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MOROCCO: Doukkala-Zemama Agricultural Irrigation:

AID-DLC/P-3152

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DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

UNCLASSIFIED
AID-DLC/P-2152
April 14, 1976

MEMORANDUM FOR THE DEVELOPMENT LOAN COMMITTEE

SUBJECT: Morocco, Doukkala-Zemamra Sprinkler Irrigation.

Attached for your review are the recommendations for authorization of a loan to the Government of Morocco of not to exceed thirteen million dollars (\$13,000,000), such funds to be made available to assist in financing foreign exchange costs of equipment and vehicles and local currency costs incurred in the construction of civil works and village infrastructure required for an irrigation project involving approximately 15,000 hectares in the Doukkala region of Morocco.

The loan is scheduled for consideration by the Development Loan Staff Committee on Wednesday, April 21, 1976, at 10:30 a.m., in Room 3885 NS; please note your concurrence or objection is requested by close of business on April 26, 1976. If you are a voting member a poll sheet has been enclosed for your response.

Development Loan Committee
Office of Development Program Review

Attachments:
Summary and Recommendations
Project Analysis
Annexes A-J

AGENCY FOR INTERNATIONAL DEVELOPMENT PROJECT PAPER FACESHEET TITLE COMPLETED BY ORIGINATING OFFICE		1. TRANSACTION CODE ("X" appropriate box) <input checked="" type="checkbox"/> Original <input type="checkbox"/> Change <input type="checkbox"/> Add <input type="checkbox"/> Delete	2. DOCUMENT REVISION NUMBER 12				
2. COUNTRY / ENTITY Mexico		3. DOCUMENT REVISION NUMBER					
4. PROJECT NUMBER 601-0127	5. BUREAU a. Symbol: ME b. Code: 4	6. ESTIMATED FY OF PROJECT COMPLETION FY 1970					
7. PROJECT TITLE - SHORT (stay within brackets) [Caukkala-Zemamra Sprinkler Irrigation]		8. ESTIMATED FY OF AUTHORIZATION/OBLIGATION a. INITIAL [3 76] b. FINAL FY [76]					
9. ESTIMATED TOTAL COST (1000 of equivalent, \$1 = 1 000,000)							
FIRST YEAR FY 76							
ALL YEARS							
a. FUNDING SOURCE		b. FX	c. LC	d. Total	e. FX	f. LC	g. Total
AID APPROPRIATED TOTAL		5,000		5,000	13,000		13,000
(P-20)							
(P-30)		5,000		5,000	13,000		13,000
OTHER:							
1.							
2.							
HOST GOVERNMENT			2,100	2,100		51,400	51,400
OTHER DONORS (HS)			30,000	30,000		20,000	30,000
TOTALS		5,000	37,100	42,100	13,000	81,400	94,400
10. ESTIMATED COSTS AID APPROPRIATED FUNDS (1000)							
FY 76							
FY 77							
ALL YEARS							
a. Grant	b. Loan	c. Grant	d. Loan	e. Grant	f. Loan	g. Grant	h. Loan
13	5,000		8,000				13,000
TOTALS		5,000	8,000				13,000
11. ESTIMATED EXPENDITURES							
12. PROJECT PURPOSE (stay within brackets) <input type="checkbox"/> Check if different from PIU/PIIP							
[To convert a traditional dry farming area of 15,400 net hectares and 12,000 population to efficient irrigated farming by consolidating land holdings, installing a complete sprinkler irrigation system and providing supporting services for farming practices, livestock raising, and marketing. To improve living standards by creating new employment in processing industries and creating new village centers with associated infrastructure.]							
13. WERE CHANGES MADE IN B.C. 4.5 12 13 14 & 15 OF THE PIO FACESHEET? IF YES, ATTACH CHANGED PIO FACESHEET							
<input type="checkbox"/> Yes <input type="checkbox"/> No							
14. ORIGINATING OFFICE CLEARANCE				15. Date Reviewed in AID/OT, or Per AID/OT Instructions, Date of Distribution			
Signature				Date Signed			
Title				Date Reviewed in AID/OT, or Per AID/OT Instructions, Date of Distribution			
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DOUKKALA - ZEMAMRA SPRINKLER IRRIGATION

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TECHNICAL EQUIVALENTS

Currency Unit	= Dirham (DH)
DH 1	= US\$0.258
DH 1,000	= US\$258
DH 1,000,000	= US\$257,732

WEIGHTS AND MEASURES

1 millimeter (mm)	= 0.039 inches (in)
1 meter (m)	= 39 inches (in)
1 kilometer (km)	= 0.62 miles (mi)
1 hectare (ha)	= 2.47 acres (ac)
1 square meter (m ²)	= 10.76 square feet (ft ²)
1 cubic meter (m ³)	= 35.31 cubic feet (ft ³)
1 liter (l)	= 0.264 US gallons (gal)
1 hectoliter (hl)	= 26.4 US gallons (gal)
1 kilogram (kg)	= 2.206 pounds (lb)
1 metric ton (ton)	= 2,206.26 pounds (lb)
1 bar	= 14.506 pounds/square inch (psi)

MINISTRY OF THE KINGDOM OF MOROCCO

FISCAL YEAR
JANUARY 1 - DECEMBER 31

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ABBREVIATIONS

- BNDE** - National Development Bank
(Banque Nationale du Développement de l'Economie)
- CFDT** - French Company for Development of Textile Fibers
(Compagnie Française pour le Développement des Fibres Textiles)
- CLCA** - Local Agricultural Credit Bank
(Caisse Locale de Crédit Agricole)
- CIAT** - International Center for Improvement of Maize and Wheat
(Centro Internacional para el Mejoramiento del Maíz y del Trigo)
- CMV** - Development Center
(Centre de Mico ou Valcour)
- CNCA** - National Agricultural Credit Bank
(Caisse Nationale de Crédit Agricole)
- COMAGRI** - Moroccan Agricultural Company
(Compagnie Marocaine d'Agriculture)
- COMAPRA** - Moroccan Company for Marketing of Agricultural Produce
(Compagnie Marocaine de Commercialisation de Produits Agricoles)
- CP** - FAO/IEED Cooperative Program
- CRCA** - Regional Agricultural Credit Bank
(Caisse Régionale de Crédit Agricole)
- IRA** - Directorate of Agricultural Research
(Direction de la Recherche Agronomique)
- IRE** - Water Resources Division
(Division des Ressources en Eau)
- EAPDI** - Economic Analysis and Projection Department - IEED
- IRCT** - Research Institute for Cotton and Textiles
(Institut de Recherches pour le Coton et Textiles)
- MARA** - Ministry of Agriculture and Agrarian Reform
(Ministère de l'Agriculture et de la Réforme Agraire)

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ABBREVIATIONS - Continued

- MTPC - Ministry of Public Works and Communications
(Ministère des Travaux Publics et Communications)
- OCE - Export Trade Company
(Office de Commercialisation et Exportation)
- ONE - National Electricity Office
(Office National de l'Electricité)
- ORSTOM - Overseas Research Institute
(Office de Recherches Scientifiques et Techniques d'Outre-Mer)
- ORMVAD - Regional Agricultural Development Office Doukkala
(Office Régional de Mise en Valeur Agricole des Doukkala)
- ORMVASH - Regional Agricultural Development Office Sousu-Massa
(Office Régional de Mise en Valeur Agricole du Sousu-Massa)
- SCAM - Moroccan Agricultural Marketing Society
(Société de Commercialisation Agricole Marocaine)
- SCET International - Consulting Company
(Société Centrale pour l'Equiperment du Territoire (International))
- USAID - United States Agency for International Development

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DOUKKALA - ZEMAMRA SPRINKLER IRRIGATION

Part 1. Summary and Recommendations

A. Face Sheet Data

B. Recommendations

Loan \$13,000,000

(Terms: 40 years, 10 years grace, 2% during grace period -- 3% thereafter)

(To be authorized \$5,000,000 in April 1976, \$8,000,000 in July 1976 (Transitional Quarter Funds) or earlier if funds become available)(Annex C)

C. Description of the Project

The AID participation that is proposed here is an integral part of a project that was developed with the GOM by the World Bank in 1975. The composition of the proposed AID participation, which comprises 14% of total cost and 30% of the foreign exchange component, was decided in the course of extensive discussions with the Bank and the GOM during the final stages of project development. AID representatives took part in the negotiation sessions with the Bank and GOM representatives where final aspects of the Bank's loan documents were reviewed by all parties.

The project will provide all equipment, materials and services for the sprinkler irrigation of 15,400 ha in the Zemamra subdivision of Abda Doukkala area of northwestern Morocco and will also provide the socio-economic infrastructure, communications and ancillary facilities to constitute a viable and economically profitable project.

Ancillary services and facilities would include land preparation, farm access roads, windbreaks, buildings and equipment for extension services, operation and maintenance, artificial insemination services and milk collecting centers, as well as consulting engineering services.

Several GOM agencies and ministries will have responsibility for separate elements of the project, with installation of the irrigation facilities, land preparation and improvement of farming practices falling to the Regional Office for Development of the Doukkala (Office Régional de Mise en Valeur des Doukkala, ORNVAD). The work of the several agencies is to be coordinated by a GOM Project Coordination Committee.

The project will make possible the production of wheat, sugar beets, cotton and tomatoes and the growing of forage for livestock, and will create substantial new employment in the area, all helping to quadruple per capita income for a population consisting mainly of families on small farms. In further improvement of living conditions, the project will provide seven new village centers with electric lighting, domestic water supply, village roads and schools.

The project will be financed in parallel by the GOM, IERD and AID. The AID loan will fund the purchase from Code 941 countries including the United States of selected operation and maintenance equipment, movable sprinklers, hydrants and the major portion of the electromechanical equipment for the irrigation system, and for reimbursing the local costs of building the pumping stations for the irrigation system and installing village water supplies.

The total cost of the project is estimated to be \$94.4 million equivalent, with a foreign exchange component of \$42.0 million to be funded by a World Bank loan of \$30.0 million and the proposed AID loan of \$13.0 million of which \$1.0 million is allocated to local costs and up to \$3.0 million may be used for local costs if not needed for foreign exchange items. The GOM is to fund the \$51.4 million equivalent of local costs and eventually will recover up to 40% of the irrigation investment through betterment levies and water charges to the beneficiary farmers. The list of items selected for financing from the AID loan is as follows.

<u>Item</u>	<u>\$ Million</u>
Electromechanical Equipment for 3 Pumping Stations	2.0
Movable Sprinkler Equipment	4.4
Hydrants	1.5
Operation and Maintenance Equipment	0.3
CMV Equipment	0.4
Civil Works for 4 Pumping Stations	0.6
Village Water Supply	<u>0.4</u>
Total Basic Cost	9.6
Physical Contingencies	1.0
Price Contingencies	<u>2.4</u>
Total AID Financing	13.0

D Summary Findings

The analysis in this paper is based almost entirely on the Project Appraisal paper of the World Bank as supplemented by verbal explanations and elaboration. The AID Project Team satisfied itself as to the soundness of each aspect of the Bank's analysis, and made adjustments where necessary to accommodate AID criteria and requirements.

The technical elements of the project have been thoroughly studied and adequately designed to maximize production from the resources already available in the area, first by increasing the supply of the critically short resource--water--and second by improving farming practices and marketing arrangements. Similar improvements in neighboring areas indicate that the expected increases in production are achievable.

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Financial arrangements have been made for funding all elements of the project, both foreign exchange and local costs. The GOM Project Coordination Committee will be responsible for insuring the timely application of financing to the successive elements of project implementation.

Satisfactory economic results are attainable. Conservative estimates of the value of increase in production to be expected from the irrigation project yield an IRR of approximately 11% without ascribing monetary values either to the secondary activity that should result in the processing plants and in routine community commerce, or to the improvements in living conditions from the new village infrastructure.

Implementation of the project and operation of the eventual new facilities call for a high order of administrative ability. Since the capabilities of ORMVAD's staff are considered less than sufficient for its role in project administration, the project requires the use of engineering consultants' services to reinforce the staff. The performance of the GOM Project Coordination Committee will be closely monitored by the World Bank and USAID. The GOM, at the central level, is familiar with AID procurement procedures. However, ORMVAD is not, and will require assistance from USAID.

The project should proceed on an orderly and timely basis as a result of the GOM planning, intensive studies by specialized consultants, and extensive review and refinement by the World Bank, all of which have been completed. Project implementation began in 1975, as did IBRD retroactive financing. No costs incurred by ORMVAD prior to March 1, 1976 are to be eligible for financing from the proposed AID loan.

E. Project Issue. Equity in water use charges.

The question of equity in land holdings is reviewed in Annex 4 which shows a distribution pattern not too different from the pattern in the Triffa irrigation project area. In this project, nearly eighty percent of the units are shown to be five hectares or smaller and another twelve percent fall below ten hectares.

With regard to equity in water use charges, the GOM has set the policy in its national legislation of recovering up to 40% of the investment cost and all of the operating and maintenance costs from the charges that are levied on farmers who use water from newly built irrigation systems. Of those charges, the betterment levy of DH 1500 per hectare is progressive to some extent because farmers of small holdings are excused from all or a part of it. The water rate and the pumping charge where applicable are directly proportional to the quantity of water used. Annex 17 describes how the schedule of water charges is set up to recover the investment costs through the charges. Annex 17 also shows the impact of water charges on the farm incomes to be perceived from the project.

Equity policy of both AID and the World Bank favors a schedule of charges varying in a way that redistributes some income from large-scale to small-scale farmers. In the Triffa loan agreement (Triffa High Service 049) the GOM undertook to review from time to time the benefits derived from irrigation development in relation to the charges levied, and to adjust the charges as appropriate. There was no commitment in that agreement, however, to make the schedule of charges progressive as a result of any such adjustments.

In negotiating the Doukkala project loan documents, the Bank, with AID participation and support, made a determined effort to get a GOM commitment to a defined progressive schedule of rates. This was not accepted by the GOM representatives, who argued that the entire rate structure had been subjected to a complete analysis and the GOM did not want to commit itself before one set of the alternative recommendations had been accepted and a new national schedule of charges would be announced. Instead, the Bank loan documents will include a simple statement of GOM intention to make irrigation cost recovery charges progressive in relation to beneficiaries' incomes.

We propose that the AID loan documents contain a GOM reaffirmation of the commitments in the Bank loan documents. For the intermediate term, the GOM has agreed to carry out in 1980 a sample survey of production and income of representative farms in areas benefitting from the project in order to evaluate actual benefits derived from the project. It will be a part of AID's evaluation plan to consider the equity implications of the data produced by that survey.

Part 2. Project Background and Detailed Description

A. Background

Agriculture is the cornerstone of Morocco's economy. About 70% of the active population is directly engaged in farming, livestock, and forestry, and 75% of the total population is dependent on agriculture. The sector contributes over 40% of all exports and about 50% of the gross domestic product. The government is investing heavily in agriculture in order to: (a) increase farmer income; (b) improve income distribution; and (c) provide more adequate food supplies and thereby help remove a critical development constraint.

Despite the fact that cereals and pulses occupy over 80% of the cultivated area, a succession of poor harvests owing to unfavorable weather and inadequate cultural practices has made Morocco a net importer of cereals. The magnitude of the gap between domestic food consumption and production is indicated by the fact that food imports in recent years have made up about one-fourth of annual value of imports (total imports in 1974 were equivalent to \$1,906 million). It is essential that the GOM fully exploit the growth potential of the agriculture sector if food production is to keep pace with the growth of domestic demand.

One of the priorities of Morocco's development program is to increase farm output and to benefit the small farmer, who holds the bulk of the land in the traditional farm sector. Major emphasis is being placed on a land consolidation and land distribution program, an expanded credit program, government subsidies of production inputs, an extension of farmer training programs and the completion or extension of irrigated agriculture projects begun in the 1968-1972 Five-Year Plan.

The Doukkala area, where the proposed project would be installed has long been one of the most densely populated of Morocco. Dwellings are randomly located throughout the area. Dry farming as it is practiced there with the limited and irregular amount of rainfall leaves the work force badly underemployed and the per capita annual income very low (\$110). There is a heavy emigration of young workers from the area to the Casablanca area.

The best foreseeable way of increasing income in the area is by increasing the water supply through irrigation, making possible double cropping and a shift to higher value crops with a higher labor demand. The effect will be augmented by a program of consolidating individual parcels, some soil improvement, and then tilling adjacent parcels jointly with larger machinery.

Preceding the present project are several decades of studies and improvements in the basin of the Oum Er R'bia River and the Doukkala plain. A first master plan for Doukkala produced in 1952 provided for bringing water from the Im Fouf dam (1944) through a tunnel and a canal to the lower service area. Later studies in 1963 and 1970 by the Italian firm Electroconsult considered the area more comprehensively

than the lower service area alone, providing for eventual irrigation of 60,000 ha, of which 27,100 ha have by now been supplied with water. In March 1971 Alpinconsult, a Swiss firm, completed a review of previous studies of the river and recommended several alternative plans for the over-all management of water in the basin.

In 1973 the Société Marocaine d'Études et de Travaux (SOMET) was asked to define the basic parameters and design a project for equipping and irrigating the Zemamra block of Doukkala, and supervising execution of the first 3000 ha. Also in 1973, SCET-INTERNATIONAL (French) began a hydraulic master plan for waters of the Oum Er R'bia River and a feasibility study for the remaining 32,000 ha of the Doukkala plain. This study was completed in March 1975 and out of it the Bank developed the project for which the Bank and AID are making financing available.

In December 1973, the GOM had requested AID help on a \$22.8 million project for irrigating 10,500 ha in the Doukkala plain. By early 1975 an IRR had been approved, but definition and analysis of the project were still not adequate for the preparation of a satisfactory loan paper. In March 1975 AID began coordinating its consideration of a Doukkala loan with the World Bank's preparations for the larger Doukkala project mentioned above. Because of limited water availability and long construction schedule, 15,400 ha of the Zemamra Subdivision alone has been selected for development under the proposed project. The coordination between AID and Bank has continued to the present date and present status of the joint project which is proposed in this paper. One result of this coordination was the selection of a list of equipment items required for the Bank-defined project, and suitable for Code 941 procurement, together with two elements of civil works to be set aside for AID financing from the proposed loan of \$13 million.

B. Detailed Description

1. Basic Framework

The project to which the proposed AID loan would contribute would comprise: consolidation of private holdings of land; land preparation, drainage, roads and windbreaks; construction of 4 pumping stations with necessary power connections and raised reservoirs; installation of a sprinkler irrigation system; improvement of the main canal and construction of a 6 km. feeder canal for the 20 sector; strengthening the road network for expected heavier traffic; and provision of village infrastructure for 7 new village centers. The project would also provide buildings and equipment for operation and maintenance, and for extension, artificial insemination and agricultural research services, agricultural credit; and telephone facilities for the CMVs. The AID-financed equipment and facilities would be indispensable to irrigation and the improvement of farming practices, in the broader project that affords social and infrastructure improvements as well. AID financing is allocated, as shown in Annex 8, to four items and parts of three additional items out of a total of 30 basic project items. The physical aspects of the project are presented in detail in Annex 1.

2. Description of the Project

The project would irrigate the four sectors of Zennara subdivision, totaling 15,400 ha. Each sector would be served by its own pumping station. Size of sector and implementation schedule would be as follows:

<u>Sector</u>	<u>Net Area (ha)</u>	<u>First Year</u>
Z1	4,150	November 1977
Z0	5,900	November 1978
Z2	2,900	November 1979
Z3	2,450	November 1979

Crops to be grown would be sugar beets, cotton, industrial tomatoes, wheat, and fodder for milk and beef production. Land consolidation has been completed in 8,500 ha and is well advanced in the remaining area. Land improvement would consist of subsoiling to rip indurated layers of calcareous material and destoning on about 4,000 ha.

The main (bas) canal would be enlarged (29 km) to accommodate project demand. Automatic flow regulators in the main canal would regulate water levels in the different canal sections. A new feeder canal would supply the Z0 pumping station. Four pumping stations with a combined installed capacity of 8,300 kw would supply water from the main canal into underground networks and hydrants, each covering 16 ha served by movable equipment. Power for the pumping station would be supplied through extension (50 km) of a 60 kV/20 kV line, which presently terminates in Sidi Bennour. A 60 kV/20 kV substation would be constructed at the new terminal near Zennara and about 50 km of 20 kV lines would serve the four pumping stations.

Existing hard surface roads would be reinforced to accommodate the expected increase in heavy traffic during the sugar beet harvest season. About 21 km of new hard top road and 64 km of gravel roads would be constructed in addition to farm roads. About 50 km of telephone lines would be constructed, connecting pumping stations and CMVs with the subdivision office in Zennara.

The Regional Agricultural Development Office (CRVAD) would be responsible for the irrigation development of the sub-project. Other institutions involved would be the Ministry of Public Works through its Road Division and ONE (Office National d'Electricite), the Ministry of Education and the Ministry of Public Works. A firm of consulting engineers would assist the engineering staff at CRVAD headquarters in El Jadida in preparing final designs and contract documents, evaluation of bids, supervision of construction, and start-up of the irrigation system. Buildings and other facilities for the project authority include the subdivision offices, workshop and housing in Zennara, and three Development Centers (CMVs). The existing agricultural research facilities at Sahm Ya'cin would be improved through provision of buildings, animals and equipment. Six new milk collection centers would improve bulk marketing of milk. Supporting services, extension, and credit would be rein-

forced. The rural environment would be improved by provision of basic village infrastructure. A total of 7 new centers would receive roads, public lighting, domestic water supply and schools.

3. Construction Schedule and Status of Engineering

a. Construction Schedule

Construction of project works began in 1975 and is to be completed by December 1979. The proposed construction and activity schedule is presented in Annex 7.

b. Status of Engineering

Preliminary design for the irrigation and drainage network for the Zemama subdivision has been completed and is satisfactory. The Road Division of MTPC has completed a study on the need for extension and improvement of the road system. The location of O&V's and village centers has been selected and detailed plans for buildings and village infrastructure would be prepared by ORMVAD. A decision on location of schools to serve seven village centers and of the milk collecting centers is still outstanding. DRA has prepared preliminary designs for the research buildings. Final design and supervision of construction would be carried out by ORMVAD. Selection of consultants has been completed in accordance with Bank guidelines. Enlargement of the main canal is in progress. ONE has started preparation of power supply construction work.

c. Consulting Services

ORMVAD would engage a firm of consulting engineers to support its engineering staff at headquarters in El Jadida in the final design, preparation of tender documents, evaluation of bids, supervision of construction and start-up of the scheme.

