilarity between the Bank and the GOS, it is appropriate to consider the management's procrastination as an adjustment rather than unsatisfactory performance, as was stated in the supervision reports.

3.02 Although the project gained momentum, the disparity in the procurement rules between the Bank and the GOS continued to occasionally slow progress. In mid-1981, misprocurement involving several contracts led to a series of additional delays. In spite of the cancellation of US\$5.31 million, because of misprocurement, progress was not affected. Hence, the Bank granted a one-year extension of the project, justified by the improved management performance.

3.03 A new action plan called for project completion by the end of 1985. Although, implementation process, including procurement, improved and tenders were prepared to purchase equipment for operation and maintenance, the Government of Syria became non-accruant and disbursement of the unexpended balance, US\$4,114,602 was suspended and eventually canceled. Thus, the operation and maintenance component of the project was not implemented.

3.04 The project's key features were defined in the SAR to follow the general pattern for full development of the project. Activity began in Zone I (57,000 ha located on the right bank downstream of Deir-Ezzor) for installation of the tubewells and pumping stations, and for preparation of a detailed feasibility and design study for Zone II (37,000 ha located on the

left bank of the Khabour River) and Zone III (30,000 ha located upstream of Deir-Ezzor on the right bank of the Khabour). The first well drilling in Zone I was scheduled to begin in November 1980. The study was scheduled for completion within two and a half years.

3.05 The SAR included a provision for constant supervision and technical assistance, given the Bank's experience in the Balikh project. During the life of the project, there were twelve supervision missions involving 109 man-days with an average of one person per mission. Not only did the initial implementation process lag, but the first supervision mission was also delayed one and a half years. The project design emphasized the integration of irrigation with good farming practices. GADEB improved its capability in managing an engineering project but was unable to integrate the two components of the project. The first supervision mission recommended including a team of engineering and agriculturalist/extension specialists for the following supervision mission. There was no explicit or implicit justification for the Bank's inaction in providing both the mandatory continual supervision and a well-defined and justified specific course of action. It became apparent that the Project management was very responsive to the recommendations made by the supervision mission and was therefore able to resolve technical and managerial problems. In retrospect, the project design was correct in requiring Bank endorsement for the project activities. This approval was needed not only to ensure efficient project direction but also to strengthen the Syrian planning and strategy development capability and to encourage discussion of sectoral policies.

3.06 While the above problems prevented timely implementation, the project was strengthened by explicit and well-defined technical aspects. The mathematical model supported the project by minimizing the risk of uncertainty and maximizing overall project benefits. At the time of cancellation, the project objectives were within the reach of the GOS. The Government policy, planning strategy and investment allocation, discriminated against agricultural development albeit unintentionally. It was assumed that throughout the course of project implementation, the Bank would contribute to changing this situation. In fairness to Syria, its no-war, no-peace situation had forced the country to bear a heavy burden in the Middle East conflict. The same situation also had tied Syrian resources to defense-related expenditures, which took up almost 25% of the total budget. These macro considerations trickled down to the project level.

#### Agricultural Research and Extension Training

3.07 SAR indicated that the agricultural research and extension components of the project would be managed by the MAAR. Because of the existing FAO/UNDP project that provided financial and technical assistance to the MAAR, the Syrian Government, upon signing the Loan Agreement, agreed to assume the responsibility for maintaining efficient and sustainable agricultural services (including extension work), consistent with that established in the Middle Euphrates during and after project development.



3.08 In October 1980, the supervision summary alluded to the minimum progress achieved in integrating the research-extension component into other activities of this project. The mission recommended including a specialist in future supervision missions. In March 1982, the supervision mission recommended that the Bank express to UNDP its special interest in the extension of the UNDP/FAO Integrated Agricultural Development project in view of its vital activities for future development of the lower Euphrates area. The following supervision mission reports made no reference to the research and extension segment. It appears that both the Bank and the Government strayed from the intended integrated design and objectives. The weakness of the GADEB in administrating and directing an integrated project was anticipated and the project design included specific measures to fill this gap.