Part 3. Project Analyses

A. Technical Analysis

1. Basic Considerations including cost

a. Choice of System

Sprinkler irrigation was determined to be the most appropriate method for the Zemzema subdivision because its irregular surface and relatively shallow wells do not permit necessary land leveling for the installation of a gravity surface system. Sprinkler irrigation would also have the added advantage of reducing development time compared with gravity irrigation. This determination was made in the feasibility study prepared by SCET International in 1974 and verified in the IBRD appraisal report of 1975 and the FAO Cooperative Programme report of 1974.

b. Employment

The project would increase employment by 270% (4,100 man years per year), and the seasonality of employment would be reduced. Labor supply in the area is estimated to be 190,000 man days per month and the rate of underemployment for the year would be reduced from 75% to 10%. Some additional labor from outside the area would be required during harvesting periods. The project would also provide employment indirectly because of the increased processing and marketing of produce and ancillary services related to farm inputs. The increase in employment should help to reduce migration out of the Doukkala into the urban areas, in particular the larger cities with extremely high unemployment rates (Casablanca 1971 about 16%). These estimates of incremental employment are based on data contained in Annex 14.

c. Operation and Maintenance

The irrigation system will be designed and the equipment will be selected for uncomplicated operation and for minimum maintenance as determined from past experience with sprinkler irrigation systems in the area.

The local Development Centers (CMV) would be responsible for operation of the irrigation system and would organize allocation and record hours of usage for billing purposes. Also, farmers' water users' associations would select among themselves a "common irrigator," responsible for equitable allocation of water and to serve as contact between the farmers and government watermen. The minimum size of Water Users' Associations would be farmers served by one hydrant. Repairs and maintenance of the irrigation system and of all equipment and vehicles would be the responsibility of the subdivisional office in Zemzema, which, in addition to its central workshop, would be equipped with mobile repair units. Minor maintenance and repairs of the irrigation system would be carried out at the local CMV level. Operation and maintenance of movable sprinkler equipment would be the responsibility of the farmers who would obtain assistance from the CMVs.

Operation and maintenance of schools would be the responsibility of the Ministry of Primary and Secondary Education. No firm program has yet been established for staffing and operation of the schools as their construction program would start within the framework of the next national 5-year plan. Assurances would be sought that the Ministry of Primary and Secondary Education would provide the staff and facilities needed to operate and maintain the schools as and when required.

Maintenance of power facilities would be the responsibility of ONE, and the Roads Division of the Ministry of Public Works would be responsible for all classified roads. Farm access roads would be maintained by ORMVAD. DRA would operate and maintain the research facilities provided for under the project. Maintenance of water supply facilities would be performed by ORMVAD until sufficient population has settled in the village centers to carry out this responsibility. Assurances would be sought that the Government would cause ONE, MTPC, DRA, and ORMVAD to operate and maintain the facilities as outlined above.

d. Cost Estimate

The total project cost amounts to \$94.4 million (DH 366.4 million) including taxes, duties and physical and price contingencies. The foreign exchange component is estimated at \$42.0 million (45%). Taxes and duties amount to about \$18.5 million (DH 71.5 million). The cost estimates are summarized in the table on page 11 and detailed in Annex 8 which identifies the items to be financed by AID and shows the allocation of costs between the Bank and the GOM on the other items.

Cost estimates for civil works and major equipment are based on unit rates obtained in contracts for similar works in Morocco during 1975. Prices have been updated to January 1976 equivalent. Physical contingencies vary from 15% for civil works to 10% for equipment. For all civil works, price contingencies were compounded at annual rates of 14% (1976) and 12% (1977-1979). For equipment, price contingencies were compounded at annual rates of 10% (1976) and 8% (1977-1979). Overall contingencies amount to 30% of total project costs.

SUMMARY OF COST ESTIMATES

Item	DM million ^{/1}			US million ^{/1}		
	Local	Foreign	Total	Local	Foreign	Total
<u>Irrigation Network</u>						
Canals	9.0	4.8	13.8	7.3	1.3	3.6
Pumping Stations	7.2	3.8	11.0	1.8	1.0	2.8
Underground Pipes	49.5	26.6	76.1	12.7	6.9	19.6
Land Preparation, Farm Roads, etc.	8.6	7.0	15.6	2.4	1.7	4.1
Drainage Network	6.0	6.0	12.0	1.5	1.5	3.0
Electro-Mechanical Equipment	4.6	10.7	15.3	1.2	2.8	4.0
Mobile Sprinklers and Hydrants	9.7	22.7	32.4	2.5	5.8	8.3
Power Network	4.2	6.3	10.5	1.1	1.6	2.7
<u>Agricultural Management</u>	4.0	4.3	8.3	1.0	1.1	2.1
<u>Infrastructure</u>						
Roads, Telephone Network, etc.	13.1	13.2	26.3	5.4	3.4	6.8
<u>Village Infrastructure</u>	4.7	3.3	8.0	1.2	0.8	2.0
<u>Agricultural Credit</u>	9.7	0	9.7	2.5	0	2.5
<u>Administration and Consultants</u>	9.1	7.9	17.0	2.3	2.1	4.4
Subtotal	139.4	116.6	256.0	35.9	30.0	65.9
<u>Physical Contingencies</u>	21.8	15.3	37.1	5.6	4.0	9.6
<u>Price Contingencies</u>	42.1	31.2	73.3	10.9	8.0	18.9
TOTAL	<u>203.3</u>	<u>163.1</u>	<u>366.4</u>	<u>52.4</u>	<u>42.0</u>	<u>94.4</u>

/1 Discrepancies due to rounding

2. Technical and Associated Aspects

a. ORMVAD and Project Implementation

The Regional Development Office, ORMVAD, is organized into six services: Administration, Agriculture, Livestock, Operation and Maintenance, Design and Construction, and Equipment and Buildings. Its main responsibilities are as follows:

design, supervise construction, operate and maintain irrigation projects in the region;
consolidate land;
supply farm inputs;
assist in disseminating information to and management of cooperatives;
train farmers.

ORMVAD would be the primary executing agency for this project and would be responsible for the functions described above and at the same time, installation of power transmission lines and substation is the responsibility of the National Electricity Office (ONE) and is scheduled for completion prior to the installation of the pump equipment. Design and construction of village infrastructure and roads are the responsibilities of the appropriate Ministries, including Primary and Secondary Education, Public Works and Public Health.

ORMVAD has gained experience during five years of operation of a 1,000 ha pilot sprinkler system and has demonstrated the need for qualified extension staff to ensure proper operation and maintenance of the field irrigation equipment.

This experience will be utilized for the development of the Zémama subdivision and similarly the technology used in the implementation of this project will be transferable to the development of the remaining areas as defined in the second phase of Doukkala irrigation scheme.

Farmers would be expected to join in groups when their land becomes more productive following the trend observed in areas already irrigated in the Doukkala. With assistance of ORMVAD they would establish independent service cooperatives to meet their needs for medium and short term credits, bulk marketing, and coownership of equipment (movable sprinkler equipment). ORMVAD has previous experience in the establishment of cooperatives and has also an ongoing training program for cooperative managers to meet future needs in their perimeter. ORMVAD has been effective in establishing milk collection cooperatives over the last three years.

b. Soils

In the Doukkala area a soil survey (scale 1:10,000) was carried out by ORMVAD. A land classification classified 67% of the lands as Class I, 16% as Class II, 33% as Class III and 4% as Class IV lands. The land capability classes are described in Annex 2, page 2. Part of Class III lands would require subsoiling. Class IV lands are light textured soils of limited depth and underlain by an indurated cal-

careous layer. On technical grounds irrigation development of the Class IV lands would have a low priority. However, small holdings are located in this area and land consolidation had been completed, thus creating expectations for further development. OPNVAD proposes to break the crust and destone this area for better root penetration. Before project execution, pedological maps covering this problem area (about 3,200 ha north of route Lt 1397) would be revised in order to define the exact scope of land preparation work.

c. Cropping Patterns and Yields

The establishment of an irrigation system with complete coverage of the project area will make it possible to establish an intensive cropping system which includes a major component of high return crops. With irrigation and the increase of yield levels it will be possible to reduce the acreage planted to the traditional wheat and bean crops and add the commercial crops such as sugar beets, cotton and tomatoes. In addition the assured irrigation will also support alfalfa and fodder crops thereby supporting milk and meat production.

The farming plans for the project area have been developed from soil surveys of the area. A planning criterion has been the establishment of mixed farming enterprises for the purpose of fuller labor force utilization and diversification of income sources. Mixed cropping and livestock enterprises are also being utilized to improve and maintain the soil fertility level. At full development the cropping intensity projected is 133% with the following production targets.

Cereals:

Wheat	6,340 ha
Maize	3,970 ha

Industrial Crops:

Sugar beets	2,900 ha
Cotton	1,360 ha
Tomatoes	1,360 ha

Fodder Crops:

Alfalfa	3,430 ha
Barley	170 ha
Berseem	630 ha

The projected yields of the project are based upon the results of a similar irrigated area of Zanzara subdivision and Sidi Bennour taking into account differences in soil and other factors. The projected yield levels compare favorably with adjusted yields of demonstration plots and research trials where comparisons can be made. The project plan anticipates full yields within six years after first irrigation. This may be an ambitious target, but appears to be feasible, particularly in view of the close supervision which will be provided by project administration. Under the project authority, which is responsible for production inputs and supporting services as well as irrigation, these ambitious targets are accepted. An interesting factor in the estimation

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of yields is a discount of the long term average to allow for possible drought -- twice in 10 years.

For purpose of project output calculations the following yields have been used:

Wheat	3.0 tons/ha
Maize	2.5 " "
Sugar Beets	45.0 " "
Cotton	1.5 " "
Tomatoes	40.0 " "

3. Markets

The additional production of the project will be marketed on both the domestic and export markets. The additional cereal production will offset the rising import requirements of the country and consequently will be fully marketed domestically.

There is also an adequate domestic demand for the sugar production but the processing capacity must be expanded. Processing capacity is presently being expanded to 4000 tons/day, but additional capacity will be required by 1982. Plans have been laid for this expansion, and further assurance of these plans is to be obtained in the loan agreement.

The milk and livestock products of the project will be marketed on the domestic market. The proposed construction of milk collection centers is designed to expedite the flow of milk to the Central Milk Plant in Casablanca and to a plant under construction in Sidi Bennou. Domestic demand for milk and an adequate marketing system is expected to readily absorb the full production of the project. The plans for livestock products marketing are similar, though less developed and less critical than for milk products.

The cotton production is expected to be readily absorbed by the European market. The 34.5 mm fiber, because of its strength and quality, is in high demand in the European textile industries. Ginning capability is adequate and other infrastructure improvements should assure efficient marketing and processing.

Tomato production is to be marketed as paste and canned products on the export market which appears particularly strong. Private entrepreneurs have expressed interest in setting up processing facilities in Doukkala. Credits for establishing new plants are available through the National Development Bank.

4. Conclusion

The planning and the economic and cost data presented in the IERD project appraisal report are based on previous detailed investigations. The most recent study was completed in March 1975. The methods used in the studies and the data presented are adequate for the development of project plans, benefit-cost computations and reasonable firm cost

estimates. AID has reviewed the IBRD appraisal and related documents and has concluded that, with the proposed reinforcement of ORMVAD Staff, the project is economically and technically sound and meets the requirements of FAA section 611 (a) and (b).

B. Financial Analysis and Plan

The financing plan would be as follows:

	<u>DH million</u>	<u>US \$ million</u>	<u>% of Total</u>
AID loan	50.4	13.0	13.8
Bank loan	116.4	30.0	31.8
GOM contribution	<u>199.6</u>	<u>51.4</u>	<u>54.4</u>
TOTAL	<u>366.4</u>	<u>94.4</u>	<u>100.0</u>

Proceeds of the AID loan will be used first for the financing of imported equipment and then for the reimbursement of local costs of project civil works, but in no event will more than \$3 million be used for such reimbursement.

The AID loan would be for 40 years, with a 10-year grace period, with interest at 2% during the grace period and 3% thereafter. The Bank loan would be for 20 years including a 5-year grace period, with interest at 8 1/2%. The GOM contribution would be made available as part of the capital budget of ORMVAD. Dirham allocations are assured for this purpose under the Third Development Plan (1973-1977). They are made available to ORMVAD annually and are then available for use by the Design and Engineering Service as needed. Bank reimbursement and AID reimbursement of local costs will be made to the Ministry of Finance against acceptable project elements already financed by the Design and Engineering Service. If AID and the GOM find it desirable, local costs may be reimbursed through Special Letter of Credit procedures. Otherwise, AID would reimburse local costs by purchasing dirhams with dollars. AID financing of imported equipment may be by reimbursement or by Letter of Commitment procedure.

C. Social Factors

1. Population

The Doukkala is characterized by one of the highest rural population densities in Morocco since, according to results of the 1971 national census, it exceeds 95 inhabitants per square kilometer distributed in 120 settlements (douars). The two most important population centers are Zemzama and Tnine Rharbia. The population is almost exclusively rural.

A comparison of the censuses of 1960 and 1971 shows that there is considerable emigration from the region, primarily to Casablanca. In fact, while the mean growth rate in Morocco is 2.6% annually, it is only 1.73% for the entire project zone and 1% for the Zemzama circle situated within the project zone.

2. Traditional Social Organization

There are vast differences in population distribution within the project area that reveal a clear parallel between soil composition and human habitation: one notes great dispersion in the rocky plateau regions with shallow soil and a linear concentration of homes bordering areas where the soil is deep and of moisture-retaining clay.

Social life centers around the weekly markets (souks), the main ones in the project area being at Zemamra, Thine Rharbia, and Sidi Smail. Community services are grouped in the larger centers. In the project zone, only Sidi Bennour, Sidi Smail, Zemamra, and Thine Rharbia now have electricity and piped water supplies. Sidi Bennour has a health center and a pharmacy, the other centers being equipped with dispensaries. As for educational facilities, Zemamra has a secondary education school, but primary school facilities are very inadequate. School attendance is low, averaging only 20% to 25%.

3. Employment

An analysis of the 1971 census shows that the average family in the project zone consists of 5.7 persons, including the head of household, his spouse, 3.4 children (2.7 under 15 years and 0.7 over 15 years), and 0.3 relatives. Currently, the inhabitants of unirrigated areas are largely underemployed, performing some 30 days of work per hectare per year, or 120 to 150 work days for the nominal exploitation of 4 hectares when the annual available family manpower is of the order of 500 work days.

4. Impact of the Project on Traditional Social Structure

The project would provide sprinkler irrigation to an area currently dry-farmed. Production of wheat, sugar beet, cotton, tomatoes, and forage for livestock are planned. Incomes will be improved and underemployment reduced. The project will also improve the quality of life by providing basic village infrastructure, including seven new village centers with public lighting, domestic water supply, village roads, and schools. Stabilization of potential migrants will result. Paid employment also will become available to the sizeable manpower reservoir in arid areas adjacent to the project zone. In the total process, tribal distinctions and cohesion will tend to fade and a new social structure emerge based on community interest, activity, and location.

5. Impact of the Project on Women

We are not aware of any studies that have been made uniquely assessing the role of rural Moroccan women in the project area. However, by extrapolating from the pattern of family tradition and organization prevalent in rural Morocco, the following assumptions can be made about the impact of irrigation on their lives:

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- a. Mothers, pregnant and nursing women and their children will receive improved health care because of expanded facilities.
- b. Nutritional deficiencies will be minimized because of increased diversified agricultural output.
- c. An improvement in shelter, due to increased income, will reduce the incidence of many diseases and illnesses concomitant with poor housing.
- d. An improvement in the overall standard of living will make it possible for mothers to spend more time nurturing young children at home and preparing them for a productive life.

Some published studies on the role of women in Morocco, and in Moslem society generally could be reviewed for indications of the effect of development on women's lives. There is little reason to expect the indications would be any more precise for this project than the foregoing extrapolations. A more productive way to gather specific information about a narrowly proscribed project area would be to engage Moroccan researchers to study the question on the spot. Some existing institutions are believed to be qualified for such studies.

D. Logical Framework

Goal

The primary goal to which the project is addressed is the increase in production of agricultural products in the Doukkala region of Morocco. A target cropping intensity of 133% has been established and target yields are presented in Annex 2, Table 1. These targets are projected to be met in 1985, within 6 years after the entire project area has been served with irrigation water. The targets were set on the basis of results obtained in a neighboring irrigated area, results from an 80-hectare sprinkler irrigated area within the Zemzama subdivision, and experimentally determined results which take into account limiting soil conditions.

Meeting the primary goal would contribute to the sector goal of increasing agricultural production for import substitution and for export. This contribution would occur in the form of increased production of cereals, milk and sugar which are currently imported, and of increased production of cotton and tomatoes for export to Europe.

Meeting the primary goal would also contribute to the sector goal of increased employment in rural areas. Due to the project, employment in the Doukkala is estimated to increase by 270% by 1985 in agriculture and in agriculture-related jobs in marketing, processing and the service sector.

Underemployment has been projected to decrease from 75% to 10%. (See Annex 14 for details.) It is hypothesized that meeting the project goal will help reduce the migration rate from the Doukkala region to urban areas such as Casablanca. The current migration rate from Doukkala to Casablanca has been estimated at 1.5% per year. No plans have as yet been made for trying to measure a change in the migration rate attributable to the project.

Purpose

The purpose of the project is to establish irrigated agriculture in the Zemzama region. The construction of the project is scheduled to be completed by 1980, by which time 2 years will have elapsed since first water was delivered to sector Z1. Sectors Z2 and Z3 will have just started operation at that time.

Evaluations are scheduled for each year of the project life. In 1978, a mid-term evaluation will measure progress of the project toward meeting the project purpose, and assess the need for change.

A major evaluation is scheduled for 1980, the year when the project purpose is supposed to be attained, to determine whether end-of-project conditions have been met. The target conditions for the time of this evaluation include:

1. Full use of the irrigation system and an on-going O & M program following the guidelines of the consultants.
2. Full use of the agricultural management services and demonstrated success of the farmers in using the new irrigation practices.
3. Full use of the credit program by farmers in the project area.
4. Full use of the village infrastructure with people relocating to the village centers and making use of the services provided.

Outputs

The outputs of the project include installation of the sprinkler irrigation and drainage systems, the expansion and strengthening of agricultural management services and agricultural credit, and the construction of project and village infrastructure.

The following are the specific project outputs:

1. Land consolidation and preparation, surface drainage, access roads, and windbreaks completed on 15,400 hectares.

Best Available Document

2. Enlargement of the main supply canal (29 km), construction of a feeder canal for Z₀ sector (6 km), and installation of automatic flow regulators.
3. Construction of 4 electric pumping stations with a total installed capacity of about 8,300 kW, each with one high equalizing reservoir.
4. Construction of a 416 km underground water distribution system, including hydrants, and movable sprinkler equipment serving 15,400 hectares.
5. Construction of 50 km of 60 kV and 50 km of 22 kV lines and one substation.
6. Construction of main drainage channels (520,000 m³ of excavation).
7. Construction of 21 km of new asphalt roads and 64 km of gravel roads, and enlargement and reinforcement of 108 km of asphalt roads.
8. Construction of necessary buildings for ORMVAD offices, workshop, and housing.
9. Installation of infrastructure for 7 new village centers including paved roads, electricity, treated public water supply and schools.
10. Construction of 3 new OMs and staffing at the level of one extension agent per 65 farmers.
11. Increase in credit availability by \$2.5M through existing credit facilities of CLCA, CRCA and ORMVAD.
12. Additional instructors to be stationed in the project area to train selected farmers in insemination practices.
13. Construction of 6 milk collection stations which are to be used by milk collection cooperatives organized by ORMVAD.
14. Expansion and strengthening of the research facilities of the DAR at Jenie Sahin.

Inputs

1. \$13 million of financing for imported commodities and local construction costs (see Part I, C for details of the USAID contribution).

2. \$30 million of financing for consultant services and agreed percentages of construction and related project cost by the World Bank.
3. All remaining project financing, estimated at \$51.4 million by the OCH.
4. Land.
5. Planning, design, supervision and labor.
6. Construction equipment and materials.

(For details of project costs see Annexes 8, 9, 10.)

Purpose to Goal Assumptions

In order that the stated project purpose contribute to the goals of increased agricultural production and increased employment, a major assumption must be made. That is, that the project, once established, will continue to operate as a successful economic enterprise. More specifically, the following assumptions must be made:

1. That products from the project area can be produced to compete successfully in local and European markets or that special concessions are granted for Moroccan exports. Prices of farmer inputs must remain at acceptable levels.
2. That processing and marketing facilities will be expanded to meet increased production levels, as planned by the OCH for sugar beet processing capacity, and by private entrepreneurs for tomato processing.
3. That sufficient quantities of irrigation water remain available to the project area, that water quality levels remain acceptable and that water management capabilities of OCHVAD and of the farmers remain acceptable.

Outputs to Purpose Assumptions

In order that the stated project outputs result in the project purpose being met, the following assumptions must be made:

1. That farmers resettle at the village centers where services can be provided.
2. That OCHVAD successfully operate and maintain the system.
3. That OCHVAD continues to effectively organize credit, purchasing, marketing and milk collection co-ops.
4. That farmers successfully adopt, with the assistance of the extension agents, the new irrigation practices.

5. That GOM ministries and agencies including ONE, MTPC, Ministry of Health and Ministry of Education assume their respective financing and maintenance responsibilities.