### Civil Works

3.09 The project successfully constructed the civil works foreseen at appraisal. These works, including tubewells, surface drains earthwork, drain lining, access roads, and transmission lines were completed in Zone I and partially completed in Zones II and III.

### Operation and Maintenance (O&M)

3.10 In August 1986, the ICB awards for purchasing O&M equipment were approved and contracts were signed. But, in the absence of trained staff to apply the computer model, some uncertainty exists about the quality of the operation and maintenance. The need for training was not identified during appraisal and was excluded from the project design. The training need was eventually recognized and recommended, but at the time of cancellation the issue was unresolved. The computer simulation model was critical for successful operation, not only in supporting the operating decisions (the amount of water to be pumped) but also in simulating the final output and predicting the end results. In retrospect, the quality of the operation as an indicator of realization of the project objectives was overlooked in the design.

### Monitoring

3.11 The establishment of a monitoring system for salinity control was more than two years behind schedule. Although it was a covenant violation, there was little concern over the salinity issue. This implied that while salinity control was a vital riparian issue, it had an insignificant impact on the Euphrates' water quality. In 1986, the Bank calculated the salinity increase during the life of the project and confirmed a no-risk scenario. A similar conclusion was reached during calculations in preparation for the second phase (land reclamation). These computations were prepared to resolve the riparian issue and assure the Government of Iraq that the project in both phases would not jeopardize the quality of Euphrates water.

### Consultants

3.12 The contract with consultants from GERSAR-SCET (France) was signed in March 1980 to carry out hydrogeological and soil investigations in Zones II

and III, prepare detailed design and tender documents for drainage works and assist in evaluating the bids. The anticipated time frame for completing these assignments was two and a half years. Initiation and completion of these investigations and studies were delayed by one year. The preparation of the tender designs and drawings for the works was constrained by the delayed approval of the technical proposals for these Zones. The reviews and approvals were assigned to a High Technical Committee (designated members were agency executives: seven from MOI, five from GOLD, and two from GOEDED). The performance by the consultants was excellent. The Bank supervision missions particularly praised the "decision support" mathematical model (which was designed by the consultant) to simulate the operation of the drainage system and aquifer reactions.

### Disbursements

3.13 Total disbursements for the project totaled US\$20,575,397, or 70% of the loan and about 38% of actual project costs. There were no disbursements for the first two years of project implementation and about 6% of actual costs in 1982. In March 1981, the Government awarded a contract to a Syrian company, although a French firm was the lowest bidder. This led to cancellation of US\$2 million. In March 1982, the Government awarded a contract to a company that bid about 33% higher than the lowest bidder, leading to an additional cancellation of US\$3.34 million.

3.14 Between 1982 and 1986, the rate of disbursement improved. Disbursements reached a pinnacle in 1986, achieving 57% of the appraisal estimate to about 85% of the loan amount. The remaining 15% of the loan was suspended and eventually canceled.

3.15 The slow disbursement and misprocurement that took place at the beginning of the project may be attributed to:

- (1) over-optimistic appraisal estimates of the readiness of the project for execution and the capacity of the implementing agencies, and
- (2) complex Syrian procurement regulations that required considerable time to bring them in line with the Bank guidelines.

### Procurement

3.16 The Loan Agreement provided for purchase of goods and civil works to be contracted on the basis of ICB. Exceptions were made for construction, furnishing and equipping of offices, workshops and warehouses at the project headquarters in Deir-Ezzor, and at sectional headquarters for operation and maintenance of drainage and related facilities, for which local competitive bidding was permitted.

3.17 The implementation schedule extended four years beyond the appraisal schedule because of delays resulting from misprocurement initially and from

modification of the procurement arrangements in October 1983 to use the Bank Loan to finance construction equipment instead of civil works contracts.

### Reporting

3.18 The implementing agency prepared 23 semiannual progress reports that were submitted to the Bank. While progress reports were required by the loan agreement, the Bank neglected to evaluate these reports and their implications for the project objectives. The supervision mission in 1986 requested a draft Project Completion Report to be submitted to the Bank by November 1986. This request remained unanswered, thus the borrower's point of view is excluded from this evaluation.

### Accounting and Auditing

3.19 Bank supervision missions reported that the project accounts were adequately maintained by GADEB/GOLD to reflect the financial operations, resources and expenditures of the project. Audit reports were submitted with considerable delays. These delays were caused by lengthy procedures in complying with audit requirements and the fact that auditing and financial statements were carried out by the Central Audit Organization, an independent agency of the Government responsible for auditing all Government accounts. While the concurrent audits were quite comprehensive, the audit reports furnished to the Bank were unsatisfactory, both in content and timeliness.

### Compliance with Covenants

3.20 Compliance with covenants was satisfactory. Exceptions were:

- (1) the establishment of a monitoring and evaluation system
- (2) the maintenance of newly completed works, which was the responsibility of the contractor up to the end of 1985, and
- (3) the auditing reports, all of which were inadequate.

3.21 At the time of signing the loan agreement, the Bank contributed only 5% of the total Syrian capital inflow. It may be overly optimistic to assume that the borrowers could immediately change the procedures for procurement, auditing and project implementation. Nevertheless, the long-term impact of this problem on the relationship between the borrowers and the donor should be evaluated.

### Performance of Management

3.21 During the life of the project, GADEB comprised two organizations, GADEB and GOLD. The former was responsible for O&M of completed projects as well as for agricultural and settlements aspects, and the latter was designated to implement and manage new projects, including this project. Because of the technical, financial and procedural constraints faced by the

project management, it is difficult to make a full and impartial evaluation of its performance during the life of the project. These forces impeded the project and should be weighed against the basic question of whether project objectives at appraisal were realistic. In hindsight, it would seem that the probability of project completion as predicted at appraisal was never great, and the performance of those involved in the project consequently suffered. Furthermore, because of the Government's emphasis on investments in irrigation and drainage projects, the limited manpower was diluted, which affected all the projects in this sector.

#### IV. PROJECT IMPACT

##### Physical Development

4.01 Operation of the tubewell drainage system on the right bank was initiated in May 1985 with eight tubewells. The results were satisfactory, with tubewells discharging at designed capacity. The salinity of the eight wells varied from 1.2 to more than 20g/l. The higher salinity readings were unexpected and could not be explained by the accumulation of salts over the last 25-30 years of irrigation. The high salinity was probably the result of a geological anomaly rather than improper irrigation systems. Yet, it introduced a host of new factors that needed to be examined and addressed. Nevertheless, the number of wells with high salinity content (20g/l) at the time of cancellation was too small to draw any specific conclusions. Additional information and salinity analysis would be necessary to determine whether a new plan of action would be required. The results of these analyses are also critical for the riparian issue, since the water from the tubewells would be pumped to the Euphrates. Furthermore, some farmers used the water from the wells to irrigate their crops with devastating results. Thus, the missing link between the extension and the installation of the drainage system was not only a constraint to agricultural production but was also an environmental hazard.

4.02 The last supervision report confirmed that the work in Zone I was completed and the main objective of the project -- to arrest the spread of the salinization by lowering the water table -- was completed. This Zone comprised 57,000 ha.

4.03 The cancellation of the Loan Agreement before the drainage systems were operational, with the exception of a few tested tubewells, precluded the project from achieving the full objectives. Phase I, which addressed the installation of drainage systems, was completed in Zone I and about 50% completed in Zones II and III.

4.04 The project was expected to reach 23,000 families in the Lower Euphrates area and to have an Economic Rate of Return of 15% over a 22-year period. The ERR was estimated to differ in different zones, ranging from 13% to 16%.

4.05 The SAR identified the key variables most crucial to the success of the project:

20% increase in capital costs	ERR 13%
20% decrease in benefits	ERR 12%
2-year delay in completion of construction	ERR 11%
No benefit of research and extension	ERR 10%

4.06 The SAR identified the main risks of the project as technical. The consultants developed a "Decision Support" simulation mathematical model that minimized these risks. The initial operation in Zone I of eight tubewells produced a set of new issues (e.g., unexpected high water salinity in some tubewells). Remaining unresolved, these issues would clearly affect the efficacy and impact of the project.