Inputs to Outputs Assumptions

In order that the stated project inputs result in the project outputs the following assumptions must be made:

1. That construction will occur in a timely manner and contractor performance will be effective.
2. That funds will be allocated from GOM, IERD and USAID in a timely manner.
3. That commodities will be delivered as scheduled.
4. That the land consolidation program continues on schedule.
5. That OBMVAD will be able to make full use of engineering consultants' services in carrying out the project.

E. Environmental Considerations

While it was refining the project design with the GOM, the Bank took into account its various environmental aspects, and found the potential for the spread of Bilharzia to warrant specific attention. A.I.D. encouraged this particular attention by the major investor, in accordance with the pertinent provision of PD 53, in the course of its coordination as a minor contributor of parallel financing to the project.

The Bank engaged an expert on the transmission and control of Bilharzia as a consultant to evaluate the potential for spreading Bilharzia in the Doukkala area and recommend appropriate

measures. The consultant found this risk to be minimal in this sprinkler irrigated project (Annex B). The Bank has included in the project provisions for monitoring by the GOM and part of the financing for necessary actions to deal with any spread that appears.

The project team believes the Bank's review of environmental considerations revealed no circumstance that should require A.I.D. to make an independent environmental study. A.I.D. loan documents will reconfirm the GOM undertakings for environmental vigilance that appear in the Bank loan documents.

F. Economic Analysis

1. Costs

The French firm SCET, in its feasibility study, prepared a project cost estimate. The IBRD, in its review of the project feasibility updated the estimate after researching locally the prices of materials, equipment and labor (Annex 8). The Bank made its estimate of costs generally higher than the Consultants' by making liberal contingency allowances for price escalation and increases in physical quantities of work and materials. There should be, therefore, a greater assurance that the project will be built within the estimate.

Some of the cost items in the estimate are solely for social development, such as schools, and still other cost items are for infrastructure development such as communication facilities, etc. These items, while forming a part of the loan package do not constitute a part of the features normally considered within the context of irrigation project works. Their costs, therefore, have been excluded from the investment costs in making the economic analysis for the proposed loan. Also, the costs of the power network being financed under the project will be recovered through the power rates charged for consumption and are, therefore, not included in the investment costs. Furthermore, since any general increase in costs that would put into effect the cost price contingency would be compensated by increases in prices of products

grown in the completed project, none of the price contingencies have been included in the investment costs. The investment costs defined as explained above, total Dfl 171.4 million.

2. Production

In calculating the returns of this investment, the agricultural production increase from the present level to that projected in 1989 is used as the basis of calculation. Without the project there is no increase in production anticipated from the area, essentially due to the low productivity caused by the unpredictability of normal rainfall of the area. The table which follows compiles the estimates of incremental production possible with assured irrigation, intensive cultivation, adequate inputs and services, and general improvement in technology. The yield levels used are those of a long-term average discounted for unusual water shortage twice in 10 years. The production increases include both field crop and livestock production. The full development is projected for the 10th year after project completion.

Crops	Without Project		With Project		Incremental Production (tons)
	Area (ha)	Production (tons)	Area (ha)	Production (tons)	
Wheat	9,600	9,600	6,360	19,080	9,480
Maize	1,500	1,200	3,970	9,925	8,725
Sugar Beet	-	-	2,900	130,500	130,500
Cotton	-	-	1,360	2,040	2,040
Beans	1,600	1,280	-	-	(1,280)
Tomatoes	-	-	1,360	54,400	54,400
Alfalfa	-	-	3,430	205,800	205,800
Barley Fodder	-	-	320	6,400	6,400
Berseem	-	-	830	20,750	20,750
Milk	-	2,500	-	18,000	15,500
Beef	-	700	-	2,000	1,300
Total	12,700		20,530		
Cropping Intensity	82.5%		133%		

AID's review of the climatological data, soil types and development program of irrigation and other services confirm that the Bank's assessment of the production potential are a reasonable, conservative basis for project analysis.

3. Prices

Two sets of output prices have been used for project appraisal, one for economic analysis and the other for financial analysis of farmer's income and farm budgets. For economic analysis, tradable commodities have been valued at international prices as described by the Bank's Economic Analysis and Projection Department (EAPDI) for 1980, in 1975 constant US dollars adjusted to a farm gate basis. Other products which are not covered in the EAPDI list of commodities have been based on

the Bank Appraisal Mission's estimate of projected border prices. For financial analysis all commodities have been valued at 1975 current farm gate prices including subsidies. The two sets of prices are given in Annex 11, Table 9. These prices when converted and compared to dollar prices in the United States appear reasonable.

4. Farmers' Income

For analytical purposes the Bank studied the impact of the project on four types of farming operations found in the project area. In this analysis all commodities were valued at 1975 farm gate prices with the subsidies then in effect. The average per capita income of the farming population would increase from \$110 to \$485 which would compare with a projected average national per capita income of \$700 in 1992.

Average farm income of farm families operating different farm types would be as follows:

Farm Type	Area (ha)	Net Cash Income (after tax)			
		With Project		Without Project	
		(DH)	(US\$)	(DH)	(US\$)
I	2	4,970	1,280	1,330	342
II	5	12,630	3,255	2,680	690
III	5	11,226	2,890	2,680	690
IV	25	41,600	10,720	6,780	1,747

AID analysis of the Farm Budgets confirms these estimates as reasonable projections for the type of enterprises found in the project areas, with the stated assumptions regarding modernization and service infrastructure. In other projects, projected net farm income increases as low as 50% have been adequate incentive for the introduction of farm improvements under moderate risk. For this case, where numerous changes in technology are necessary, the estimated increase in net income of 275% or more should prove to be adequate for the necessary farm level incentive. Also, there are several opportunities for redeployment of resources in alternative farming systems which could provide essentially the target levels of returns, should implementation difficulties be encountered for the planned complex farming systems.

In summary, the farming systems planned are ambitious because of their complexity but the target levels above are reasonable planning levels.

5. Main Benefit and Beneficiaries

The major quantifiable benefit from the project would be the substantial increase in agricultural output which would raise farmers' incomes and employment opportunities. The project would benefit mostly farmers operating farms of less than 5 ha (78% of the farms in the Doukkala). Among the intangible benefits would be the creation of better

living conditions as a result of investments in the social infrastructure which would enhance quality of life. The bilharzia control program should prevent any deterioration in health from that cause in the Doukkala. The project would have an important beneficial effect on the rural employment market. Labor requirements would increase at full development, increasing employment by 4,100 man years per year. In addition the project would provide the greatest additional employment during periods when employment has been traditionally the lowest and therefore would reduce seasonality of employment. Further use of existing processing capacities as well as establishment of additional processing plants will create varied employment opportunities.

Having examined the items of production costs, market prices and cropping patterns suggested by the Bank, AID accepts the project direct benefits as computed by the Bank to be satisfactory for economic analysis.

6. Economic Costs and Benefits

The Bank's analysis leading to the economic rate of return (IRR, in AID usage) of 11.4 per cent is shown in Annex 13. Major assumptions made for computing the basic rate of return include:

- (1) The economic life for canals, drains, electro-mechanical equipment and mobile sprinkler equipment of 25, 15, 15 and 10 years respectively, and for main adduction canals 40 years, buried pipes and other major civil work structures of 50 years.
- (2) Project investment costs, production inputs and project benefits valued at current prices, net of taxes, subsidies and price contingencies.
- (3) Exclusion from the stream investment costs of credit cost for annual production since that cost is included in the calculation of the flow of incremental benefits.
- (4) Treatment as sunk costs of the existing diversion and adduction structures in the Doukkala project.
- (5) Electricity cost of 0.128 Kwh which corresponds to average tariffs to large consumers.
- (6) Full development period for (a) crops of 6 years and (b) livestock 10 years.

The IRR, costing hired labor at the market rate of DH per day and family labor at DH 8 per day and excluding village infrastructure, is summarized as follows:

	IIR
1. Basic Run	11.4
2. Increasing all costs 20%	9.3
3. Decrease benefits 20%	8.8
4. Increase power costs 50% and all other costs 20%	8.9

The Bank's IRR analysis assumes that the full capital disbursement will be made essentially within five years, with the benefits building up to design levels over a fifteen year period. These are conservative assumptions regarding project evolution, with discount periods for costs and for benefits that combine to produce the modest IRR for the project.

There have been a number of other projects with more liberal assumptions about the rate of project evolution, but these projects have not achieved the assumed rates. Rather, their actual performance conformed reasonably well with the rates the Bank has projected for this project, offering re-assurance that the rate of return derived for this project can be reached.

The economic analysis does not include a factor representing the increased economic activity of the project area which would be a secondary result of the direct incremental benefits of agricultural production. This category is not easy to estimate. Nonetheless, if farm per capita incomes increase by 200% there will be a marked increase in consumer purchases, home improvements and related service industries. With the information in the Bank reports, it would not be possible to construct an alternative analysis taking this factor into account, but it may be assumed that 40-60 % of the increase income would be spent on non-food expenditures. In other words the Gross Domestic Product generated as a result of the incremental agricultural production would be increased by at least 40% for purposes of estimating project benefits.

7. AID Analysis

After reviewing closely each element of the Bank's economic analysis, the Project team is satisfied that the rate of return that is derived is a conservative one. It may be noted that benefit-cost ratios computed at discount rates of 7, 8, 9 and 10 per cent came to 1.3:1, 1.2:1, 1.1:1 and 1.02:1 respectively. Considering in addition the social and intangible benefits to be expected from the project, and the possibility for greater increments in production than are used in the forecast, the team considers AID participation in the project appropriate.

Part 4. Implementation Planning

A. Administrative Arrangements

1. Recipient

ORMVAD would be the primary executing agency for the Doukkala-Zemamra subproject, and would be responsible for the construction, operation and maintenance of the irrigation and drainage works, and for agricultural development. It would also be responsible for construction of treated water supply facilities, project buildings, and farm roads. ORMVAD in addition would supervise construction of the village centers. ORMVAD is thus the institution to which the Bank and AID will look for project supervision, management and implementation.

The present organization of ORMVAD would be restructured and strengthened for the implementation of the project, in view of the heavy workload presently being undertaken by it, noticeably the development of the 27,100 ha already equipped for irrigation. A subdivision of ORMVAD's Design and Construction Service has been moved to Zemamra with responsibility for coordinating ORMVAD construction activities in the area. ORMVAD would set up Zemamra office in charge of operation and maintenance which would be responsible to the Operation and Maintenance Service. A Zemamra Subdivision of the Agriculture Service would be opened to take charge of all activities of the CMVs in Zemamra (Annex 15) when three or more CMVs were created.

Present Design and Construction Services of ORMVAD are understaffed for meeting project needs. In addition to the proposed permanent reinforcement of the Design and Construction Service, the size and complexity of the project works would require assistance from a consulting engineering firm for design work, preparation of contract documents, evaluation of bids, supervision of construction and start-up of facilities. ORMVAD has already contracted consultants in agreement with the Bank. Agreement was reached that their employment would be on terms and conditions acceptable to the Bank. ORMVAD's extension services would be strengthened by the appointment from local sources of agriculturists to head the CMVs, ten agents per CMV (equal to one agent per 65 farmers or about 300 hectares), arranging for subject matter specialists of the Agriculture and Livestock Service to assist the agents, and strengthening the research facilities of the DRA at Jemie Sahim.

ONE would be the executing agency for construction of connecting power lines in the project area and the Road Division of MTPC would be the executing agency for construction and improvement of the road network. The Ministry of Primary and Secondary Education would be the executing agency for construction and operation of schools; and the Ministry of Public Health would be responsible for elaboration and implementation of the bilharzia control. ONE, the Road Division of MTPC and the Ministries of Education and Health would carry out their responsibilities through their local offices in El Jadida.

A Project Coordination Committee with local representation of all government agencies involved in project implementation, would be responsible for the coordination of the different agencies involved. The GOM has agreed that the Project Coordination Committee would meet not less than once every three months to approve quarterly progress reports, review past achievements and future work program for each of the participating organizations and make recommendations to take action as necessary to ensure coordination between participants. The establishment of the Project Coordination Committee with terms of reference satisfactory to the Bank, would be a condition precedent to disbursement of the proposed loan.

Farmers are expected to join in groups when their land becomes more productive, following the trend observed in rehabilitated areas of the Tadia and in the area already irrigated in the Doukkala. With assistance of ORMVAD they would establish independent service cooperatives to meet their needs for medium and short term credits, bulk purchase of inputs and bulk marketing. ORMVAD has previous experience in the establishment of cooperatives and ongoing training programs for cooperative managers to attend to future needs in their perimeter. It has been effective in establishing milk collection cooperatives over the last three years.

The administrative arrangements by which the operation and maintenance of the new facilities and infrastructure will be assured are set forth in section 3.A.1.c above.

2. AID

a. Monitoring

AID, in collaboration with the Bank, will monitor the progress of construction of the project. AID's monitoring activities will include the following:

Follow up on fulfillment of conditions precedent and compliance with covenants;

Advise ORMVAD and other Government Agencies regarding items eligible for AID financing, and financing procedures;

Review and approve requests for reimbursement of local costs;

Follow up on reporting requirements;

During construction of the project hold periodic meetings with ORMVAD to: (a) jointly review construction progress; (b) evaluate effect of problems affecting completion of construction; and (c) discuss plans and progress that the GOM is making to realize expeditiously the project's goal of increased agricultural production;

In conjunction with ORMVAD and the Bank, prepare a schedule and agenda for the evaluation of the project and resulting benefits as irrigated farming begins in each sector, and as provided in the loan agreements for 1980.

Attend the quarterly meetings of the Project Coordination Committee and/or maintain close liaison while the meetings are in progress.

Follow up on actions and measures decided in the quarterly meetings.

b. Reports

ORMVAD, being responsible for execution of the project, will be required to present quarterly progress reports which shall include a bar-type chart that shows the actual amount of project completion in comparison to planned completion. ORMVAD will also be encouraged to maintain and utilize a PERT or GPM-type chart of the project which will provide a focus to the quarterly meetings of the Project Coordination Committee.

The Project Coordination Committee will be required to make available the minutes of its quarterly meetings or a summary of the discussions held, decisions reached and actions to be taken before the next quarterly meeting.

B. Implementation Schedule

1. Loan

Following is the schedule for loan implementation actions:

Authorization	April 1976
Loan negotiated and signed	June 1976
Implementation Letter No. 1 Issued	June 1976
Loan amendment adding \$8.0 million authorized	July 1976
Loan amendment signed	July 1976
Conditions Precedent Met	September 1976
IFBs For Imported Equipment	October 1976
Request for Disbursement (Reimbursement of Local Costs)	October 1976
TD For Disbursement	June 1980

2. Project

Project construction began in 1975 and is scheduled to be completed in December 1979. Costs incurred prior to March 1, 1976 will not be eligible for financing from the proposed loan. Annex 7 is a chart of the implementation schedule.

3. Disbursement

The flow of AID disbursements is expected to continue throughout the construction period on approximately the pattern which follows (in millions of dollars).

	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>Totals</u>
Foreign Exchange	0.5	3.0	3.0	2.0	8.5
Local Costs	0.2	0.4	0.4	0.2	1.2
Contingencies	0.2	1.2	1.2	0.7	3.3
TOTALS	0.9	4.6	4.6	2.9	13.0

Of the amounts shown for 1979, some part may be shifted from foreign exchange to local costs, to the extent not needed for procurement of commodities from abroad. For a detailed forecast of disbursements for the entire project, see Annex 9.

C. Evaluation Plan

As the major lender in the Doukkala project, the World Bank will conduct its evaluations as a part of its usual monitoring pattern, which consists of sending an inspection team to the country at least twice a year. The inspection visit will culminate in a review of project status jointly with ORMVAD, SCET, and the Project Coordination Committee as appropriate. COM agreement will be obtained that AID will receive information provided to the Bank's inspection teams.

USAID will conduct its project monitoring on a continuing basis, since it will have staff in the country continuously during project implementation, in contrast to the Bank's twice yearly schedule. USAID's monitoring will be coordinated with the Bank and the COM, to provide such additional monitoring or backstopping services as may be appropriate for USAID to provide. One focus of USAID monitoring will be that the necessary credit, extension and machinery rental services shall be in place in each sector in advance of the start of pumping and the beginning of irrigation in the sector.

At the end of 1976 and 1977, USAID and ORMVAD will conduct brief, joint evaluations:

- (a) reaffirming the continual relevance and validity of the project target;
- (b) reassessing the validity of assumptions (e.g. timely land consolidation); and
- (c) examining actual progress toward pre-established targets.

Approximately six months after water has been made available to each sector, USAID will conduct an evaluation with ORMVAD to observe:

(a) the effectiveness of the planting, irrigation, and cultivation as carried out the first year;

(b) the effectiveness of the extension service and the timeliness of the machinery service;

(c) the suitability of the cropping pattern and farming plan chosen for the sector; and

(d) the opportunities for improvement in any of those elements in the next season in the same sector and in each remaining sector as it is completed and made ready for farming.

In the third year of project implementation, which is to be the first crop year in the first sector to receive water, USAID and ORMVAD, with such participation as the Bank wishes to have, will make a mid-term in-depth evaluation to measure accomplishments and cause-and-effect and assess need for changes in future direction.

The GOM undertakes in both the Bank and the AID Loan Agreements to cause ORMVAD to carry out in 1980, which is to be the first crop season in the last sectors to receive water, a sample survey of production and income on representative farms in areas benefitting from the project in order to evaluate actual benefits derived from the project. USAID will collaborate as appropriate with ORMVAD in the sample survey.

D. Conditions, Covenants and Negotiating Status

Establishment by the GOM of a Project Coordination Committee will be a Condition Precedent of the loan. A Specific Covenant in the loan agreement will assure the Committee's performing the function described for it in this paper. Additional Specific Covenants will set forth the several assurances of project implementation that appear throughout the paper and will provide that data and information about the project that is provided to the Bank shall also be available to AID.

The GOM was provided a preliminary version of this paper in December 1975 and has had French and English versions of the draft loan agreement for its study for several weeks. An AID attorney was in Rabat in mid-February to assist USAID in discussions with the GOM. It is anticipated that the Loan Agreement can be signed promptly after authorization.

Best Available Document

While it is expected that all or nearly all of the A.I.D. loan will finance foreign exchange costs of equipment and materials, the loan will permit a maximum of \$3 million in local cost financing on a FAR basis with a L/C device for disbursement. The bulk of such local currency costs (75% or more) will be for local construction services. However, up to a maximum 30% of such costs could be for shelf items of Code 935 origin to be incorporated in the construction. Such items will consist of small conduit, reinforcing bars, reinforcing mesh, electrical conductor, and tin flashing for the pumping stations and the water supply systems. It is impractical to purchase these items from the United States or other Code 941 countries, because the separate purchases would be too small to constitute import transactions, the construction contractors' bid prices would have to increase to cover their turning to unaccustomed sources of supply, and construction of the early scheduled installations would be delayed by the lead time for import transactions. The total value of shelf item procurement is not expected to exceed \$750,000 in value. Compared to the total \$13 million U.S. contribution, this figure is not judged to be unacceptable.

It is anticipated that all work will be done by local Moroccan contractors who are experienced in this type of building. They, of course, have their normal commercial practices for purchasing equipment and materials from local outlets. For reasons of efficiency of operation we wish to structure the local currency financing to conform to those practices to the greatest extent possible. Accordingly, the authorization of the loan will permit such Code 935 origin shelf item procurement.

Addendum
to
Project Paper

Morocco: Doukkala-Zemamra Sprinkler Irrigation

AID-DLC/P-2152

1. Insert page 32 (attached)
2. Add to Annex F, page 1, at the end of paragraph 3a:
"subject to the exception that bona fide shelf items of Morocco source but Code 935 origin may be financed under the local currency portion of the Loan."

KINGDOM OF MOROCCO

DOUKKALA IRRIGATION LOAN

Project Setting and Description

1. Oum Er R'Bia River Basin

The Doukkala project lies outside the Oum Er R'Bia River Basin to the southwest, but will draw its water supply from that river. The Basin is in the Central West sector of Morocco and the river, from which the basin derives its name, drains the northwestern slopes of the Atlas Mountains which extend northeasterly through Central Morocco. The river discharges to the Atlantic Ocean at Azemmour about 75 km south of Casablanca. This river is one of the Country's principal water sources and, as such, has received prime consideration for development and will furnish the water supply for the irrigation project herein proposed for financing. In its upper reach the main river course flows in a south-westerly direction for about 230 km along the foot of the mountain range to near El-Borouj where it turns gradually north westward across the valley floor to discharge in the Atlantic Ocean. In the upper reach the river is joined on the left side by numerous tributaries as the debouch from mountain canyons. One such principal tributary is the Qued El ABID which joins the main stream (Oum Er R'Bia) as it turns westward towards the ocean. Further downstream it is joined by the tributary Qued Tessaout. These tributaries have the only major water storage constructed to date in the basin. The Qued Tessaout joins the main river furthest downstream of any of the principal tributaries and its juncture with the main stream thereby divides the basin into an upper basin with principal tributaries and a lower basin. In the upper basin irrigation has developed along both the tributaries and the main water course whereas in the lower basin development has been restricted to the main stream as a water source, which will be the Doukkala project's water source as well.

a. Upper Basin

The upper basin contains two of the major storages constructed to date in the basin. A reservoir was constructed on the Qued El Abid at Bin El Ouidane in 1956 and a second completed in 1970 at Ait Adel on the Qued Tessaout. The Bin El Ouidane storage provides irrigation water to the Beni Moussa service area and the Ait Adel storage regulates the flows of the Qued Tessaout to serve the Tessaout Amont. A run-of-the-river diversion on the main river channel at Kasba Zidania was constructed in 1933 and diverts to the Beni Amir unit of the Tadla project. Storage on the main stream above the Kasba Zidania diversion is proposed at Lechra El Oued and Imizdifane. Additional upper basin storage is foreseen on the Qued Larh'ar tributary for service to areas along the lower Qued Tessaout below its junction with the Qued Larh'ar.

b. Lower Basin

Development in the lower basin dates from 1925 with a power diversion just 25 km above the river's mouth at Maachou on the lower river. A storage reservoir for power generation was built about 1950 above the Maachou diversion at Daourat. At the upper limit of the lower basin, where a reservoir could provide regulation of the entire lower basin's water supply, there is a favorable dam and storage site, known locally as Sidi Cheho. A combination power and irrigation project began in 1944 with construction of the in Fout diversion dam and power plant, a 17 km tail-race tunnel and a 111 km irrigation canal (bas canal) served from the tailrace tunnel. This lower (bas) canal and a proposed future upper (haute) canal will service the entire Abda Doukkala area of 94,000 ha of which 59,000 ha are in the service area of the lower canal and 35,000 ha are to be served by the upper canal. At present 27,100 ha receive irrigation service from the lower canal. This Doukkala/Zemamra project area of 15,400 ha in the vicinity of the village of Zemamra forms a part of the additional service area of the lower canal and will bring to 42,500 ha the area irrigated from the lower canal.

2. Description of the Zemamra subdivision

The Zemamra subdivision of the Doukkala Irrigation area is one of four more or less distinct blocks with irrigation potential. Two of the blocks are presently under irrigation and development of the fourth would be possible when sufficient water is available.

a. Area

The Zemamra subdivision extends about 35 kilometers from Sidi Smail towards Zemamra along the main road to Safi. The area is presently dry farmed.

b. Population

The population, including the towns of Zemamra (8,000 inhabitants) and Sidi Smail (5,000 inhabitants) amounts to 32,000 people. About 71% of the active population is directly employed in agriculture, 4% in retail merchandising and marketing of agricultural products, and the remaining 25% in the industrial and service sector. Farmer dwellings are in scattered locations over the countryside. About 47% of the population is below 15 years old, which is close to the average of Morocco, and an average household has 5.7 persons with a labor potential of about 60 man-days per month. Most of the population is underemployed. The average annual per capita income is about US \$110, which compares with a national per capita income of US \$320 per year.

c. Electricity and Water Supply

The existing 22 kV network is insufficient and any further development would require additional power supply. The towns of Zemamra and Sidi Smail, and some of the Development Centers (CIV) and project

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villages have domestic water supply from wells.

d. Transportation and Communication

The road system is adequate to meet present production levels but would need reinforcement and expansion if agricultural production would be increased. The telephone network is inadequate and only serves part of the major towns.

e. Health

A one-doctor hospital in Zemamra and a 200 bed provincial hospital in El Jadida serve the project area. The Government is successfully completing a malaria eradication program. Bilharzia exists in the Oum Er R'Bia Basin and affects mainly the Tadla Perimeter. Government plans call for a control program in Tadla under the proposed Beni Amir Rehabilitation Project financed by the Arab Fund for Economic and Social Development. No reliable data on bilharzia exists for the project area. However, the adjacent and recently completed gravity irrigation system around Sidi Bennour is heavily populated by several snail species, including some sinistral pulmonates, which may be bilharzia vectors.

f. Education

Educational facilities comprise 25 classrooms in the project area, which is insufficient to meet the needs of the farming population of about 19,000 persons.

3. Description of Project Works

a. Irrigation Network

(1) Land Consolidation and Preparation

Land consolidation has been completed on 8,500 ha and is presently underway in the remaining area. Land preparation would include subsoiling to break hard calcareous crusts and destoning on about 4,000 ha mostly located in ZO sector. Farm roads (76 m/ha) with storm water collector ditches and windbreaks (106 m/ha) complete land preparation works.

(2) Canals

The existing main canal, constructed in 1959, has earth embankments over most of its length and lining over 5.8 km where it passes through permeable strata. The main canal starts at km 17 at the outlet of the pressure tunnel connecting it to the headworks. Widening and repair of the canal is completed up to km 77. For works on the next 12.3 km, contracts for civil works have been let and the project would only include supply and placing of automatic gates for regulation of flow with downstream control. The project would further provide civil works including gates for the remaining 16.4 km serving the Zemamra subdivision and the 6 km feeder canal supplying the ZO pumping station.

(3) Pumping Stations

Four pumping stations of the following characteristics would be constructed:

<u>Sector</u>	<u>No. of Pumps</u>	<u>Q, l/s per Pump</u>	<u>H m</u>	<u>kW per Pump</u>
Z0	8	470	55	255
Z1	6	470	60	400
Z2	6	340	56	286
Z3	5	340	54	280

Water would be pumped through a rotating filter to prevent floating debris from entering the system. On-line elevated storage tanks would equilibrate fluctuations in pressure and demand. Automated controls would activate pumps according to fluctuations in demand.

(4) Pipe Distribution System

A buried distribution network would consist of 1,400 mm to 60 mm diameter pipes, concrete for the larger diameters and asbestos cement for the smaller. The average length of the pipe would be 27 m/ha. Each sector would have its individual distribution system. Pipes would run parallel to farm roads permitting easy access to hydrants. Typical layout would be as follows: 4 m wide farm roads would divide into two blocks a 15.6 ha irrigation unit to be served by one hydrant. This hydrant, equipped with two fixed discharge outlets, would therefore serve a separate block of 7.8 ha on each side of the road. Each outlet would have a continuous block which, measured along the road, would be 294 m and since hydrants would be placed in the middle of a block the distance between hydrants would also be 294 m. The distance between hydrants measured perpendicular to the road would be 556 m.

(5) Movable Equipment

An 18 x 18 m sprinkler pattern was selected. The net area of one irrigation block (1/4 unit) of 144 x 270 m was derived on the basis of allowable pressure losses and standard pipe lengths of 6 m. The movable equipment would consist of a 252 m central 4" feeder line connected to a hydrant outlet, with take-offs at 54 m intervals. Three-inch moving laterals of 153 m would operate simultaneously on each side of the feeder line. Because of the 18 x 18 m pattern it would be necessary to serve three lateral positions from one take-off. Each lateral would carry 8 sprinklers with an individual discharge of 0.54 l/sec and nozzle pressure of 3 atmospheres. During the peak month, irrigation would take place during 20 hours per day (2 positions at 10 hours) with an intensity of 6 mm/hour because of the low infiltration capacity of the heavier soils. The irrigation interval would be 7.5 days.

(6) Power Supply

Power supply would be provided by about 50 km of 60 kV line connecting the present terminal at Sidi Bennour with a new substation near Zemamra. From the substation, about 50 km of 22 kV lines would connect to the pumping stations.

(7) Drainage

No natural surface drainage exists in the project area because the Doukkala Plain is separated from the ocean by a 30-50 km wide band of fossil dunes superimposed on karstic jurassic and cretaceous layers. Storm water collects in karstic sinkholes called "dayas" in which surface water is observed for a couple of days if 90 to 100 mm of rain fall in a 15-day period. This happens about once every 12 years. The storm water flows underground towards the ocean in the direction of Safi. Since it is impossible to cross the dune zone, drainage would be provided by guiding large open collector drains towards two very large "dayas" behind the first row of dunes (see Map). Storm discharge coming from the south would be passed underneath the canal into the main drains. Design criteria for storm run-off are the peak flows with a return period of 10 years. For the irrigation area drains were designed for a specific drainage of 0.62 l/sec/ha.

b. Infrastructure

(1) Roads

A major national highway, RP8, from Casablanca to Agadir via Safi passes through the area. About 108 km of asphalt roads in the project area would have to be reinforced and widened to 6 m to accommodate the increase in heavy traffic during the sugar beet harvest period; 11 km of new asphalt road and 64 km of 4 m wide gravel roads would be provided. Criteria for the establishment of different types of roads would be:

<u>Estimated Agricultural Traffic</u>	<u>Type of Road</u>
More than 20,000 tons/year	6 m asphalt
Between 6,000 and 20,000 tons/year	4 m gravel
Less than 6,000 tons/year	4 m dirt

Asphalt and gravel roads would be constructed and maintained by the Ministry of Public Works and farm roads by ORMVAL.

(2) Telephones

About 50 km of telephone lines would be provided to link the pumping stations and CHV's with the subdivision headquarters in Zemamra.

(3) Buildings for the Project Authority

A new subdivisional headquarters would be constructed in Zemamra. Three CMV's and six milk collection centers would be constructed of a type described in para 11. The existing facilities of the Government experiment station would be extended through provision of additional buildings and equipment.

(4) Village Centers

The presently scattered population could only be provided with some amenities if they could be grouped into village centers. The project would provide for the creation of seven such centers with paved roads, electricity, treated public water supply and schools.

4. Construction Schedule and Status of Engineering

a. Construction Schedule

Construction of project works would begin in 1975 and be completed by December 1979. The proposed construction and activity Schedule is presented in Annex 7.

b. Status of Engineering

Preliminary design for the irrigation and drainage network for the Zemamra subdivision has been completed and is satisfactory.

5. Water Demand Supply, Quality and Rights

a. Water Demand

Allowing for effective rainfall, types of crops to be grown and a cropping intensity of 133%, the gross water demand would amount to 153 Mm³/year or 9,900 m³/ha/year. Peak water demand of 21.3 Mm³/month or 8.0 m³/sec occurs in August, the month with lowest river flow. Efficiency at farm level was assumed at 75% and canal conveyance losses at 15% giving an overall efficiency of about 65%. The main canal also supplies the recently completed 26,000 ha Sidi Bennour gravity scheme and the 1,100 ha sprinkler scheme at Boulaouane. Peak demand for these two schemes occurs also in August and would amount to 15.7 m³/sec at full development. Therefore the total irrigation demand would be 23.7 m³/sec. In addition to serving these irrigation needs, the main canal would also supply 2 m³/sec for industrial and domestic needs in Safi. At full development, the total demand at Im Fout headworks would thus amount to 25.7 m³/sec.

b. Water Supply

The Oum Er R'Bia river supplies the main canal via a 17 km pressure tunnel from headworks upstream of the Im Fout dam. Construction of large dams at Bi El Guidane and Ait Abdel have changed the regime of the river. The Im Fout reservoir is partly silted up (75%) and has

no storage capacity for irrigation. River flows were analyzed in the Oum Er R'Bia master plan. In 8 out of 10 years the flow would fully meet the demand at Im Fout headworks (26 m³/sec) and allow for downstream reservations (8 m³/sec). Deficits of up to 16% would occur in 2 out of 10 years in the critical month of August.

c. Water Quality

The relatively saline upstream river water is diluted by two major tributaries but the average conductivity at Im Fout is still 1,260 mmhos/cm² and water would still be classified as C₃S₁ (United States Salinity Laboratory, Riverside). No negative effects may be expected as long as drainage is adequate and relatively salt tolerant crops are cultivated. The same waters have been used successfully over a period of time for crops similar to those proposed at full development.

d. Water Rights

No problems are expected as waters belong to the public domain and are administered by the MTPC which has transferred its powers in this respect to ORMVAD.

DOUKKALA IRRIGATION PROJECT

KINGDOM OF MOROCCO

Crop Production

General

1. Out of 7.7 million ha of land suitable for cultivation in Morocco about 6 million ha (80%) are cultivated. Nearly one million ha have irrigation systems, but one-third of these receive water only in winter by flooding and less than 400,000 ha have modern and efficient perennial irrigation. Although grain crops mainly wheat and barley, comprise 75% of the cropped area and about 40% of the irrigated area the wheat deficit in Morocco for 1975 is estimated at 1.5 million tons. Production could be significantly increased by irrigation of dry lands and by giving full water supply on present partially irrigated land. In Morocco and in the Oum R'bia Basin where water is a limiting factor, agricultural development should envisage efficient use of this resource. The Doukkala Irrigation Project aims at efficient use of water for production of sugar beet, cereals, and milk for import substitution, and industrial tomatoes and long staple cotton for export. It would provide sprinkler irrigation for 15,400 ha presently dry farmed in Doukkala.

Climate

2. The climate is under maritime influence. Annual rainfall averages 360 mm. Dry periods may extend over six months, and supplementary irrigation is required for most crops in the project area. The rainfall pattern shows strong variation from year to year. Average monthly temperatures vary from 12.0°C in December to 25.0°C in August. Average minimum and maximum temperatures vary from 6.7°C in December to 33.3°C in August respectively. The relative humidity average is 76%. Evaporation amounts to 1,800 mm.

Soils and Topography

3. The project area extends from Sidi Saïl towards Zemzara along the main road to Safi (R.P.8). The total net area covers 15,400 ha. The average elevation is about 150 m above sea level and the general slope two to three percent in northwestern direction. The microrelief is irregular. A number of gentle sloping 10 to 20 m high mounds rise up from the flat terrain. They cover approximately 15% of the area and would have to be excluded in case of surface irrigation.

4. ORMVAD carried out a soil survey scale 1:10,000 (final maps 1:20,000) covering the entire subproject area recognizing light alluvial soils along old riverbeds and bordering the "Sahel", brown calcareous soils underlain by calcareous materials, subtropical isohumic soils of limited depth underlain by calcareous crusts, and deep vertisols. ORMVAD also completed a land capability classification (scale 1:10,000) recognizing 4 classes:

<u>Class I.</u>	Lands suitable for irrigation farming, capable of producing sustained and relatively high yields of a wide variety of climatically adapted crops at a reasonable cost.	7300 ha
<u>Class II.</u>	Soils of medium depth underlain by a light calcareous layer. Suitable for a variety of climatically adapted crops, not recommended for fruit trees.	2400 ha
<u>Class III.</u>	Shallow medium to light textured soils limited by a hard calcareous layer. Suitable for cereals, forage crops and most vegetables, not recommended for cotton and fruit trees.	5200 ha
<u>Class IV.</u>	Very shallow soils underlain by a hard calcareous layer generally considered not irrigable.	600 ha

5. Poorer lands which includes all class IV and part of class III lands are mainly located in the Z0 section North of road LT 1307 (Map 11855R). Class IV lands are mostly light textured of limited depth (less than 50 cm) and underlain by an indurated calcareous layer. On technical grounds irrigation development of these soils would have low priority. However small holdings are located in this area and land consolidation has been completed thus creating expectations for further development among the local population. The Government is reluctant to exclude these lands. ORSVAD based on experimental results during 5 years in Sidi Bennour (para 17) proposes to break the crust by subsoiling and destoning to achieve better root penetration and crop development. Part of class three lands also require subsoiling. ORSVAD would, before project execution and based on existing aerial photography topographic maps and field checks revise the existing pedological maps in the problem area (about 3200 ha all located north of road CT 1307) in order to define the scope of land preparation works and to decide on possible exclusion of all or part of class IV land.

6. The project area because of pedologic and topographic conditions should be sprinkler irrigated. The relatively shallow soils do not permit necessary land leveling for installation of a gravity system. Experimental results obtained at ORSVAD's field station in Sidi Bennour show slightly higher yields under sprinkler irrigation.

Present and Future Land Use and Yields

7. The subproject area (15,400 ha net) is presently dry farmed with wheat (63%), maize (10%), and beans (10%). The remainder is fallowed. Sheep, goats, and cattle subsist on fallowed land, supplemented by crop residues and stubble. Because of the scanty and irregular rainfall (360 mm), yields are low varying from almost nothing in dry years to 2 tons per ha for wheat, 1 ton/ha for maize and 1.2 ton/ha for beans in wet years. Average yields and revenues do not allow improved agricultural techniques and additional inputs. Present average annual crop production amounts to about 9,600 tons of wheat, 1,200 tons of maize, and 1,280 tons of beans (Table 1). No significant production increases are assumed under prevailing conditions.

8. With the project the total area would be irrigated with sprinklers and the available water supply would permit an intensive cropping pattern. High value and labor intensive crops like sugar beet, cotton and industrial tomatoes would partly replace wheat and beans. Alfalfa and fodder would be grown for milk and meat production.

9. Choice of crops and crop rotations take into account soil conditions. To improve and maintain the fertility, mixed farming (crop/livestock) would be implemented and the rotation would include a high percentage of leguminous crops. At full development the cropping intensity would be 133% and the pattern as follows:

Cereals	Wheat	6,360 ha
	Maize	3,970 ha

Industrial Crops:

	Sugar beets	2,900 ha
	Cotton	1,360 ha
	Tomatoes	1,360 ha

Fodder Crops:

	Alfalfa	3,430 ha
	Barley	320 ha
	Berseem	830 ha

Rotations followed by different farm types are shown in Table 2.

10. Yields are expected to increase significantly because of irrigation, increased inputs and strengthened supporting services. (Wheat 3.0 tons/ha, maize 2.5 tons/ha, sugar beets 45.0 tons/ha, cotton 1.5 tons/ha, industrial tomatoes 40.0 tons/ha). Projections take into account possible water deficiencies in certain years (once in 10 years 16%). Because of the authoritarian approach adopted by ORMVAD for the main crops (sugar beet, cotton, and cereals) farmers are expected to achieve projected average yields within 6 years after receiving water. Projected yields are based on results obtained in the already irrigated area in Sidi bennour, on a sprinkler irrigated area of about 80 ha within the Zemzara subdivision and experimental results and take into account limiting soil conditions. The projections are significantly below the currently obtained yields in DRA demonstration plots or research centers. Future yields, and production are summarized in Table 1.

Inputs

11. Labor and Mechanization. Under the project land preparation, bulk sowing and cereal harvesting would continue to be mechanized: (a) because land preparation and harvesting periods create peak labour demands; (b) in order to insure that a second crop can be grown on time; and (c) because there are not sufficient animals within the project area. Animal power would mainly be used for cultivation of row crops and transport within

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the farm. Tractors are available for sugar beet, cotton, and cereal operations through ORMVAD at a subsidized rate and through private entrepreneurs. ORMVAD arranges aerial sprayings for cotton when necessary, but to the extent possible sprayings would be done by the farmer himself. All other operations would be done manually. Households farming 5 ha or more would require to hire additional labor during peak seasons. This demand would be met by smaller farmers which otherwise would continue to be underemployed. Details on the employment situation in the project area are given in Annex 14.

12. Seeds. Improved seeds are available and would be used in the project area. Research has been carried out with high yielding wheat varieties and hard wheat currently grown in the area would be progressively replaced by Mexican type soft wheat (Sieta Cerros) and the Moroccan varieties 149/70/7 and 150/70/7. Tadra 16 is a cotton variety well adapted in already irrigated areas of the Doukkala. The fiber is shorter (34.5 mm) if compared with Pima varieties (38 mm), but stronger and appreciated on European markets. DRA produced sufficient improved cotton and cereal seeds to meet project needs. These seeds are distributed to the farmer through ORMVAD. In a similar way ORMVAD has an agreement with COMAGRI, for sugar beet seeds. The main sugarbeet variety cultivated is Zwaan Poli and to a lesser extent varieties like Maribo, Polibel, Tribel, KWS, Megapoly, and Dalitsch Poly 24. Alfalfa seeds are provided by ORMVAD and vegetable seeds (beans, tomatoes, etc) are mainly distributed through private merchants. No difficulties are foreseen for future seed distribution.

13. Fertilizers. Present consumption of fertilizer is low (140 tons N, 110 tons P₂O₅, 100 tons K₂O) but would with the project increase to 1,700 tons of N, 1,700 tons of P₂O₅ and 1,100 tons of K₂O. Recommended doses assume use of animal manure for main crops. A summary of estimated future fertilizer demand is presented below:

NUTRIENT CONSUMPTION

<u>Crops</u>	<u>N</u>	<u>P₂O₅</u>	<u>K₂O</u>
	-----Kg/ha/year-----		
Wheat	100	80	60
Maize	100	80	60
Sugar beet	150	120	50
Cotton	60	70	40
Tomatoes	80	120	80
Alfalfa	20	80	60

14. Fertilizers are distributed by ORMVAD and private merchants and are available on credit to farmers, groups of farmers and cooperatives.

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15. Plant Protection. ORMVAD would organize and implement pest and disease control. Pest and disease control materials are available for distribution to farmers through ORMVAD. The main pests of the cotton crop are the pink bollworm (*Platyedra gossypiella*), spiny bollworm (*Earias insulana*), American bollworm (*Heliothis armigera*), and white fly (*Bemisia tabaci*). About 6 routine spray applications are needed to maintain control. Sugar beets are sprayed at least twice, mainly against aphids (vectors of virus diseases) and dry heart rot (Boron deficiency). Metasystox, Endrin, DDT, Dicarbam, Sevin, Borax, Ziram, Captan, and Copper sprays are the main chemicals used.

Supporting Services

16. DRA is responsible for agricultural research in Morocco and has, supported by USAID and the International Center for Improvement of Maize and Wheat in Mexico (CIMYT), successfully introduced and adapted high yielding cereal varieties. Cotton research and seed multiplication is supported by the "Institut de Recherche pour le Coton et les Textiles" (IRCT) and "Compagnie Francaise pour le Developpement des Fibres Textiles" (CFDT) through bilateral technical assistance. DRA operates 3 experimental stations in Doukkala: (1) Boulouane is the oldest station in the area but because of pedological conditions not representative for the region; (2) Sidi Bannour is mainly dedicated to fruit production; and (3) Jemie Sahim located within the project area, would benefit from the project irrigation network and is representative for both the Zemzra and Taïne Rharbia subdivisions. It would be developed under the project to become the main station for applied research and seed production. Table 3 gives a complete list of buildings and equipment to be provided under the project.

17. The sugar factory in coordination with DRA and ORMVAD gives technical assistance to farmers and carries out field experiments with sugar beets. ORMVAD operates one field station in Faregh and one near Sidi Bannour. Their work concentrates on measurements of evapotranspiration and management of typical soils under irrigation. Experimental data collected in 7 years of experience show slightly higher yields for wheat, alfalfa, and sugar beets under sprinkler irrigation as compared to gravity irrigation in the prevailing soils. Four years of experiments also show yield increases of about 10% (sugar beet, maize, cotton, alfalfa) as a result of deep subsoiling and destoning.

18. The CMV's would be staffed (Table 4 and equipped (Annex 10)) to meet project needs. The CMV's because of their distance to ORMVAD headquarters in El Jadida would depend directly from the Zemzra Office for Agricultural Development.