4.07 Considering the above analysis and the project implementation delays (four and a half years), lack of information concerning the benefits from research and extension, and the anticipated increase in project costs to US\$60 million as estimated in the 1984 supervision report, the ERR would be less than 10% for this phase of the project.

4.08 The main elements of Phase II of the project were identified in 1985 by an IBRD/FAO/CP mission. Preliminary examination of the data required for Lower Euphrates Reclamation project preparation indicated that Phase II would be a justifiable investment.

4.09 The real impact of the project might vary significantly depending on the project completion in total (Phase I and II) and the success of its operation and management. Experience has proven that a comprehensive and integrated drainage, irrigation, and land reclamation program would have greater economic and social benefits than an isolated drainage project because the combined benefits would trigger associated advantages.

## V. CONCLUSIONS AND BANK'S ROLE IN THE FUTURE

### Project Execution

5.01 The project was appraised in October 1977, approved by the Board in April 1979, and became effective in October 1979. The project was conceived to conserve the productivity of 300,000 ha in the Lower Euphrates Valley that was gradually deteriorating because of salinization. In the beginning, there were numerous delays. The Bank supervision reports deduced that these problems were management related, yet, two years' delay in implementing bank-financed agricultural projects is not unusual. The problems related to procurement were resolved, but the Syrian Government lost US\$5.31 million from the original US\$30 million loan.

5.02 The high salinity from some of the test tubewells was greater than could be attributed to land reclamation. A possible explanation is salt water intrusion from lower depths. Discharging drainage water from these

wells into the Euphrates river will not seriously affect the water quality; however, if the water from the entire set of drainage wells reached these high saline levels, Euphrates water quality would suffer.

5.03 The supervision reports highlighted management's willingness to complete the project. Although management continually attempted to overcome constraints, the project suffered periodic slowdowns. This cycle of stagnation/progression was as much related to the national political milieu as to ineffective management.

5.04 The actions that induced the cancellation of the project and impeded its activities and operation shortly before the closing date were not generated by the project management. Government's articulated goals emphasized the development of the agricultural sector, but the macro policies discouraged agricultural developments. Unsatisfactory performance during this project and other irrigation projects for the Euphrates Valley were predictable from the conflicts between the short-term/ad hoc policies and the medium-term planned policies (3.10 and 3.21).

### Institutional Development

5.05 GADEB and GOLD have gained significant experience during the last fifteen years through the Balikh Irrigation Project and other projects aimed at the development of the Euphrates Basin. Although these agencies proved their capability in construction management, land settlement and farm management, their experience in O&M of a complex and integrated system had not been tested. The supervision reports recommended that some of these capabilities could be developed through training, but there was no provision for training in this project.

5.06 While the Loan Agreement committed the Government to providing research and extension services, GADEB was unable to adequately coordinate the project activities with the Directorate of Agricultural Extension, Directorate of Agricultural Research and other research departments within the MAAR. The link between this project, irrigation projects, water management projects, and agricultural research and extension is vital for project success and should be developed and maintained.

5.07 The traditional irrigation and cropping methods practiced in the Euphrates basin led to increased salination and declining production. The project installed the technical capacity to reverse this situation, but did not effectively link this with extension. A fundamental extension role is transmitting information and facilitating the adoption of practices consistent with new technologies -- in this instance the new drainage program.

### Performance of the Bank

5.08 In 1979, the SAR assumed that all project work would be completed in four years. In retrospect, this schedule was too ambitious, especially in view of the procurement problems. In 1980, the Bank found that the

preparation of bidding documents was significantly lagging and suggested prompt action. Although the Government committed itself to abide by the Bank's ICB guidelines, it awarded two contracts in violation of these guidelines. The differences between Bank and the GOS's procurement procedures were identified during implementation of the Balikh project. Although the SAR assumed that GADEB had adapted to the Bank guidelines and procedures in reality GADEB was also obliged to follow GOS guidelines. It is prudent for the Bank to recognize that the final decisions on ICB were made by the GOS, not by GADEB management.

5.09 Despite a substantial field supervision effort, the Bank was unsuccessful in eliciting Government compliance with Loan Covenants related to O&M. Although these issues were raised by supervision missions, and recommendations were given through aide-memoires and several letters addressed to the highest concerned authorities, results were partial to non-responsive.