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REGION OF NIAGARA
DOUGLASS IRRIGATION PROJECT
Land Use, Yields and Production

Item	Without Project				With Project			
	Area (ha)	Area (ha)	Yield (t/ha)	Production (t/ha)	Area (ha)	Area (ha)	Yield (t/ha)	Production (t/ha)
Wheat	52.5	9,600	1.0	9,600	41.5	6,360	5.0	19,000
Maize	13.0	1,500	0.8	1,200	25.8	3,970	2.5	9,925
Sugar beet	-	-	-	-	18.8	2,900	46.0	130,500
Cotton	-	-	-	-	8.8	1,360	1.5	2,040
Bears	10.0	1,600	0.8	1,280	-	-	-	-
Tomatoes	-	-	-	-	8.8	1,360	60.0	54,400
Alfalfa	-	-	-	-	22.5	3,450	12.6	41,160
Barley ¹	-	-	-	-	2.0	320	40.0	6,400
Bersee ¹	-	-	-	-	5.4	810	25.0	20,700
Total	<u>85.5</u>	<u>12,700</u>			<u>135.2</u>	<u>20,530</u>		

¹ Green matter.

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KINGDOM OF MOROCCO
DOUKKALA IRRIGATION PROJECT

Crop Rotations

Item	Area (ha)	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6	
		Crops	ha	Crops	ha	Crops	ha	Crops	ha	Crops	ha	Crops	ha
<u>Available Subplots</u>													
Type I 2 ha Farm	2,100	Alfalfa ¹	0.5	Cotton	0.5	Wheat Maize	0.5 0.4	Tomato Barley (Fodder)	0.5 0.5				
Type II 5 ha Farm	5,200	Alfalfa ¹	1.25	Wheat Maize	1.25 0.85	Sugar beet	1.25	Wheat Maize	1.25 0.90				
Type III 8 ha Farm	8,000	Alfalfa ¹	0.83	Wheat Maize	0.83 0.52	Tomato	0.83	Sugar beet Berseem	0.83 0.83	Cotton	0.53	Wheat Maize	0.5 0.5
Type IV 25 ha Farm	3,100	Alfalfa ¹	6.25	Wheat Maize	6.25 4.25	Sugar beet	6.25	Wheat Maize	6.25 0.45				

¹ Each year 50% of the Alfalfa would be ploughed and enter the rotation of annual crops.

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DOUKKALA IRRIGATION PROJECT

Agricultural Experimental Station Zouamm

<u>Buildings</u>	<u>DH</u>
Office and Work Rooms (250 m ²)	162,500
Storage Farm Machinery and Work Shop (500 m ²)	200,000
Storage Farm Products (500 m ²)	250,000
Stable (500 m ²)	250,000
Silos	6,000
3 Houses	240,000
8 Apartments	280,000
Collective (Laborers)	195,000
Water Supply and Treatment	150,000
Diverse	<u>66,500</u>
Subtotal	<u>1,800,000</u>
<u>Transport</u>	
3 Vehicles Type "R 4"	36,000
1 Vehicle Type Jeep	50,000
1 Vehicle Type "R 16"	20,000
1 Truck 6 tons	<u>60,000</u>
Subtotal	<u>166,000</u>
<u>Research Equipment</u>	<u>200,000</u>
<u>Animals</u>	<u>60,000</u>
<u>Incremental Staff</u>	
1 Agriculturist (DH 32,000) 1/2)	16,000
1 Research Assistant (DH 40,000) 1/2)	20,000
1 Irrigation Controller (DH 12,000) 1/2)	6,000
1 Mechanic (DH 12,000) 1/2)	6,000
1 Field Officer (DH 12,000) 1/2)	6,000
1 Accountant (DH 12,000) 1/2)	<u>6,000</u>
Subtotal	<u>60,000</u>
GRAND TOTAL	<u>2,286,000</u>

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REPUBLIC OF MOROCCO

DOUHALA IRRIGATION PROJECT

CEMVAO Incremental Staff Requirement

<u>Item</u>	<u>Number</u>	<u>Individual Salary M/Year</u>
<u>Central Office</u>		
Professional Engineers	2	40,000
Junior Engineers	2	32,000
Technicians	3	25,000
<u>CMV (3 New Centers)</u>		
Technicians	3	25,000
Extension Agents	12	20,000
Mechanics	3	20,000
Storekeepers	3	15,000
Secretaries	3	15,000
Bookkeepers	3	20,000
<u>Artificial Insemination</u>		
Inseminators	3	20,000
<u>Milk Collecting Centers</u>		
Directors	3	20,000
<u>Subdivision (Zemara)</u>		
Junior Engineer	1	32,000
Technician	1	25,000
Mechanic	1	20,000
Watermen	20	10,000

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KINGDOM OF MOROCCO
 BORDJBOUA IRRIGATION PROJECT
 Estimated Water Requirements

Item	Area (ha)	Units	Net Irrigation Requirement ¹ at Parcel													
			Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual	
Wheat	8,360)		1,781	2,035	3,264	3,478	- ¹²	-	-	-	-	-	-	-	445	11,003
Cultivar	7,360)		-	-	-	340	604	1,224	2,339	2,298	1,741	-	-	-	-	-
Wheat Beet	2,900)		647	725	1,392	2,117	2,314	3,440	1,836	-	-	-	-	-	-	2,608
Maize	3,970)		-	-	-	-	-	-	-	-	-	-	-	174	270	14,181
Tomato	1,340)		-	-	-	-	-	-	1,509	4,923	6,703	5,637	-	-	-	18,778
Alfalfa	3,490)	1000 m ³ month	617	632	1,338	2,574	4,390	4,871	5,900	6,105	4,871	2,675	1,563	549	59,535	
Winter Forage	370)		123	102	-	-	-	-	-	-	-	-	-	32	58	317
Sorghum	830)		324	266	-	-	-	-	-	266	-	946	739	374	266	3,181
Total Net at Parcel			3,214	3,780	6,164	8,640	2,754	11,601	13,821	13,592	16,287	8,707	1,643	1,608	97,763	
Net Demand ¹³		m ³ /ha	228	245	400	574	634	753	999	822	526	555	107	104	6,347	
Gross Demand ¹⁴		m ³ /ha	304	327	533	783	843	1,004	1,199	1,176	1,235	723	143	139	8,443	
Gross Demand ¹⁵		l/s/ha	.136	.162	.239	.354	.379	.465	.537	.527	.572	.315	.066	.062		
Gross Demand at Bordjboua ¹⁶		l/s/ha	.160	.191	.281	.419	.444	.547	.632	.620	.673	.418	.078	.073		
For 15,400 ha Gross Demand at Bordjboua ¹⁷		m ³ /month 3.5	3.3	3.9	9.7	13.9	15.3	18.2	21.7	21.3	12.3	14.4	2.6	2.5	153.3	

- ¹ Net Irrigation Requirement = Net Water Requirement - Effective Rainfall.
- ¹² = 0 m crop during this month.
- ¹³ Assumes a field efficiency of 75%.
- ¹⁴ Assumes Irrigation during 20 hours per day.
- ¹⁵ Assumes 1% conveyance losses and distribution losses based on 20 hours per day pumping.
- ¹⁶ Assumes in fact Bordjboua provides coverage during 4 hours of no pumping per day.

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DOUKKALA IRRIGATION PROJECT

KINGDOM OF MOROCCO

Land Tenure

1. All lands benefitting from the Project are private freehold and would be consolidated before construction of the irrigation and drainage networks. Land tenure changes to be implemented under the project are governed by the Land Consolidation Law of 1962 and the Agricultural Investment Code of 1969. The Land Consolidation Law provides a procedure for land registration and consolidation of existing fragmented holdings in areas delineated by Ministerial Order, and subjects future subdivision of holdings created by consolidation to approval by a local commission. The Agricultural Investment Code applies to areas decreed as "Zones of Development" within which the State may intervene to reorganize land tenure through land consolidation, enlarging small non-viable holdings and changing of boundaries to ensure effective use of capital improvements such as irrigation facilities and drainage. In these "Zones of Development", division of land into units of less than 5 ha is forbidden and tenure in collectives is limited to those individuals who hold rights to land at the date of publication of the law (July 23, 1969). Within a decreed Zone of Development, further transactions are prohibited until reorganization within the zone is completed. The code defines the degree to which the farmers within a "Zone of Development" shall participate in the investment for improvement of agriculture through a land betterment levy and charges for irrigation water.
2. Land consolidation has been completed on about 60% of the project area. Before land consolidation about 60% of the plots were of less than 1 ha, 27% ranged between 1 and 5 ha and 4% between 5 and 10 ha. Only 3% of the plots were above 10 ha. A holding or plot corresponds to a unit of land and does not coincide with the concept of a farm unit. One farmer on average owns 1.4 holdings. Land consolidation would join scattered land and consequently reduce the number of holdings. Taking into account the results of land consolidation on 8,500 ha, future farm size distribution is expected to be as follows:

Farm Size (ha)	Farm Units		Area	
	No.	%	ha	%
0 - 2	1,370	43	1,960	13
2 - 5	1,130	35	4,850	31
5 - 10	440	14	3,850	25
10 - 20	124	4	1,490	10
Above 20	136	4	3,250	21
Total	<u>3,200</u>	<u>100</u>	<u>15,400</u>	<u>100</u>

ORMVAD has the technical staff and experience to complete the land consolidation program in the Zemamra Subdivision.

The expected farm size distribution may be compared to the distribution pattern that was planned for the Triffa High Service area. After the distribution of government-held land combined with consolidation in that area the pattern was expected to be as follows:

Farm Size (ha)	Farm Units		Area	
	No.	%	ha	%
0 - 5	892	84	4,459	66
5 - 10	103	10	714	11
10 - 20	40	4	524	8
Above 20	21	2	1,024	15
Total	<u>1,056</u>	<u>100</u>	<u>6,721</u>	<u>100</u>

While the latter distribution is skewed a little more toward the smaller sizes, the two patterns are not too different from each other.

DOUKKALA IRRIGATION PROJECT

KINGDOM OF MOROCCO

Animal Production

General

1. Livestock production in Morocco accounts for one third of the total value of agricultural production. Total animal production includes about 3.4 million cattle, 16.0 million sheep, 7.0 million goats and 0.2 million camels. Of the 3.4 million cattle, about 3.0 million consist of the local breed Brown Atlas; 0.05 million are cross-bred between Brown Atlas and Friesian; while European pure breeds, mainly Friesian cattle, account for about 57,000 heads, or about 1.5% of the total cattle production.
2. Three systems of livestock production can be identified in Morocco. The majority of production originates from extensive grazing on 12.4 million ha of marginal land which is either collectively owned or state forest land. In addition, these animals may have access to supplementary grazing on 3 to 4 million ha of crop stubble following the harvest of rainfed grains. The second system of livestock production is intensive dairy production which depends almost completely on purchased feed. It has developed around the outskirts of large urban centers. The third system exists on irrigated perimeters and areas of adequate rainfall where both livestock and forage production are carried out on the same farm. This system is envisaged for the livestock component of the project.
3. At present, cattle productivity in the project area is low because of the following constraints: (a) low level of nutrition caused by inadequate supply of feedstuffs at reasonable prices; (b) low production potential of local cows at a reasonable level of nutrition; and (c) low capacity and thin distribution of existing milk collection centers. The constraint imposed on production by the prevailing managerial skills is of less significance and the measures proposed to solve the major problems of production would enhance better quality of farmers. Animal health is not a major problem and the control measures and practices are satisfactory.
4. The project would increase livestock production in the project area through the following measures: (a) introducing grain and fodder crops in the rotation and thus providing the basis for balanced rations; (b) improving local dairy cattle productivity through cross-breeding with Friesian breed which are the most popular cattle breed in Morocco; and (c) increasing the capacity of

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existing milk collection centers and installing additional units within the project area. Cattle breeding would be accomplished through artificial insemination. The project would provide additional inseminators, which would be stationed in the project area and train selected farmers in insemination practices. Specialists of the Department of Animal Production of MARA would supervise the cross breeding program in order to maintain equilibrium between production potential and disease and parasite resistance.

5. Animal health is also the responsibility of the Ministry of Agriculture and Agrarian Reform. This responsibility is discharged through 10 regional offices in the major areas of production. The project area is adequately served through offices. The main diseases of cattle are brucellosis, septicemia, fasciola hepatica and piroplasmosis. Diseases of less incidence are tuberculosis anthrax and blackleg. Free vaccination is available against septicemia and blackleg.

Present and Future Livestock Production in the Project Area

6. The project area corresponds to the Zemama subdivision. Beef fattening and milk production are traditional enterprises among farmers. Through provision of irrigation water and supporting services such as artificial insemination, veterinary services, marketing facilities and improved extension, the project would increase livestock production from the current low of about 2,500 tons of milk, 700 tons of beef (liveweight) and 800 heads of breeding heifers to about 18,000 tons of milk, 2,000 tons of beef (liveweight) and 1,500 heads of heifers with high milk production potential at full development. The dairy herd in the project area would increase to about 11,000 head.

7. Four different farm types have been analyzed (Annex 12). Feed availability on type I-2ha, type 2-5ha (4 crop rotation), and type 3-5ha (6 crop rotation) are shown in Table 2. Herd size and feed availability was assumed five fold of type II on type IV (25 ha) farms. Herd development and production coefficients for representative 2 ha farms and 5 ha farms are tabulated in Tables 1 and 3.

8. About 15% of farmers participating in dairy production would receive medium term credit towards the purchase of cattle and construction of stables (Annex 6). Labor would be supplied by the farm family. One man would be able to care for 8 animal units.

9. The project would provide 6 additional milk collection centers by 1978 to complement existing ones in the area and meet project needs. MARA manages a well staffed and equipped artificial insemination laboratory which would adequately serve the area. To make its services more accessible to farmers in the project area, the project would provide additional 3 inseminators and 5 vehicles. Slaughtering capacity is adequate with two municipal slaughterhouses in El Jadida and Ezmour and 3 large rural slaughterhouses in Sidi Smail, Sidi Bennour, Zemama. The central slaughterhouse in Casablanca traditionally receives about 40% of its cattle from El Jadida Province. In addition excess capacity of the municipal slaughterhouse in Rabat is estimated at about 25%. Details on marketing of livestock produce are given in Annex 14.

January 9, 1976

KINGDOM OF MOROCCO
DOUKALA IRRIGATION PROJECT

Dairy Cattle - Herd Production, Production Coefficients and Sales
(10 Farms-5 ha)

	Before Project	Years Following First Irrigation									
	0	1	2	3	4	5	6	7	8	9	10
Herd Composition											
Breeding Cows	20	23	24	27	30	32	35	35	35	35	35
Calves 0-1 yr	12	14	16	18	21	22	25	25	25	25	25
Heifers 1-2 yrs	6	6	7	8	9	9	11	11	12	12	13
Stoers 1-2 yrs	6	5	7	8	8	8	10	12	12	13	12
Total Animal Units Δ	32	34	38	43	47	52	54	58	59	60	60
Sales											
Culled Cows	0	2	2	4	5	5	7	7	7	7	7
Stoers 1-2 yrs	8	4	7	8	8	10	9	12	12	12	12
Breeding Heifers	2	3	2	0	0	2	3	3	3	4	5
Milk (kg)	8,400	10,300	12,800	15,300	23,100	30,800	40,000	47,500	52,500	55,000	55,000
Mortality											
Breeding Cows	1	0	0	1	1	1	1	1	1	1	1
In-calf heifers	0	0	0	0	1	0	0	0	1	0	0
Stoers 1-2 yrs	0	1	0	0	0	0	1	0	0	1	0
Production Coefficients											
Fertiling Rate %	60	65	65	65	70	70	70	70	70	70	70
Adult Mortality %	3	2	2	2	2	2	2	2	2	2	2
Cow Culling %	0	10	10	15	15	17	20	20	20	20	20
Est Milk Production (kg)	700	800	800	850	1,100	1,400	1,600	1,900	2,100	2,200	2,250

Δ Includes calves.

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TABLE 3

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DORNYA IRRIGATION PROJECT

Feed Availability

Feed Source	Without Project	With Project					
		Year					
	0	1	2	3	4	5	6
	tons						
<u>Farm Type I 1 ha</u>							
Wheat Straw	2.5	2.0	2.0	1.9	1.6	1.7	1.5
Maize Straw	0.2	-	-	-	0.3	0.8	1.2
Bean Straw	0.2	-	-	-	-	-	-
Alfalfa Δ	-	1.5	12.0	13.5	15.0	28.0	30.0
Fodder (Barley) Δ	-	-	1.6	3.4	5.4	5.7	6.0
Maize (Grain)	0.2	-	-	-	0.2	0.7	1.0
<u>Farm Type II 5 ha</u>							
Sugar beet Tops	-	3.3	11.1	14.6	15.4	16.3	16.9
Wheat Straw	3.0	2.0	4.4	4.8	5.2	7.0	7.5
Maize Straw	0.5	1.5	4.7	4.6	4.6	4.1	5.3
Alfalfa Δ	-	7.5	20.0	22.5	40.0	68.8	75.0
Bean Straw	0.4	-	-	-	-	-	-
Maize (Grain)	0.4	3.8	3.9	3.8	3.9	3.5	4.3
<u>Farm Type III 7 ha</u>							
Sugar beet Tops	-	3.3	5.6	11.7	12.3	10.7	11.2
Wheat Straw	3.0	6.0	6.6	4.8	5.2	4.7	5.0
Maize Straw	0.3	0.9	1.0	1.1	1.3	1.7	2.0
Alfalfa Δ	-	7.5	20.0	22.5	25.0	45.7	49.8
Bean Straw	0.4	-	-	-	-	-	-
Berseem Δ	-	-	-	-	10.5	19.1	20.8
Maize (Grain)	0.4	0.8	0.9	1.0	1.1	1.5	1.6

Δ Green matter
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KINGDOM OF MOROCCO
 BOUKHALA IRRIGATION PROJECT
 Dairy Cattle - Herd Projection, Production Coefficients and Sales
 (10 Farms - 2 ha)

Item	Before Project	Years Following First Irrigation									
		1	2	3	4	5	6	7	8	9	10
Herd Composition											
Breeding Cows	10	10	10	11	12	14	16	17	18	19	20
Calves 0-1 yr	6	6	6	7	8	9	11	12	13	13	14
Heifers 1-2 yrs	3	3	3	2	4	4	5	5	6	7	6
Steers 1-2 yrs	3	3	3	1	3	4	4	6	5	6	7
Total Annual Units ^Δ	16	16	16	16	19	22	25	28	29	32	33
Sales											
Culled Cows	0	1	1	1	2	2	3	3	4	4	4
Steers 1-2 yrs	3	3	3	3	3	4	4	4	4	6	7
Breeding Heifers	3	1	1	0	0	0	0	1	1	1	2
Milk (kg)	4,200	4,500	4,800	5,720	6,520	12,760	17,920	22,610	26,460	29,260	30,000
Mortality											
Breeding Cows	0	1	0	0	0	0	1	0	0	1	0
Female Heifers	0	0	0	1	0	0	0	0	0	0	0
Steers 1-2 yrs	0	0	0	0	0	0	0	0	1	0	0
Production Coefficients											
Stocking Rate %	80	80	80	85	85	85	70	70	70	70	70
Adult Mortality %	3	2	2	2	2	2	2	2	2	2	2
Cow Culling %	0	10	10	10	15	15	17	20	20	20	20
Net Milk Production (kg)	700	750	800	850	1,100	1,400	1,600	1,900	2,100	2,200	2,300

^Δ Includes calves.

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DOUKKALA IRRIGATION PROJECT

KINGDOM OF MOROCCO

Agricultural Credit

1. The most important source of organized credit to the agricultural sector is the National Agricultural Credit Bank (CNCA) established in 1961. Loans through CNCA are disbursed either directly through the various Regional Banks (CRCA) and Local Banks (CLCA), or indirectly through the intermediation of the various Development Offices of the MARA (ORMVA). Other sources of credit are loans from commercial banks and suppliers' credits, but access to such credit tends to be easier to larger farmers. Their amount is unknown. Equally important means of financing are credit from merchants and landowners, but again amounts and conditions are unknown.

2. Farmers with fiscal incomes exceeding DH 3,000 per annum are eligible for credit through CRCA. The CLCA finances the needs of small farmers with incomes of at least DH 100 per annum but not exceeding DH 3,000 per annum. Credit through Development Offices is limited, regardless of fiscal income, to farmers participating in the integrated cropping operations organized and managed by ORMVA. Such credit is therefore limited to crop loans for the cultivation of sugar beet, cotton and hybrid maize.

3. The yardstick used to divide farmers into those eligible for CLCA credit and those for CRCA is based on fiscal income.^{1/} In line with current practice, credit requirements have been calculated on the basis of fiscal rather than actual farm incomes. Credit needs thus calculated would be adequate to meet project needs, taking into account special arrangements for industrial crops (para 2).

4. Incremental income requirements of CLCA and CRCA have been calculated on the basis of the DH 3,000 per annum fiscal income dividing line. Land distribution data has been combined with the fiscal income norms in the initial and terminal years of the project, furnishing a basis for dividing the land area into that proportion that will be served by CLCA and the balance that will be served by CRCA.

A. Caisse Regional de Credit Agricole

5. CRCA advances short and medium credit to individual farmers, groups of farmers, collectives and agricultural enterprises. Credit facilities are

^{1/} Fiscal income norms in the project area are DH 300/ha for land under traditional irrigation, DH 450/ha for land under modern irrigation, DH 80-130/ha for dry land. Olives and industrial tomatoes command a much higher fiscal income, DH 500/ha and DH 1,000/ha respectively.

available for productive purposes, processing, stocks and marketing. The terms and norms for loans are revised annually and published by the CRCA in the "Régime des Prêts des Caisses Régionales de Crédit Agricola".

6. The main features of the current regulations are as follows:

- (i) Loan requests are prepared, often with the assistance of CRCA staff and submitted by the applicant, together with supporting documentation to the CRCA.
- (ii) Short and medium term loans not exceeding DH 5,000 individually and less than DH 15,000 in total can be extended without a survey of the farmer and his holdings.
- (iii) Loans not exceeding DH 60,000 (DH 30,000 in the case of credit for land improvement) are generally handled by the regional credit committee; requests for larger loans are forwarded to the CRCA Board of Directors.
- (iv) The type and amount of security required by the CRCA is at the discretion of the Director. Generally, chattel mortgages and the signature of guarantors are considered adequate, but in certain cases land titles must be deposited.
- (v) All loans are subject to (i) an annual commission of 4% (except for loans to harvest 2%); and (ii) a guarantee commission of 2% in the amount of paid at the time of disbursements, which is paid to a Guaranteed Fund.
- (vi) Short term credit is limited to a maximum of one year at a rate of 6% for cereals, 8% for sugar beet, cotton and 8.5% for fattening operations (Table 1). Norms indicating the maximum amounts that can be extended for various purposes are set out in Table 2.
- (vii) Medium term credit is available for a maximum of 10 years. Interest rates vary between 7% and 8.5% per annum depending on the type of loan and beneficiary (Table 1). Maximum norms for various purposes are outlined in Table 2.

7. The project is adequately served through CRCA in El Jadida which is the oldest and largest of the CRCA's in Morocco and a recently established CRCA in Sidi Bennour. The Jadida branch has been experiencing a very rapid rate of growth in terms of the volume of loans and its clientele. Due to dynamic management, the activities of the CRCA have been extended into sectors which had traditionally relied on private sources of credit, e.g. market gardening.

8. Incremental short term credit needs would amount to DH 1.6 million at full development. The increase is mainly due to a shift of clientele from CLCA to CRCA as land is brought under irrigation and fiscal incomes increase.

Currently 55% of area qualify for credit through CLCA; at full development this would fall to around 45%. Medium term credit needs will increase by DH 2.6 million at full development. The CRCA in Jadida is too far to serve the project area.

B. Caisse Locale de Credit Agricole

9. The minimum fiscal income for eligibility for CLCA credit is between DH 100-3,000 p.a. Short-term credit is available for up to a maximum of one year at 4% per annum. Medium term credit is limited to farmers with fiscal income exceeding DH 300 and is extended for up to a maximum of five years at 6.5% per annum. Depending on the fiscal income of the farmer a maximum of 3 loans can be extended in one year, with annual disbursement of loans limited to a maximum of 35% of the borrower's fiscal income. The maximum monies for each purpose are outlined in Table 1.

10. Security is generally in the form of the signature of a guarantor combined with a survey of the farmer's holding. All loans are subject to a 2% tax on the amount of the loans which become part of an insurance fund for the CLCA.

11. There are two CLCA in Sidi Bennour and Zemamra. Both have been very active, notably the branch at Zemamra. Recovery rates have been very high (99% in Zemamra).

12. Incremental short term requirements would be small because (a) decreased area in wheat, (b) increased area of industrial crops participating in the integrated cropping operations of ORMVAD, and (c) shift of CLCA's clientele to CRCA as fiscal incomes exceed DH 3,000 (para 9). Medium credit needs will, however, increase substantially as farmers expand their livestock activities and would amount to DH 1.3 million.

C. Office de Mise en Valeur

13. Loans to farmers participating in the integrated cropping operations organized and managed by ORMVAD are advanced through the respective Office. Such advances are generally in the form of materials, e.g. fertilizer and seeds, services (e.g. tractors), and fixed cash payments. Crops included in this program are sugar beet, cotton and hybrid maize. Loans for sugar beet and cotton are recovered at the processing factories; farmers being paid for their produce after ORMVAD has deducted the farmers' outstanding debts. Recovery rates are very high for sugar beet since farmers have no option but to sell their crop to the local processing plants. In the case of cotton, difficulties have existed. Farmers have had the opportunity and found it convenient to avoid selling to the local ginning companies because of long delays in receiving payments. The procedure has been revised and recovery rates have improved. Recovery rates for maize are poor; however, credit extended through the Office for this purpose is expected to be a temporary measure aimed at encouraging farmers to become familiarized with production of maize.

14. In the project area a growing proportion of credit requirements would be financed through ORMVAD, reflecting the growing importance of sugar beet and cotton. Additional DM 4.3 million in credit would be required. This is a substantial increase (49%) over ORMVAD's current level of lending.

D. Conclusion

15. The changes in cropping patterns at full development result in a large shift towards credit provision through ORMVAD. Short term incremental credit needs would be relatively small for CLCA and CRCA. Credit requirements through CLCA and CRCA would increase mostly because of increased need for medium term credit resulting from the increased importance of livestock activities in both projects.

16. Incremental credit requirements would be important. There would be an important shift of clientele from the CLCA to the CRCA. However, since the activities of the CRCA are already very extensive, the incremental increase would be fairly small in relation to the size of its operation. In spite of this shift, incremental needs of credit through CLCA would be important. However, this should pose no special difficulties. ORMVAD would double its scale of operations. Incremental credit requirements in relation to total CLCA operations would be very small (4%) and CRCA has sufficient funds to meet project needs.

17. Table 4 summarizes future incremental credit needs with the project and indicates their importance in relation to 1973/74 lending.

January 9, 1976

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KINGDOM OF MOROCCO

DOUJYALA IRRIGATION PROJECT

Rates of Interest on Agricultural Credit

<u>Source</u>	<u>Interest Rate</u> /1	<u>Maximum Duration</u>
<u>CRCA: Fiscal Income DH 3,000 per annum</u>		
Short Term		
Cereals	6.0%	1 year
Sugar beet, Cotton	8.0%	1 year
Fattening Operations	8.5%	1 year
Medium Term		
Agrarian Reform Groups and Cooperatives	7.0%	10 years
Standard Rate	8.5%	10 years
<u>CICA: Fiscal Income DH 100-3,000 per annum</u>		
Short Term	4.0%	1 year
<u>OPVA: (Integrated Cropping Operations)</u>		
Short Term		
Cereals	6.0%	1 year
Sugar beet, Cotton	8.0%	1 year
<u>Commercial Banks</u>		
Short Term	8.0-10.0%	
Medium Term	12.0%	

/1 Nominal

December 1975

KINGDOM OF MOROCCO

EGYPTIA IRRIGATION PROJECT

Credit Availability Norms 1974/75

(DH/ha)

Item	CRCA	CLCA	CR/VAD
<u>Small Term Credit</u>			
Sugar beet	-	-	900
Cotton	-	-	800
Wheat:			
Traditional Varieties	250	350	-
High Yielding Varieties	350	350	-
Maize:			
Local Varieties	350	350	-
Hybrids	500	350	-
Industrial Tomatoes	1,300	900	-
Vegetables	1,100	900	-
Berseen	250	300	-
Suberba	- [△]	900	-
Beans	300	300	-

	CRCA		CLCA	
	Norm	Years	Norm	Years
<u>Medium Term Credit</u>				
Lucerne	DH 1,300	3-4	- [△]	-
Agricultural Equipment	70%	3-6	80%	2
Irrigation and Drainage	70%	6	60%	5
Construction	DH 50-150/m ²	7-10	DH 50/m ²	5
Cattle:				
Imported	70% (DH 3,000 max.)	4-5	80%	3-5
Local	70% (DH 2,200 max.)	4-5	80%	3-5

[△] Only available on medium term.

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KINGDOM OF MOROCCO
DOUKKALA IRRIGATION PROJECT
Loans Advanced by CRCA and CLCA

<u>Item</u>	<u>1972/73</u> <u>Amount</u>	<u>1973/74</u> <u>Amount</u>	<u>% of total</u> <u>CRCA, CLCA</u> <u>Loans</u>
	----- DH Million -----		
CRCA: (El Jadida)			
Short	9,700	16,100	
Medium	<u>7,800</u>	<u>11,200</u>	
Total	<u>17,500</u>	<u>27,300</u>	13%
CLCA: (Sidi Bennour/Zemama)			
Short	78	322	
Medium	<u>1,146</u>	<u>3,530</u>	
Total	<u>1,224</u>	<u>3,852</u>	5%
Grand Total Doukkala	<u>18,724</u>	<u>31,152</u>	11%

December, 1975

KINGDOM OF MOROCCO

DOUKKALA IRRIGATION PROJECT

Incremental Credit Requirements

Region	<u>Short Term</u>	<u>Medium Term</u> (in '000)	<u>Total</u>	<u>Increase</u> <u>over 1973/74</u> <u>Lending</u>
CLCA	24.0	1,263.0	1,287.0	33%
CRCA	1,603.0	2,587.0	4,190.0	17%
ORMVAD	<u>4,260.0</u>	<u>-</u>	<u>4,260.0</u>	49%
Total	<u>5,887.0</u>	<u>3,850.0</u>	<u>9,737.0</u>	

December 1975

MINNESOTA STATE UNIVERSITY
 MINNESOTA STATE UNIVERSITY PROJECTS
 Cont Estimate

Item	Local	System	Total	Local	System	Total	Percent Contingency
ILLUMINATION SYSTEMS							
CIVIL WORK							
Cables	8,082	6,831	14,913	2,313	1,344	3,657	33
Fluorescent Station Civil Works ¹¹	1,071	1,812	2,883	455	267	722	33
Device Towers	3,350	3,230	6,580	1,340	712	2,052	33
Underground Piping	67,691	16,812	84,503	12,756	6,800	19,556	33
Lead Piping Installation	3,120	3,100	6,220	830	830	1,660	33
Flow Valve	1,947	1,940	3,887	507	507	1,014	33
Watermains	2,031	0	2,031	329	0	329	0
Pressure Network	5,990	3,910	9,900	1,344	1,344	2,688	33
Project Buildings	522	522	1,044	121	121	242	33
Subtotal	79,294	46,753	126,047	20,617	12,090	32,707	
Price Contingency	11,111	11,111	22,222	1,111	1,111	2,222	
Total	101,661	60,362	162,023	21,728	13,201	34,929	33
Equipment							
Electromechanical ¹¹	6,006	10,762	16,768	1,187	2,700	3,887	33
Mobile Signaling	7,314	17,060	24,374	1,003	6,390	7,393	33
Reference ¹¹	1,631	3,473	5,104	827	1,662	2,489	33
Operation and Maintenance Equipment ¹¹	1,588	1,128	2,716	171	652	823	33
Subtotal	15,000	31,200	46,200	3,000	9,000	12,000	
Price Contingency	1,111	1,111	2,222	111	1,111	1,222	
Total	16,111	32,311	48,422	3,111	10,111	13,222	33
Construction							
Construction	6,166	6,166	12,332	1,076	1,076	2,152	33
Price Contingency	111	111	222	50	50	100	
Total	6,277	6,277	12,554	1,126	1,126	2,252	33
Subtotal Irrigation Network	96,555	64,216	160,771	21,601	22,775	44,376	
Price Contingency	11,111	11,111	22,222	1,111	1,111	2,222	
Total Irrigation Network	107,666	75,327	183,000	22,712	23,886	46,600	33
Structural Materials							
Off and Research Station Buildings	2,701	1,350	4,051	697	370	1,067	33
Mill Collecting Center	111	111	222	11	110	121	33
Subtotal	2,812	1,461	4,273	708	480	1,188	
Price Contingency	111	111	222	11	110	121	
Total	2,923	1,572	4,495	719	590	1,309	33
Equipment and Vehicles ¹¹							
Equipment and Vehicles ¹¹	1,071	2,000	3,071	263	611	874	33
Price Contingency	111	111	222	52	110	162	
Total	1,182	2,111	3,293	315	721	1,036	33
Material and Labor ¹¹							
Material and Labor ¹¹	9,969	0	9,969	2,113	0	2,113	0
Price Contingency	1,111	0	1,111	111	0	1,111	
Total	11,080	0	11,080	2,224	0	2,224	0
Information ¹¹							
Books	13,071	13,071	26,142	3,000	3,000	6,000	33
Telecommunication	11	111	122	11	110	121	33
Subtotal	13,082	13,182	26,264	3,011	3,110	6,121	
Price Contingency	1,111	1,111	2,222	111	110	221	
Total	14,193	14,293	28,486	3,122	3,220	6,342	33
Utility Communications							
Water Supply ¹¹	1,313	0	1,313	700	210	910	33
Electricity	500	0	500	130	300	430	33
Farmstead	100	0	100	100	0	100	33
Schools	1,177	1,177	2,354	269	210	479	33
Subtotal	3,090	1,177	4,267	1,199	510	1,709	
Price Contingency	1,111	1,111	2,222	111	110	221	
Total	4,201	2,288	6,489	1,310	620	1,930	33
Administrative							
Government Engineering	3,002	0	3,002	1,110	0	1,110	0
Local Consultant	700	0	700	200	0	200	0
Engineering Consultant	1,111	4,073	5,184	611	1,750	2,361	33
Traffic Feasibility Study	410	1,100	1,510	107	300	407	33
Bifurcate Control Program	800	1,100	1,900	207	300	507	33
Vegetable Marketing Study	111	700	811	11	300	311	33
Subtotal	6,091	7,073	13,164	2,046	3,000	5,046	
Price Contingency	1,111	1,111	2,222	111	1,111	1,222	
Total	7,202	8,184	15,386	2,157	4,111	6,268	33
Total Irrigation Price Contingencies							
Total Irrigation Price Contingencies	171,666	106,662	278,328	62,717	37,137	99,854	33
Physical Contingencies							
Physical Contingencies	21,700	15,112	36,812	5,113	3,511	8,624	33
Price Contingency	1,111	1,111	2,222	111	1,111	1,222	
Total Physical Contingencies	22,811	16,223	39,034	5,224	4,622	9,846	33
GRAND TOTAL							
GRAND TOTAL	222,222	162,222	384,444	77,777	62,222	140,000	33
Total Contingencies	67,000	44,000	111,000	10,000	11,000	21,000	33
Total Price Contingencies	67,000	44,000	111,000	10,000	11,000	21,000	33

¹¹ Proportions due to rounding.
 Financing by AIP.
 Part financing by AIG.
 December 1975

Schedule of Expenditures

Item	1973		1974		1975		1976		1977		Program Expenditure
	Budget	Total	Budget	Total	Budget	Total	Budget	Total	Budget	Total	
AGRICULTURAL PROJECTS											
CIVIL WORK											
Canals	6,555	12,817	1,275	2,664	2,183	6,579	1,275	2,664	-	-	33
Fanning Station Civil Works II	1,433	2,534	-	-	193	879	345	1,643	567	1,043	33
Water Tower	2,600	6,000	-	-	1,600	4,000	1,600	4,000	-	-	33
Underground Pipes	20,652	76,167	-	-	3,500	10,553	3,957	17,136	9,737	37,830	30,906
Land Preparation	7,100	8,500	-	-	600	1,750	2,150	4,307	623	805	30
Flow Roads	1,900	2,933	-	-	300	1,650	903	1,800	533	1,000	30
Windbreaks	0	2,000	-	-	0	1,500	0	100	710	-	30
Drainage Network	2,900	11,900	-	-	-	-	-	-	1,331	4,501	7,450
Project Buildings	223	724	-	-	223	724	-	-	-	-	33
Subtotal	66,753	176,951	1,275	2,664	6,066	23,176	12,116	31,760	15,310	35,992	11,462
Price Contingency	12,242	22,574	0	0	420	1,712	2,227	4,415	4,578	10,723	15,515
Total	78,995	199,525	1,275	2,664	6,486	24,888	14,343	36,175	19,888	46,715	26,977
IRRIGATION											
Electromechanical II	10,762	15,360	-	-	2,995	4,370	3,287	4,410	2,100	2,806	2,572
Mobile Equipment II	17,000	26,300	-	-	4,700	6,730	4,700	6,600	5,550	5,475	6,100
Water II	7,433	8,100	-	-	1,500	1,800	2,177	2,103	1,975	2,810	-
Operational and Maintenance Equipment II	1,232	2,528	-	-	1,232	1,272	129	511	-	-	-
Subtotal	36,427	52,288	-	-	10,427	13,772	11,293	13,794	10,625	11,691	10,672
Price Contingency	5,572	9,072	-	-	729	523	1,342	1,433	1,325	1,478	1,350
Total	42,000	61,360	-	-	11,156	14,295	12,635	15,227	11,950	13,169	12,022
LONG RANGE											
Subtotal Irrigation Network	6,232	10,400	1,010	2,010	2,010	4,300	616	1,030	-	-	60
Price Contingency	127	512	0	0	111	112	59	157	-	-	-
Total	6,359	10,912	1,010	2,010	2,121	4,412	675	1,187	-	-	60
Subtotal Irrigation Network	60,214	104,700	3,065	6,640	10,733	40,114	22,721	49,442	29,133	51,412	39,653
Price Contingency	20,227	52,272	0	0	1,112	2,111	2,433	2,433	2,433	2,433	20,227
Total Irrigation Network	80,441	156,972	3,065	6,640	11,845	42,225	25,154	51,875	31,566	53,845	59,880
AGRICULTURAL DEVELOPMENT											
U-T and Research Station Buildings	1,450	4,163	-	-	633	2,642	330	999	233	722	33
Wild Collecting Centers	511	522	-	-	-	127	227	211	127	127	63
Subtotal	1,961	4,700	-	-	633	2,769	557	1,210	360	849	96
Price Contingency	270	621	-	-	60	121	121	120	120	121	102
Total	2,231	5,321	-	-	693	2,890	678	1,330	480	970	198
EQUIPMENT AND SUPPLIES											
Subtotal	2,296	3,600	-	-	-	-	923	1,110	1,443	2,000	70
Price Contingency	673	683	-	-	-	-	133	129	252	323	-
Total	2,969	4,283	-	-	-	-	1,056	1,239	1,695	2,323	70
AGRICULTURAL STUDIES											
Subtotal	0	2,300	-	-	0	117	0	2,664	0	2,664	0
Price Contingency	0	1,120	-	-	0	52	0	612	0	1,258	0
Total	0	3,420	-	-	0	169	0	3,276	0	3,922	0
INFRASTRUCTURE											
Roads	10,073	10,165	-	-	2,275	2,270	1,200	10,400	2,320	6,600	1,420
Telecommunication	100	117	-	-	100	117	-	-	-	-	30
Subtotal	10,173	10,282	-	-	2,375	2,387	1,200	10,400	2,320	6,600	1,450
Price Contingency	2,925	5,120	-	-	811	700	1,500	2,112	1,123	1,123	1,123
Total	13,098	15,402	-	-	3,186	3,087	2,700	12,512	3,443	7,723	2,573
VILLAGE INFRASTRUCTURE											
Water Supply II	616	2,211	-	-	-	-	233	660	233	660	1,000
Electric II	611	1,511	-	-	-	-	112	300	112	300	170
Sanitary II	100	711	-	-	-	-	111	111	111	111	133
Schools	1,112	2,000	-	-	-	-	320	1,200	323	1,200	1,200
Subtotal	2,439	6,433	-	-	-	-	676	2,271	677	2,271	2,503
Price Contingency	1,200	1,212	-	-	-	-	183	612	200	420	1,200
Total	3,639	7,645	-	-	-	-	859	2,883	877	2,691	4,703
ADMINISTRATIVE											
Government Engineering	0	1,002	-	970	0	1,027	0	1,027	0	1,027	0
Local Commissions	0	700	-	-	0	260	0	260	0	260	0
Engineering Commissions	6,073	6,525	273	300	1,100	1,150	1,100	1,100	1,100	1,100	30
Public Works II Study	1,100	1,200	-	-	123	100	150	100	100	100	30
Wildlife Control Program	1,100	1,700	-	-	123	900	150	100	100	100	30
Vegetable Marketing Study	220	1,023	-	-	220	1,023	-	-	-	-	30
Subtotal	9,500	17,000	273	1,270	1,323	3,327	1,350	3,527	1,200	3,127	90
Price Contingency	1,212	2,220	0	0	112	220	220	220	220	220	1,212
Total	10,712	19,220	273	1,270	1,435	3,547	1,570	3,747	1,420	3,347	120
TOTAL INCLUDING PRICE CONTINGENCIES											
Subtotal	140,692	306,136	2,300	6,603	22,120	77,977	30,630	81,000	42,323	92,090	73,680
Price Contingency	2,203	2,132	0	0	1,112	320	827	1,222	1,222	1,222	
Total Physical Contingencies	18,037	64,274	413	1,020	3,300	7,960	3,229	12,782	3,751	13,091	
GRAND TOTAL	158,932	370,530	2,713	7,623	25,420	85,937	33,859	93,782	46,074	105,181	
Total Contingencies	66,667	110,377	413	1,020	3,300	7,960	3,229	12,782	3,751	13,091	
Total Price Contingencies	20,165	71,245	0	0	1,027	6,920	6,920	19,744	11,600	27,897	

II Planning by JID
 Part Planning by JID
 December 1973

KINGDOM OF MOROCCO

DOUKKALA IRRIGATION PROJECTMachinery and Vehicles to be Procured

Type	Number	Unit Cost (DH)	Total Cost (DH'000)
<u>Operation and Maintenance</u> <u>(Subdivision and Headquarters)</u>			
Graders /1	2	500,000	1,000
Hydraulic Excavator/1	1	500,000	500
Telescopic Crane (Truck Mounted)/1	1	300,000	300
Tractor with Tank Wagon/1	2	60,000	120
4-Wheel Drive Vehicles	5	50,000	250
Small Cars	5	12,000	60
Car	1	15,000	15
Light Motorcycles	20	1,400	28
Workshop Equipment		100,000	100
Total Operation and Maintenance Equipment			<u>2,373</u>
<u>CMV's</u>			
Light Crawler Tractors/1	6	200,000	1,200
Small Cars	9	12,000	108
4-Wheel Drive Vehicle	3	50,000	150
Wheel Tractors/1	18	45,000	810
Light Motorcycles	30	1,400	42
Agricultural Equipment	24	15,000	360
Total Equipment for 3 CMV's			<u>2,670</u>
<u>Artificial Insemination</u>			
Small Cars	5	12,000	60
Total Artificial Insemination			<u>60</u>
<u>Research Station</u>			
Truck, 6 tons	1	60,000	60
4-Wheel Drive Vehicle	1	50,000	50
Small Cars	3	12,000	36
Car	1	15,000	15
Experimental Equipment		386,000	386
Total Research Station			<u>547</u>
GRAND TOTAL			<u>5,650</u>

/1 Financed by AID.