5.10 In general, continuity and frequency of supervision for the construction elements were reasonable. They were relatively lacking for the integration of research and extension, in spite of the fact that they were linked in the covenant. Supervision was effective in detecting major shortcomings in project execution. However, it was unable to remedy the shortcomings that were generated by macro policy.

### Training

5.11 The complexity and the multiple-objectives of the project required sophisticated management and skilled staff to operate the supporting decision model. Although training was not a foreseen need at appraisal, during supervision it became evident that both management training and training in computer applications were needed. However, the Bank declined to amend the loan agreement to finance these training needs.

### Conclusion

5.12 The project was the first phase of a comprehensive irrigation/drainage, land reclamation program for the Lower Euphrates. Construction of the civil works was successfully completed within the extended project period. However, sound operation and maintenance priorities, were not in place at the time of cancellation.

### Lessons Learned

5.13 The project was technically sound as implemented. However, as only a few tubewells were in operation at the time the project was cancelled the fate of the full operation and sustainability of the project remained unclear. More accurate assessment of the borrower's management and technical capabilities may have led to the inclusion of more technical assistance and training to resolve these weaknesses or to revise project objectives. An eight-year project implementation period instead of four would have permitted the borrower to adjust and adapt to Bank investment guidelines.

14 In summary, the important lessons learnt are as follows:

- (1) The introduction of a long-term integrated project requires sophisticated management and specific technical skills. Thus, the adaptation of new and appropriate technologies to the borrower's needs should be carefully examined by the Bank. Furthermore, the design should include a lag period to allow for this adjustment.
- (2) A design that involves high technology and technology transfer should include tailor-made training programs to address the need at three levels of decision making and management:
  - (a) policy and strategy makers and long/medium-term planners;
  - (b) mid-level managers and medium/short-term decision makers;
  - and
  - (c) grassroots decision makers and producers (technology users and daily decision makers).
- (3) The borrower's capacity vis-a-vis the Bank's requirements should be accurately assessed so that appropriate measures can be taken to reverse unsatisfactory trends such as inadequate auditing reports, part-time managers, and lengthy procurement procedures, and
- (4) Integrated projects are very complex and demand dedicated, multidisciplinary specialists. The project design should identify the specific expertise and skills needed for managing and monitoring a long-term, sophisticated and integrated irrigation project, taking into consideration the borrower's weaknesses that were identified at the time of the appraisal.