December 1978

DOUKKALA IRRIGATION PROJECT

KINGDOM OF MOROCCO

Marketing

General

1. Commodities produced under the project offer no marketing difficulties. The pattern of production and marketing at full development would offer two important changes: (a) a shift towards increased production of industrial crops and vegetables, and (b) increased production of milk. The increased production of cereals, sugar beet and milk would be aimed at reducing the country's current dependence on imported produce, while production of industrial tomatoes and cotton will be primarily aimed at the export market.

Cereals

2. Moroccan trade statistics reflect important annual fluctuations due to climatic factors and a growing cereal deficit resulting from a rapid growth of population and a relatively slow growing agricultural sector. The trend is quite marked and shown below:

<u>All Cereals</u> (tons/annum)	<u>1947/8-1956/7</u>	<u>1957/8-1966/7</u>	<u>1966/7-1969/70</u>
Exports	514,000	181,000	79,000
Imports	60,000	317,000	561,000
Imports as % of Exports	12%	175%	1145%

3. Morocco is self sufficient in hard wheat but imported 968,000 tons of soft wheat in 1973/74 to supplement the domestic consumption of 2.8 million tons (Table 1). In recent years maize deficit has been increasing; in 1973/74, 32,000 tons out of a domestic consumption of 420,000 tons was imported. Projections made by Cereals Trade Office (ONICL) anticipate a wheat deficit of more than 1 million tons with self sufficiency in maize production for 1980. The incremental production of wheat and maize at full development is summarized in Table 2. Total increases would be small in relation to total domestic consumption and would contribute to a reduced reliance on imported cereals.

4. The state sets support prices for wheat and maize. The minimum price for soft wheat is currently DH/ton 600, for hard wheat, DH/ton 630, and for maize DH/ton 450. Farmers are free to sell to the local market. During harvesting time prices drop below intervention levels, and farmers

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prefer to sell to the Government's supported cereals agency (SCAM). A survey conducted by ORMAD shows last agricultural campaign free market prices up to 50% above the intervention level. Therefore a financial price of DH/ton 700 for wheat (weighted average of hard and soft wheat) and DH/ton 550 for maize have been used. Economic prices have been calculated on the basis of IBRD projected prices for wheat and maize in 1980, expressed in constant 1975 dollars and amount to DH/ton 700 and DH/ton 524 for wheat and maize respectively.

Sugar Beet

5. Despite recent increases in domestic production of sugar beet, Morocco imports increasingly larger amounts of sugar to meet domestic needs. In 1973/74 about 50% of the domestic consumption of processed sugar were imported (Table 1). Government's projections based on expected per capita consumption of 32 kgs per annum, indicate a national consumption of about 800,000-850,000 tons of sugar by 1990. The increase in production in both perimeters would account for about 6% of the 1974 consumption level and less than 3% of the expected consumption level in 1990. No marketing difficulties are anticipated on the national level.

6. The existing sugar factory in Sidi Benour is currently expanding its capacity of 2,700 ton/day to 4,000 ton/day by 1977 (Table 3). Additional capacity would be required by 1982 (Table 4). Government's plans include a factory in the area and plant would be justified as part of the second phase project in the Thine Rharbia perimeter.

7. Farmgate prices are fixed by the government and vary with sugar content of the beet: DH/t 57 for a sugar content of 11% and DH/t 150 for 24%. The price for an average 17% concentration is DH/t 99.6. Since farmers have no alternative but to sell to local sugar plants government prices have been used for the financial analysis.

8. Economic prices have been calculated on the basis of IBRD projections, allowing for transport and processing costs. The resulting economic price for sugar beet would be DH/t 140.

Cotton

9. Cotton production will consist exclusively of long staple cotton for export.

10. After a record harvest of 29,936 tons in 1965 total Moroccan cotton production declined in the late 1960's and gradually recovered in recent years. This decline was due to growing competition from sugar beet, irregularity in payments and inadequate parasite control. It is forecasted that for the current year some 25,000 to 28,000 tons of seed cotton would be produced. It is estimated that programs for irrigation infrastructure (Tadla, Gharb, Doukkala), increased government incentives (higher prices and better payment systems) and inclusion of cotton in the rotation as part of the sugar development plan, would rise seed cotton production to a total of 55,000 tons in 1985. Of this about 60% would be for the domestic industry.

11. Cotton is exclusively marketed by the Moroccan Marketing Company for Agricultural Products (COMAPRA). COMAPRA was established in 1962 as a limited liability corporation with the state as a majority stockholder. It has responsibility for the purchasing, transportation, warehousing, ginning and processing of raw cotton. Raw cotton is delivered to COMAPRA managed mills, where loans outstanding to the farmer as part of OCMVAD's integrated cropping scheme are deducted (Annex 6). Late payment often forced the farmer to sell on the local market at a lower price. The Government has improved procedures, producers are paid upon delivery to the factory with debts deducted.

12. The Government Export Office (OCE) has monopoly over export of cotton. Total production of seed cotton in 1973 was estimated at 18,800 tons of which only 7% in the Doukkala (Table 5). Exports in 1973 were 7,800 tons of cotton lint (Table 5).

13. Prices for long staple cotton are more stable than for short staple. With the rapid decline in world prices for short staple cotton, the premium on long staple has increased from a historic level of around 70% to over 140%. Price of long staple are dependent on decisions of the two main producer countries, Egypt and Sudan. It is expected the historic relationship between short and long staple will be restored. Economic prices used in project analysis are based on IBRD projections for Mexican short and adjusted for a 70% premium.

14. Actual farmgate prices are fixed by the government depending on quality and vary from US\$387 per ton to US\$493 per ton of seed cotton.

15. The increase in production is substantial. However existing processing facilities of 5,000 tons per year are adequate. Cotton production in the already irrigated areas would increase from 1,300 tons to 2,500 tons in 1985, and incremental production in the project area would be 2,000 tons of seed cotton.

Industrial Tomatoes

16. In 1974 the equivalent of approximately 110,000 tons of fresh tomatoes were processed in Morocco of which 17,000 tons equivalent was consumed locally (Table 6). The project would increase production of industrial tomatoes by 54,400 tons. Currently only a small and outdated processing plant exists in El Judida, and a further plant with a 20,000 tons fresh tomatoes capacity is under construction in Azemour. Private entrepreneurs have expressed interest to the Government and the Bank in setting up a tomato processing plant. Credit for establishing processing industries are available from INDE. Project production would be transformed into tomato paste and exported. Current Moroccan exports represent about 2 and 3 percent of the total Western European and North American consumption respectively and a negligible percentage of the estimated world production of over 1.5 million tons. Market prospects are good. Italy has traditionally been the biggest supplier of tomato paste in the European market, followed by Portugal. There are inherent weaknesses in the industry in both countries. Italy is facing

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difficulties with rising costs of labor and raw material while Portugal has been forced to curtail the area devoted to tomato production because of over-cultivation and increasing labor problems. Similarly USA has reduced the area cultivated for industrial tomatoes. Demand for tomato paste has been growing. Given the proximity to the European market and its ties with France, Morocco would be in a position to take advantage of the expected growth and structural change in the world market. Given the fairly small market share of Morocco and its already developed export trade, no difficulties in marketing of paste are foreseen.

17. Tomato paste prices increased from about US\$350 per ton in 1972 to US\$700 per ton in the current year. Financial and economic prices are assumed to be equal and have been calculated on the basis of current market prices for tomato paste adjusted for transportation and processing costs.

Livestock Produce

18. In 1973 Morocco produced about 540 million liters of cow milk (Table 7). Of these only 12% reached the processing factories, a further 8% was marketed in the traditional way, either through the souk or street milk vendors, and the remainder consumed at the source of production. In the same year Morocco imported 190 million liters of milk equivalent in dairy products. Projections, for the rural and urban sectors (Table 7) indicate a growing deficit in dairy produce unless the annual growth in production reaches 8% for the period 1973-1980 and 5% for 1973-85. This is substantial in comparison to past performance of the sector.

19. An important element in the country's dependence on milk imports has been the inability to offer the producer a reliable outlet for his production throughout the year. Only recently and under Government's guidance farmers grouped into cooperative to operate milk collecting centers. Such milk collecting centers have been extremely successful in the Doukkala where large quantities of milk previously consumed locally are now marketed.

20. The number, capacity, and degree of utilization of the major dairy factories show that in spite of relatively low levels of overall utilization skimmed milk was thrown away during the period of maximum production at a rate of several thousand liters a day. Currently the bulk of milk received by dairies is sold pasteurized. There is a need to shift towards products with a long shelf life. The establishment of a plant in Sidi Bennour specializing in the production of milk powder will be helpful (para 23).

21. The price of milk to the producer is about DH/0.95 ranging from a low of DH/1 0.8 in periods of high production to DH/1 1.05 in the period of lowest production. This price includes a variable government subsidy, the non-subsidized price being DH/1 0.67.

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22. In Doukkala production of presently irrigated areas was 14,000 l/d in 1974, and is expected to increase by 7-8% p.a. An average of 13,000 l/d was collected through 12 existing milk collecting centers. With a total capacity of 37,000 l/d. (Table 8) Further 8 centers would become operational in the current year increasing total capacity to 60,000 l/d. In addition 12 centers would be provided, through the project, for the Zemzema sector. The project would increase production by 49,000 l/d at full development. Thus total production in the Doukkala region is expected to reach about 145,000 l/d by the year 2,000 1/.

23. In the past all milk has been transported to Casablanca for processing. A decision has been taken to construct a dairy plant at Sidi Bennour with a capacity of 70,000 l/d. Contracts have been awarded. With the expansion of the Centrale Laitiere Casablanca and the construction of the plant at Sidi Bennour marketing facilities would be adequate.

24. Production of meat is expected to increase by 2,700 tons (live weight) in Doukkala representing less than one percent of domestic supply of beef. Market channels are through traditional souks as well as wholesale and retail butchers. Municipal slaughterhouses in Casablanca and in the project area are sufficient for project needs. Economic prices have been calculated by adjusting IBPD projected 1980 prices for beef. Financial and economic prices are assumed to be equal.

Other

25. Production of beans is expected to decline with the increased area devoted to the cultivation of more profitable crops. Beans have been consumed locally. The decline in production will not pose difficulties since it is likely to be a natural shift in consumption from beans towards more expensive and nutritious food as incomes rise in the area.

26. Table 10 summarizes economic and financial prices used in project analysis.

January 9, 1976

1/ Existing irrigated area, project area, and adjacent rainfed area.

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KINGDOM OF MOROCCO

DOUKKALA IRRIGATION PROJECT

National Production and Consumption of Major Crops 1971-1974

Crop	1971-1972			1972-1973			1973-1974		
	<u>Production</u>	<u>Imports</u>	<u>Exports</u>	<u>Production</u>	<u>Imports</u>	<u>Exports</u>	<u>Production</u>	<u>Imports</u>	<u>Exports</u>
	-----('000 tons)-----								
Wheat	2,161	574	-	1,574	469	-	1,853	968	-
Maize	368	10	-	217	20	-	390	33	-
Sugar beet ^{/1}	1,677	210	-	1,293	231	-	1,944	269	-

^{/1} Sugar

December 1975

KINGDOM OF MOROCCO
DOUKKALA IRRIGATION PROJECT
Incremental Crop Production

<u>Crop</u>	<u>Production tons</u>	<u>% of National Consumption</u>
Wheat	9,480	1%
Maize	8,725	2%
Sugar beet	130,500	1%
Cotton	2,040	11%
Milk	17,890	2%
Meat (liveweight)	2,680	3%
Olives	-	-
Tomatoes	54,400	49% ^{/1}
Beans	-	-

/1 Domestic production.

December 1975

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KINGDOM OF MOROCCO

DOUKKALA IRRIGATION PROJECT

Processing Capacity and Utilization

	<u>No. of Plants</u>	<u>Without Project</u>		<u>No. of Plants</u>	<u>With Project</u>	
		<u>Processing Capacity</u>	<u>Production</u>		<u>Processing Capacity</u>	<u>Production</u>
		----- tons	----- tons		----- tons	----- tons
<u>Doukkala</u>						
Cotton	1	5,000	1,210	1	5,000	4,500
Sugar beet	1	243,000	243,000	2	700,000	418,000
Milk	-	-	-	1	70,000 l/d	
Industrial Tomatoes	-	-	-	3	90,000	87,700

December 1975

ANNEX 11
Table 3

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KINGDOM OF MOROCCODOUKKALA IRRIGATION PROJECTSugar Beet Production and Processing Capacity in Doukkala

<u>Year</u>	<u>Project Area</u>	<u>Existing Irrigated Area</u>	<u>Total</u>
<u>Production</u>			
1975	-	261,000	261,000
1976	-	279,000	279,000
1977	-	288,000	288,000
1978	5,500	288,000	293,500
1979	20,900	288,000	308,900
1980	26,700	288,000	316,700
1981	55,440	288,000	346,440
1982	78,800	288,000	366,800
1983	98,400	288,000	386,400
1984	116,100	288,000	404,100
1985	124,600	288,000	412,600
1986	125,000	288,000	414,000
1987	130,000	288,000	418,000
1988	130,500	288,000	418,500
<u>Existing Capacity</u>		<u>243,000</u>	
<u>Expansion in Process</u>		<u>117,000</u>	
<u>Total Future Capacity</u>		<u>360,000</u>	

KINGDOM OF MOROCCO
DOUKKALA IRRIGATION PROJECT

Moroccan Production of Seed Cotton and Exports of Lint Cotton 1971-1974

<u>Year</u>	<u>Production (seed)</u>			<u>Total</u>	<u>Exports (Lint)</u>	<u>World Production (Lint)</u> ^{/1}
	<u>Tadla</u>	<u>Doukkala</u>	<u>Other</u>			
	----- tons -----					
1971	19,155	1,911	3,121	24,120	4,525	155,211
1972	21,826	1,290	3,212	26,358	7,710	181,878
1973	14,362	988	2,468	17,818	7,818	182,312
1974	13,500	1,242	4,101	18,843	n.a.	

^{/1} Extra long staple 1-3/8" and over, cotton advisory board.

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AMERICAN OVERSEAS BANKING CORPORATION

KINGDOM OF MOROCCO

DOUKKALA IRRIGATION PROJECT

Production and Exports of Tomato Products 1974

	<u>Tons</u>	<u>US\$/ton</u>	<u>Tomato Equivalent</u>
Exports			
Tomato Juice	448	137	750
Preserve	1,428	376	1,750
Concentrate	8,378	756	52,800
Powder	<u>2,013</u>	2,916	<u>38,000</u>
Total of Exports	12,267		93,300
Total Domestic Consumption	<u>5,233</u>		<u>17,000</u>
GRAND TOTAL PRODUCTION	<u>17,500</u>		<u>110,300</u>

December 1975

DOUNKALA IRRIGATION PROJECT

Projected National Consumption and Production of Dairy Produce 1973-1985

Item	1973			1980			1985		
	Rural	Urban	Total /1	Rural	Urban	Total	Rural	Urban	Total
	('000 tons of Fresh Milk Equivalent)								
Population	10.3	6.0	16.3	11.6	8.6	20.2	12.6	10.9	23.5
Milk									
Fresh	256.0	12.4	298.4	290.0	-	290.0	283.0	-	283.0
Pasteurized	-	66.0	66.0	-	125.0	125.0	-	201.0	201.0
Concentrate	-	38.4	38.4	-	-	-	-	-	-
Powder	-	12.2	12.2	64.0	152.0	216.0	160	206.0	366.0
Cheese	21.7	24.0	48.7	34.0	42.0	76.0	43	61.0	104.0
Butter	177.5	126.0	306.5	247.0	220.0	467.0	310	322.0	632.0
Total Demand ²	<u>460.2</u>	<u>309.0</u>	<u>769.2</u>	<u>635.0</u>	<u>539.0</u>	<u>1,174.0</u>	<u>796.0</u>	<u>710.0</u>	<u>1,535.0</u>
Total Supply			538.0						
Imports			190.0						
% Imported			25.0						

1 Figures for total demand have been calculated on the basis of consumption norms and do not correspond exactly with actual demand in 1973, which equalled 528 million liters.

2 Calculated on the basis of the following norms: kg/year/head

	Rural	Urban
Milk	24.9	26.5
Cheese	2.4	4.0
Butter	0.0	1.0

Per capita consumption growth = 2.9% p.a.
Growth in milk production = 3.9% p.a.

December 1975

ANNEX II
TABLE 7

KINGDOM OF MOROCCO

DOUKKALA IRRIGATION PROJECT

Cooperative Milk Collection Centers in the Doukkala Perimeter 1970-1974

<u>Year</u>	<u>No. of Cooperatives</u>	<u>Total Collection</u>		<u>Peak Collection</u> ^{/1}	<u>Capacity lit/day</u>
		<u>'000/lit</u>	<u>lit/day</u>	<u>lit/day</u>	
1970	6	2,200,000	6,027	9,300	21,300
1971	7	2,100,000	5,753	8,900	25,700
1972	10	3,040,696	8,331	12,900	31,900
1973	10	4,111,864	11,265	17,500	31,900
1974	12	4,703,857	12,867	20,000	37,300
1975 ^{/2}					

^{/1} Estimates.

^{/2} Not available.

December 1975

KINGDOM OF MOROCCO

DOUKKALA IRRIGATION PROJECT

Economic and Financial Prices

Item	Financial	Economic ^{/1}
	(DH/ton)	
Wheat		
Hard	630)	
Soft	600)	675
Sugar Beet ²	96	110
Cotton (Seed)	2,100	2,460
Maize	450	497
Lucerne	350	350
Industrial Tomatoes	120	116
Milk	950	810
Meat (Liveweight)	3,500	4,454
Vegetables		
Niors	300	300
Beans	900	900
Olives	1,044	1,044
Transport Costs		
Zemama/Casablanca	32.2 DH/ton	

NOTE: Conversions are made at a rate of DH 3.88 = US\$1.

^{/1} Based on IBRD Commodity Forecasts.

^{/2} 17% Sugar content.

December 1975

KINGDOM OF MOROCCO
BOUKKALA IRRIGATION PROJECT

Farm Budgets

1. Four models of farm budgets are analyzed in Table 1. Tables 2 to 5 give detailed information on different farm types. Farm types 1, 2, 3, and 4 represent 15%, 35%, 30% and 20% respectively of the project area. Net farm income at full development would increase by about 275%, 371%, 322%, and 513% in type 1, 2, 3, and 4 farms. Average per capita income would raise from \$109 to \$485. Average yields and production costs are shown in Table 6.
2. The functional life of the first sprinkler equipment is estimated at 7 years, replacement as necessary and maintenance of the equipment is estimated at about DH 130 per hectare, of which about DH 95 would be depreciation and the remainder routine repair.
3. Interest on working capital has been calculated under the current credit regulations which require each borrower to contribute from his own resources 30% to 70% towards the total working capital. A typical farmer is assumed to contribute from his own resources 50% of his working capital. Therefore, interest has been computed at 6% for one year for 50% of the estimated working capital for each model and situation (with and without project).
4. Hired labor is valued at DH 10 per day, tax deductions are made on the basis of the existing regulations. The first DH 1,400 are exempted. A tax of 8% is applied to the fiscal income within income bracket DH 1,401-6000, 12% to the fiscal income in the DH 12,000-24,000 bracket (and 15% if the fiscal income is between DH 2,400 and 48,000).
5. Water charges were computed according to prevailing legislation. (paras 5.21 and 5.22) and amount to DH/ha 0.147. In addition 25 ha farms would pay a betterment levy of DH/ha 1,500, over a period of 20 years (first 3 years grace) at 4% interest.

January 9, 1976

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STATE OF MICHIGAN
AGRICULTURAL STATISTICS
Summary Data 1964-1965

1964-1965

Item	1964		1965		1964		1965	
	Value	Index	Value	Index	Value	Index	Value	Index
Gross Value of Production								
Crop Production								
Wheat	1,060	1,060	8,370	8,170	3,370	8,100	24,879	10,000
Wheat 1	..	..	..	..	..	..	..	..
Wheat 2	118	..	2,408	..	..	..	17,011	1,000
Sugar beets	..	..	2,400	..	..	..	27,000	..
Cotton	1,173	..	..	..	2,114	..	..	..
Tomatoes	2,350	..	..	..	3,041	..	..	..
Beans	..	180	..	30	..	30	..	1,000
Vegetables (Misc)	..	..	..	..	..	..	..	..
Alfalfa	..	..	..	..	..	..	..	..
Barrows	..	..	..	..	..	..	..	..
Barley Fodder	..	..	..	..	..	..	..	..
Subtotal	5,470	1,318	13,089	2,600	15,829	2,600	68,828	13,600
Livestock Production								
Milk	2,396	..	6,404	..	6,600	..	33,080	..
Dressed Cows	139	..	1,239	..	1,239	..	6,138	..
Wool	614	..	2,008	..	1,600	..	10,000	..
Steers	..	..	2,125	..	2,125	..	11,000	..
Subtotal	3,149	..	11,776	..	11,564	..	60,218	6,700
Total Gross Value of Production	8,619	1,318	24,865	2,600	27,393	2,600	129,046	20,300
Variable Costs of Production								
Physical Inputs	1,775	107	3,030	103	4,004	103	18,000	4,000
Mechanical Operations	247	114	278	100	244	100	8,000	2,000
Hired Labor	..	..	..	..	1,000	..	20,000	4,000
Interest on Working Capital	..	..	..	..	..	..	..	..
Total Variable Cost of Production	2,022	121	3,308	103	5,248	103	46,000	10,000
Fixed Costs and Depreciation								
Maintenance and Replacement	200	..	80	..	200	..	1,000	..
Mobile Hydraulic Equipment	20	..	10	..	20	..	1,000	..
Maintenance Investment Building	..	..	..	..	..	..	..	..
Water Charge	..	..	..	..	..	..	..	..
Total Fixed Costs and Depreciation	220	..	90	..	220	..	2,000	..
Farm Income Before Tax	6,597	1,197	21,557	1,597	22,145	1,597	83,046	10,300
Less: Farm Income Tax	200	120	80	70	215	80	1,000	1,000
Farm Income After Tax	6,397	1,077	21,477	1,527	21,930	1,517	82,046	9,300
Increase in Farm Income After Tax	778	..	778	..	778	..	778	..