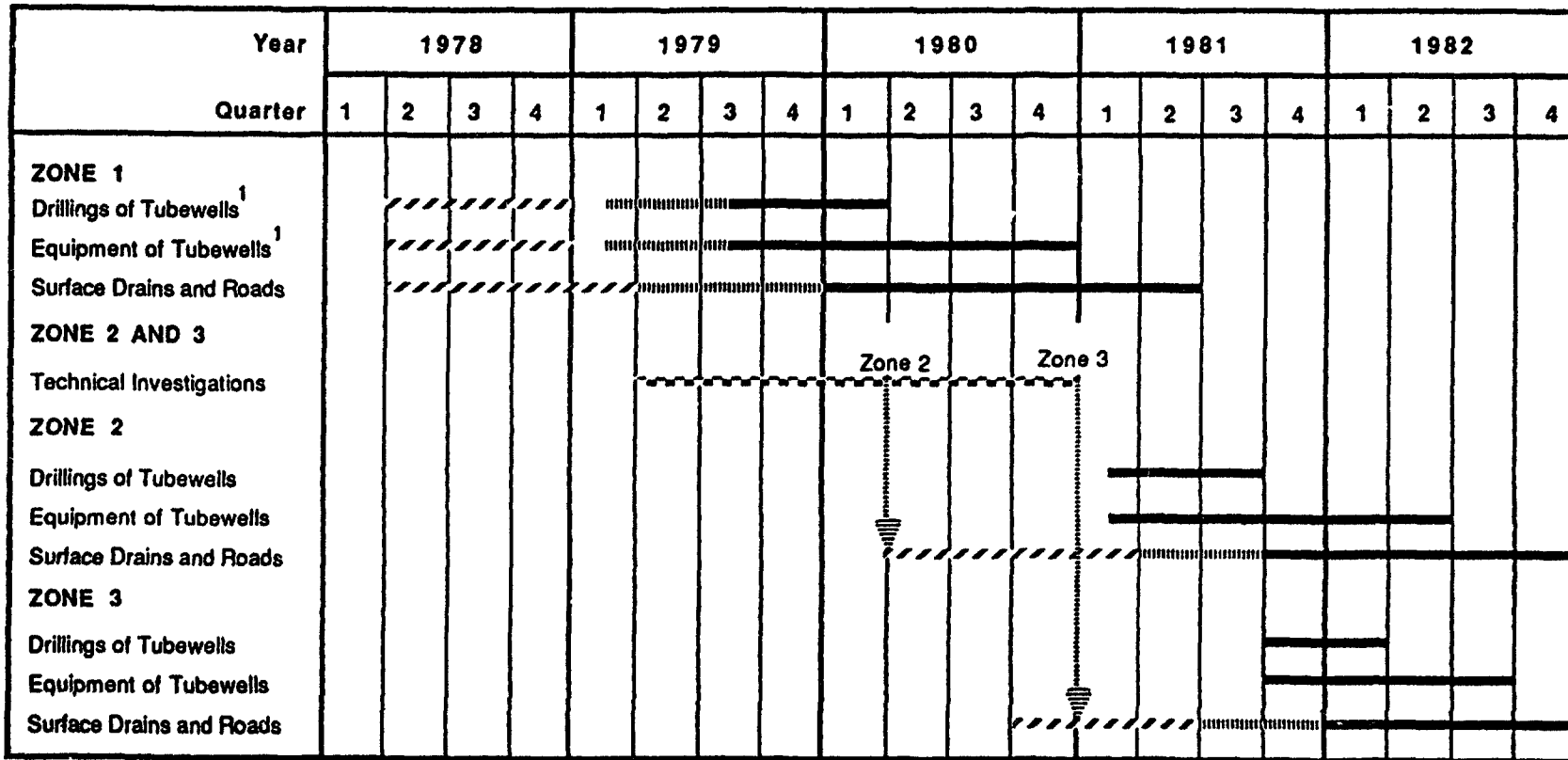
SYRIA  
LOWER EUPHRATES DRAINAGE PROJECT  
(LOAN 1682 SYR)

PROJECT COMPLETION REPORT

Project Cost Estimates (Reproduced from SAR)

	Local	Foreign	Total	Local	Foreign	Total	% of Foreign
	---(SL million)---	---	---	---(US\$ million)---	---	---	Total
<b>Drainage Works</b>							
Tubewells	6.7	13.8	20.5	1.7	3.5	5.2	68
Surface Drains	26.4	19.5	45.9	6.7	4.9	11.6	42
Access Roads	6.2	4.2	10.4	1.5	1.1	2.6	40
Transmission Lines	4.9	7.5	12.4	1.3	1.9	3.2	60
Subtotal	44.2	45.0	89.2	11.2	11.4	22.6	50
<b>Buildings</b>	1.3	0.7	2.0	0.3	0.2	0.5	35
<b>Equipment</b>	0.7	3.7	4.4	0.2	0.9	1.1	85
<b>Consultants</b>							
Detailed Investigations (Zones 2 & 3)	7.0	17.7	24.7	1.8	4.5	6.3	72
Supervision, Technical Assistance & Monitoring	4.1	8.8	12.9	1.1	2.2	3.3	68
Subtotal	11.1	26.5	37.6	2.9	6.7	9.6	70
<b>Total Project Cost Excluding Contingencies</b>	57.3	75.9	133.2	14.6	19.2	33.8	57
	====	====	====	====	====	====	
<b>Contingencies</b>							
Physical	10.4	12.7	23.1	2.5	3.2	5.7	55
Price	23.2	28.0	51.2	5.9	7.1	13.0	55
Subtotal	33.6	40.7	74.3	8.4	10.3	18.7	55
<b>GRAND TOTAL PROJECT COST</b>	90.8	116.6	207.4	23.0	29.5	52.5	56
	====	====	====	====	====	====	

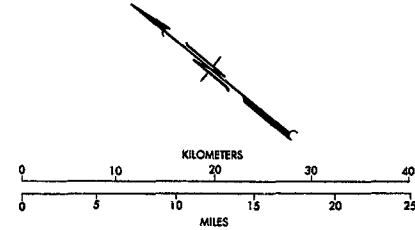
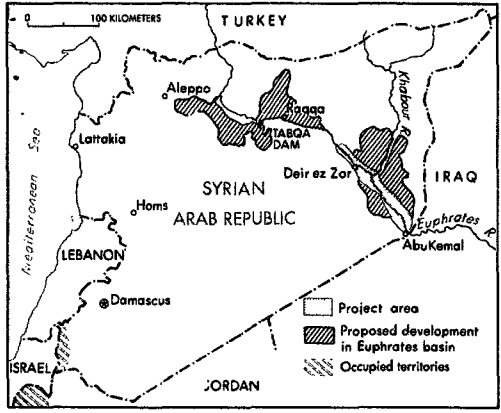
**SYRIAN ARAB REPUBLIC  
LOWER EUPHRATES DRAINAGE PROJECT  
IMPLEMENTATION SCHEDULE  
Reproduced From The (SAR)**



<sup>1</sup> Tendering for drilling and equipment of tubewells for the whole project

- //// Preparation of designs and tender documents
- |||| Bidding and award of contracts
- Construction

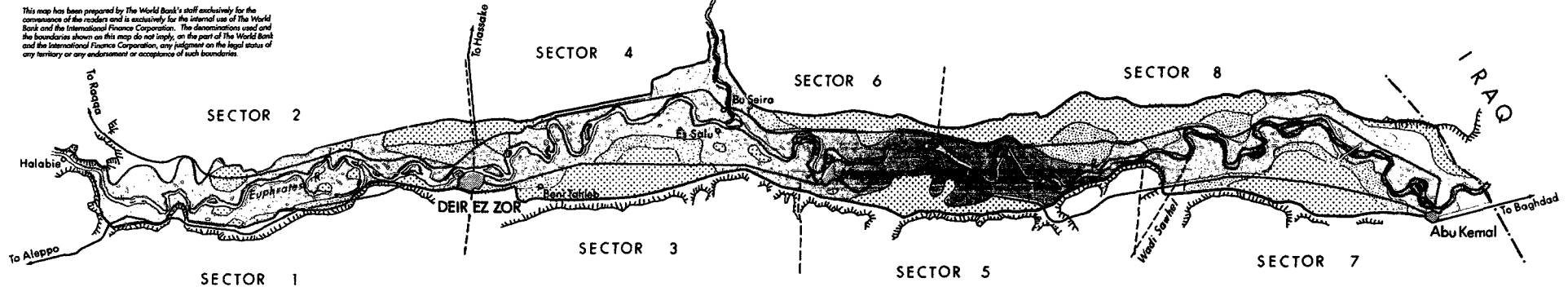
Table 2



SYRIAN ARAB REPUBLIC  
LOWER EUPHRATES DRAINAGE PROJECT

- Project boundaries
- Non-saline lands
- Moderately and severely saline lands
- Abandoned lands
- Rivers
- Wadi
- Existing roads
- Main towns
- Other towns and villages
- Gypsum cliffs
- Sector boundaries

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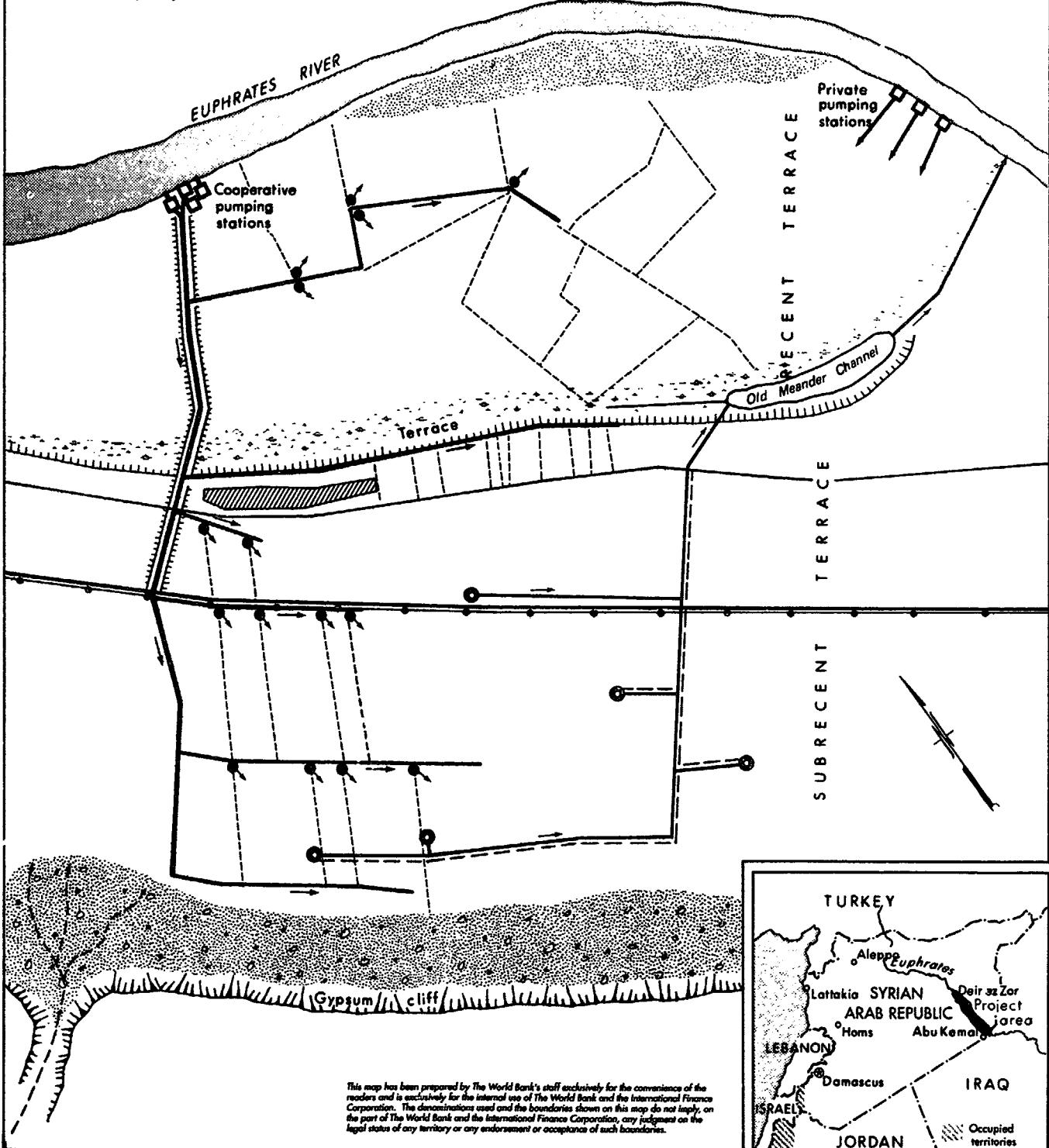


# SYRIAN ARAB REPUBLIC

## Lower Euphrates Drainage Project

### Typical Village Unit in Project Area

- |  |   |   |
|--|---|---|
| <ul style="list-style-type: none"> <li>--- Project roads</li> <li>— Project collector drainage</li> <li>● Drainage tubewells</li> <li>— Existing irrigation system</li> <li>○ Turnouts</li> <li>□ Pumping stations</li> <li>- - - Property boundaries</li> </ul> | <ul style="list-style-type: none"> <li>— Main road</li> <li>— Internal road</li> <li>— Power line</li> <li>▨ Village</li> <li>▬ Gypsum cliff</li> <li>▬ Embankment</li> </ul> | <ul style="list-style-type: none"> <li>Non-saline land</li> <li>Moderately &amp; severely saline land</li> <li>Abandoned land</li> <li>Marsh</li> <li>Sand</li> <li>Gravel</li> </ul> |
|--|---|---|



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