Δ Fed to animals.

December 1967

Post Agricultural Document

KINGDOM OF MOROCCO

IRRIKALA IRRIGATION PROJECT

Farm Budget - Farm Type I - 2 ha

Item	Area (ha)	Production (ton)	Gross Production Value (Dir)	Production Cost (Dir) ^{1/1}	Net Production Value (Dir)
<u>Without Project</u>					
Wheat	1.5	1.5	1,050	510	
Maize 1	0.2	0.16	88	56	
Beans	0.2	0.16	180	55	
Livestock	-	-	778	-	
Total	1.9		2,096	621	1,475
<u>With Project</u>					
Wheat	0.5	1.5	1,050	345	
Maize 2	0.6	1.0	525	200	
Cotton	0.5	0.75	1,575	438	
Tomatoes	0.5	20.0	2,320	625	
Alfalfa	0.5	30.0 ^{1/2}	- ^{1/2}	250	
Barley Fodder	0.3	6.0 ^{1/2}	- ^{1/2}	48	
Milk	-	3.03	2,926	-	
Culled Cows	-	- ^{1/4}	559	-	
Calves	-	- ^{1/2}	816	-	
Steers (1-2 years)	-	- ^{1/4}	673	-	
Breeding fees	-	-	-	67	
Hibernal	-	-	-	50	
Veterinary	-	-	-	100	
Total	3.7		12,374	2,113	7,741

- ^{1/1} Including hired labor only.
- ^{1/2} Cash meter.
- ^{1/3} Fed to livestock.
- ^{1/4} One cow every 2-3 years.
- ^{1/5} One every 3 years.
- ^{1/6} One every 3 years.

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Annex 13
Table 5

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KINGDOM OF MOROCCO

DOUKKALA IRRIGATION PROJECT

Farm Budget - Farm Type II- 5 ha

Item	Area (ha)	Production (ton)	Gross Production Value (DH)	Production Cost (DH) /1	Net Production Value (DH)
<u>Without Project</u>					
Wheat	3.0	3.0	2,100	1,020	
Maize 1	0.5	0.4	220	140	
Beans	0.5	0.4	360	138	
Livestock	-	-	1,353	-	
Total	4.0		4,033	1,298	2,735
<u>With Project</u>					
Wheat	2.5	7.5	5,250	1,600	
Maize 2	1.75	4.38	2,409	958	
Sugar beet	1.25	56.25	5,400	1,275	
Alfalfa /2	1.25	75.0 /2	- /2	775	
Milk	-	6.952	6,606	-	
Culled Cows	-	- /5	1,239	-	
Heifers	-	- /3	2,022	-	
Stears	-	- /6	2,654	-	
Breeding Fees	-	-	-	148	
Minerals	-	-	-	110	
Veterinary	-	-	-	221	
Total	6.25		22,578	5,217	27,361

- /1 Including hired labor only.
- /2 Gross matter.
- /3 Fed to livestock.
- /4 0.8 cows per year.
- /5 0.6 heifers per year.
- /6 1.5 steers per year.

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KINGDOM OF MOROCCO

DOUKALA IRRIGATION PROJECT

Farm Budget - Farm Type III - 5 ha

Item	Area (ha)	Production (ton)	Gross Production Value (Dh)	Production Cost (Dh) /1	Net Production Value (Dh)
<u>Without Project</u>					
Wheat	3.0	3.0	2,100	1,020	
Maize 1	0.5	0.4	220	140	
Beans	0.5	0.4	360	138	
Livestock	-	-	1,353	-	
Total	<u>4.0</u>		<u>4,033</u>	<u>1,298</u>	<u>2,735</u>
<u>With Project</u>					
Wheat	1.70	5.10	3,570	1,275	
Maize 2	0.65	1.63	897	500	
Sugar beet	0.83	37.35	3,525	958	
Cotton	0.83	1.25	2,525	843	
Tomatoes	0.83	23.20	3,851	1,206	
Alfalfa	0.83	49.80 /2	-	606	
Soybeans	0.83	20.75 /1	- /2	222	
Milk	-	4.63 /4	4,600	-	
Colled Cows	-	- /4	900	-	
Woolers	-	- /2	1,600	-	
Sheep	-	- /4	2,100	-	
Shearing Fees	-	-	-	118	
Minerals	-	-	-	63	
Veterinary	-	-	-	176	
Total	<u>6.50</u>		<u>23,029</u>	<u>6,010</u>	<u>17,599</u>

- /1 Including hired labor.
- /2 Green matter.
- /3 Fed to livestock.
- /4 0.7 tons per year.
- /5 Calculated every two years.
- /6 1.7 tons every year.

Revised for 1973

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KINGDOM OF MOROCCO

DUKKALA IRRIGATION PROJECT

Farm Budget - Farm Type IV - 25 ha

<u>Item</u>	<u>Area (ha)</u>	<u>Production (ton)</u>	<u>Gross Production Value (M)</u>	<u>Production Cost (M) (1)</u>	<u>Net Production Value (M)</u>
<u>Without Project</u>					
Wheat	15.0	15.0	10,500	8,550	
Maize 1	2.5	2.0	1,100	1,000	
Beans	2.5	2.0	1,000	1,125	
Livestock	-	-	6,765	-	
Total	20.0		20,165	10,675	9,490
<u>With Project</u>					
Wheat	12.50	37.50	26,250	12,750	
Maize 2	8.75	21.90	12,091	6,925	
Sugar beet	6.25	231.00	27,000	12,025	
Alfalfa	6.25	375.00 (2)	- (2)	8,375	
Milk	-	34.76	33,000	-	
Other Cows	-	(4)	6,125	-	
Hedgers	-	(2)	10,010	-	
Steads	-	(6)	13,270	-	
Marketing Fees	-	-	-	710	
Electricity	-	-	-	550	
Veterinary	-	-	-	1,145	
Total	33.75		127,776	65,070	62,706

- (1) Including hired labor.
- (2) Gross matter.
- (3) Net by livestock.
- (4) Four cows per year.
- (5) Three hedgers per year.
- (6) Seven steers per year.

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ANNEX 14
Table 9

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KINGDOM OF MOROCCO

DOUKKALA IRRIGATION PROJECT

Variable Production Costs
With and Without Project

Item	Yield per ha tons	Physical Input	Mechanical Operation	Type I-2 ha Farm		Type II-5 ha Farm		Type III-5 ha Farm		Type IV-25 ha Farm	
				Hired labor	Total	Hired labor	Total	Hired labor	Total	Hired labor	Total
<u>Without Project</u>											
Wheat	1.0	159	101	-	910	-	910	-	340	230	570
Maize	0.8	164	111	-	290	-	290	-	240	120	360
Beans	0.8	176	79	-	275	-	275	-	275	175	450
<u>With Project</u>											
Wheat	3.0	509	181	-	690	30	720	60	750	530	1,020
Maize	2.5	577	123	-	500	70	570	100	600	520	1,020
Sugar beet	45.0	731	169	-	-	120	1,020	240	1,180	1,120	2,020
Cotton	1.5	722	134	-	856	-	-	160	1,016	-	-
Tomatoes	10.0	1,073	177	-	1,250	-	-	300	1,550	-	-
Almonds ^Δ	60.0	420	80	-	500	120	620	230	750	840	1,540
Peas ^Δ	25.0	129	111	-	-	-	-	100	340	-	-
Fodder Barley ^Δ	20.0	55	108	-	160	-	-	-	-	-	-

^Δ Green matter

December 1973

DOUKKALA IRRIGATION PROJECT

KINGDOM OF MOROCCO

Economic Analysis

The economic rate of return costing family labor at DH 8 per day and hired labor at the market rate of DH 10 per day would be 11.5%. A breakdown of investment costs including operation, maintenance and replacement costs but excluding village infrastructure over the project life are presented in Table 1. Processing industries have been excluded from the cost stream because (a) they would be self-sustaining and (b) benefits have been evaluated at the farmgate.

2. The Table also shows the incremental net benefits and net cash flows. For the economic analysis, tradeable commodities have been priced at international prices as derived from commodity forecasts by IBRD Economic Analysis and Projections Department for 1980, in 1975 constant US dollars. Major assumption made for calculating the basic rate of return include:

- (a) The economic life for drains, electromechanical equipment and mobile sprinkler equipment of 25, 15, 15 and 10 years respectively, and for main adduction canals 40 years, buried pipes and other major civil work structures of 50 years.
- (b) Project investment costs, production inputs and project benefits valued at in 1975 constant prices, net of taxes, subsidies and price contingencies.
- (c) Exclusion from investment costs of credit cost for annual production since these are included in the cost of production.
- (d) Treatment as sunk costs of the existing diversion and adduction structures.
- (e) Electricity cost of 0.128 Kwh which corresponds to present average tariffs to large consumers.
- (f) Full development period for (a) crops of 6 years in Doukkala, and (b) livestock 10 years.

2. The results of the sensitivity tests are summarized below:

<u>Assumptions</u>	<u>Percent</u>
Basic Rate of Return	11.6
20% increase in project costs	9.3
20% decrease in power costs	14.2
50% increase in power costs	10.8
50% increase in power costs, 20% in all other	8.9
20% increase in benefits	13.7
20% decrease in benefits	8.8
Advancing project benefits by one year	12.9
20% increase in project costs and 20% decrease in benefits	6.6

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DOUKKALA IRRIGATION PROJECT

Economic Costs and Benefits

<u>Year</u>	<u>Incremental Cost</u>					<u>Incremental Benefits</u>	<u>Incremental Cash Flow</u>
	<u>Investment</u> ¹	<u>Operation & Maintenance</u>	<u>Power</u>	<u>Replacement</u>	<u>Total</u>		
	-----DH million-----						
1975	3.7	0	0	0	3.7	0	(3.7)
1976	26.1	0.7	0	0	26.8	0	(26.8)
1977	54.0	2.4	1.0	0	57.4	0	(55.5)
1978	60.5	4.1	0.6	0	65.2	2.2	(63.0)
1979	27.1	5.2	1.4	0	33.7	7.4	(26.3)
1980	0	5.3	2.2	0	7.5	13.7	6.2
1981	0	5.3	2.5	0	7.8	16.6	8.8
1982	0	5.3	2.9	0	8.2	22.5	14.3
1983	0	5.3	3.3	0	8.6	28.8	20.2
1984	0	5.3	3.5	0	8.8	35.2	26.4
1985	0	5.3	3.7	0	9.0	38.1	29.1
1986	0	5.3	3.7	0	9.0	40.5	31.6
1987	0	5.3	3.7	0	9.0	41.9	32.9
1988	0	5.3	3.7	0	9.0	42.6	33.6
1989-1991	0	5.3	3.7	0	9.0	43.1	34.1
1992	0	5.3	3.7	23.3	32.3	43.1	10.8
1993-1996	0	5.3	3.7	0	9.0	43.1	34.1
1997	0	5.3	3.7	11.8	20.8	43.1	22.3
1998-2006	0	5.3	3.7	0	9.0	43.1	34.1
2007	0	5.3	3.7	32.3	41.3	43.1	1.8
2008-2017	0	5.3	3.7	0	9.0	43.1	34.1
2018	0	5.3	3.7	11.8	20.8	43.1	22.3
2019-2021	0	5.3	3.7	0	9.0	43.1	34.1
2022	0	5.3	3.7	23.3	32.3	43.1	10.8
2023-2024	0	5.3	3.7	0	9.0	43.1	34.1

¹ Excludes cost of credit, roads, and village infrastructure. Costs are net of taxes and price contingencies.

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ANNEX 13
Table 1

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DOUKKALA IRRIGATION PROJECT

KINGDOM OF MOROCCO

Employment and Migration

1. In the province of Jadida migration is towards Casablanca. This tendency is most pronounced in the Doukkala where migration was about 1.5% per annum between 1961 and 1971 (Table 1). The project would increase employment by 270% (4,100 man years), and the seasonality of labor would be reduced. Labor supply in the project area is estimated to be 190,000 man days and the rate of underemployment would be reduced from 75% to 10% and would occur in about 5 months in the year. Some additional labor would be required during harvesting periods. Migrant workers are available to fill this need. Table 2 summarizes labor requirements in the project area.

2. Indirectly the project would provide employment because of use of increased processing and marketing of produce, and ancillary services related to farm inputs. Migration out of the rural areas and into the urban areas would fall. The Doukkala is close to the main urban center of Casablanca and has suffered from a migration rate to the city at 1.5% per year. The irrigation project would create a growth pole in the rural area, stemming migration into larger cities with extremely high unemployment rates (Casablanca 1971 about 16%).

January 9, 1976

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KINGDOM OF MOROCCO

DOUKKALA IRRIGATION PROJECT

Population, Age Distribution and Employment in the El Jaddia Province

Item	1961		1971		% per annum growth	Migration Rate /1
	Number	%	Number	%		
<u>Population</u>						
Rural	433,760	88	498,710	84	1.3	-1.5
Urban	58,800	12	92,100	16	4.1	+1.3
Total	<u>492,560</u>	<u>100</u>	<u>590,810</u>	<u>100</u>	1.9	- .9
Of which in Project Area	108,254		124,796		1.3	-1.5
<u>Age Distribution (1961)</u>						
	<u>Number</u>	<u>% of Total</u>				
0-14	225,198	46				
14-24	73,434	15				
25-64	161,553	33				
65	29,373	6				
Total	<u>489,560</u>	<u>100</u>				
<u>Population by Activity (1971)</u>						
	<u>Number</u>	<u>% of Total</u>				
Agriculture	121,020	71				
Commerce	7,020	4				
Other	<u>43,350</u>	<u>25</u>				
Subtotal (Active)	171,400	100				
Students	41,020					
Inactive	<u>378,390</u>					
Total Population	<u>590,810</u>					

/1 Based on an average population growth rate of 2.8% in Morocco between 1960-1971.

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KINGDOM OF MOROCCO
DOUKKALA IRRIGATION PROJECT

Labor Requirements

	<u>Men Day/Month</u>			<u>% Increase</u>
	<u>Without Project</u>	<u>With Project</u>	<u>Incremental Requirement</u>	
January	64,100	105,900	41,800	65
February	94,500	149,600	55,100	58
March	60,400	162,700	102,400	168
April	65,100	169,800	104,700	161
May	136,200	188,000	51,800	38
June	20,000	227,200	207,200	1,036
July	38,000	233,100	195,100	513
August	6,300	187,200	180,700	2,780
September	6,500	145,200	138,700	2,134
October	11,300	227,800	216,500	1,915
November	33,700	172,300	138,700	412
December	<u>25,700</u>	<u>102,300</u>	<u>76,600</u>	298
Total	<u>561,800</u>	<u>2,071,100</u>	<u>1,509,300</u>	269

December 1975

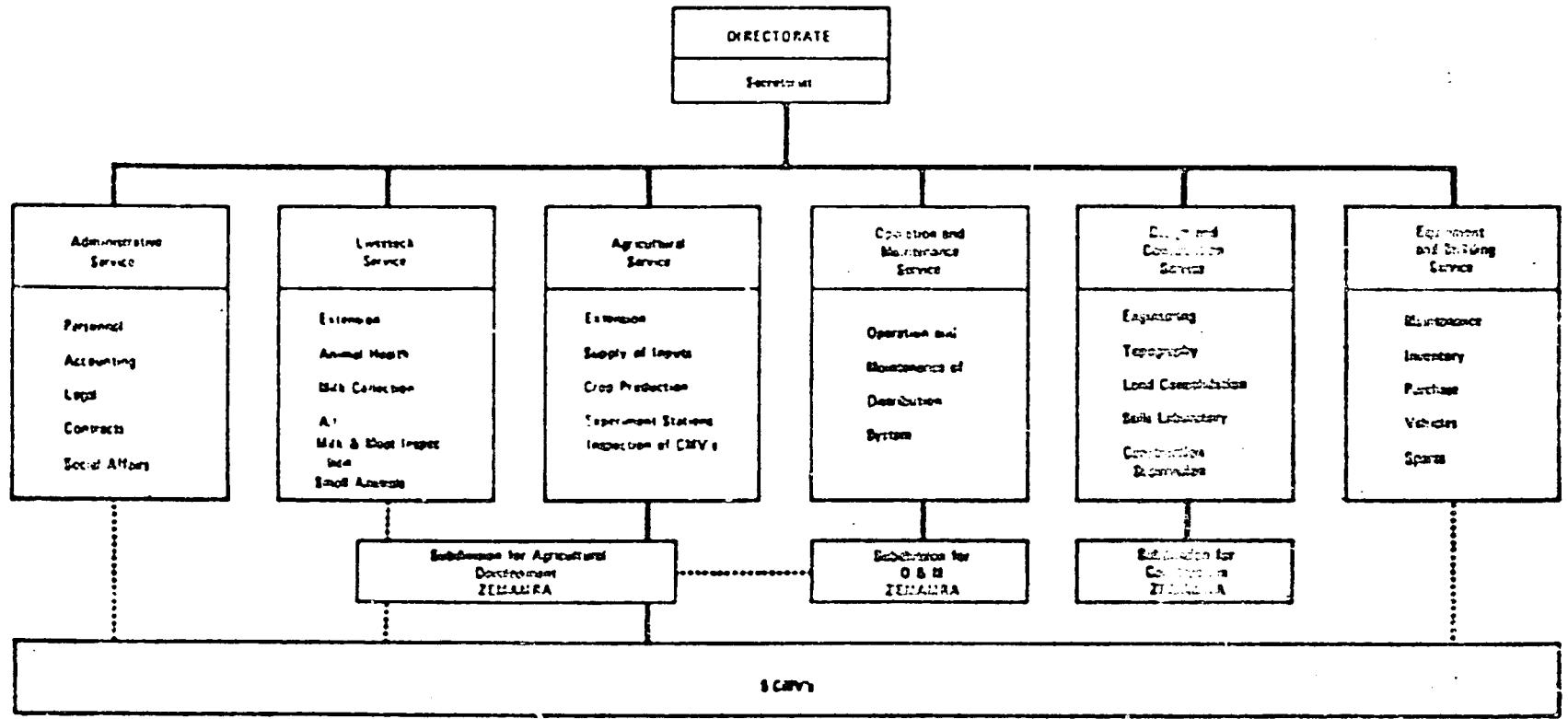
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1961 Doukkala Document

KINGDOM OF MOROCCO
DOUKKALA IRRIGATION PROJECT
Organization of ORMVAD



----- Line of Command
- - - - - Supporting Activities

ANNEX 24

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KINGDOM OF LESOTHO
 POLYKALA IRRIGATION PROJECT

Climatic Data

Month	Temperature (°C)			Rainfall (mm)	Relative Humidity (%)	Evapo- transpiration (mm)	Sunshine Hours (h)
	Maximum	Minimum	Average				
January	18.2	7.3	12.1	43	82	246	590
February	19.0	7.7	13.9	59			
March	20.8	8.6	14.3	38			
April	22.2	10.2	15.7	26	74	520	792
May	25.4	13.1	19.2	8			
June	28.9	16.1	21.8	4			
July	32.9	18.9	24.9	0	70	711	997
August	33.3	19.4	25.6	0			
September	31.3	17.1	23.3	8			
October	27.7	14.2	19.9	45	78	319	650
November	21.4	10.8	15.3	74			
December	16.9	6.7	12.0	57			
Annual Total				<u>360</u>		<u>1,796</u>	<u>3,032</u>
Annual Average	24.8	12.5	18.1		76		

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MIF

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Recovery of Project Costs

The Agricultural Investment Code of 1969 provides for the recovery from project beneficiaries, over the life of the project of full operation and maintenance costs and up to a maximum of 40% of the investment costs. Costs are recovered through (a) a fixed betterment levy on a per ha basis, (b) a basic water charge on a volumetric basis, and (c) a supplementary water charge to cover energy costs for pumping. The betterment levy amounts to LD 1,500 per ha; however the first 5 ha of holdings up to 20 ha are exempted from payment of the betterment levy. In addition, farmers can choose to pay the levy through annual installments over 20 years. Over the first five years of irrigated cultivation, the amount of the basic water charge is increased linearly to the full base rate.

For the Bank-financed Sebou II Development Project (Loan 1018 HDR) the Government agreed to a periodic review of the levels of the basic water charge to take into account actual operation and maintenance and investment costs. Later under the Bank financed Sousse Groundwater Project (Loan 1123 HDR) Government agreed to collect water charges from the start of irrigation and review them thereafter at its own initiative or at the request of the Bank, with the objective to recover throughout the life of the project actual operation and maintenance costs and up to 40% of the actual capital costs, taking into account beneficiaries incentives and capacity to pay. For the proposed project, Government has agreed to recover, beginning in the fifth year of irrigation, all actual operating and maintenance costs and, taking into account the beneficiaries' incentives and capacity to pay, to recover over the life of the project a reasonable proportion of the actual capital costs through the water charges and betterment levy provisions of the Agricultural Investment Code. Furthermore, an understanding was reached at negotiations that the proportion of capital costs, discounted at the social discount rate, to be so recovered would, subject to the beneficiaries' capacity to pay, be 40%, less that amount represented by the exemptions from the betterment levy provided for under the Investment Code.

The energy cost for pumping for the Doukkala subproject would be passed directly to consumers through the supplementary water charge. The present bulk tariff, which ORNVAD is likely to pay for electricity, DH 0.128 per kilowatt hour, is close to the estimated marginal cost of providing power. In addition Government in accordance with the Agricultural Investment Code is preparing an index to adjust the basic water charge in accordance with certain parameters (construction costs, prices of agricultural inputs and commodities) to compensate for the effect of inflation. The Government indicated its intention to institute a system for indexing before the end of 1977. The Government has also informed the Bank that it is at present undertaking a review of water charges for irrigation throughout Morocco, and that the new structure of water charges, which would be implemented as a result of this review will retain the element of progressivity with incomes, which is a feature of the present structure, resulting from the exemption of small farmers from the betterment levy.

For the proposed project using (a) the method of calculation agreed upon during negotiations, (b) a discount rate of 10%, and (c) 1975 prices, results in a charge of DH 147 per thousand cubic meters (US\$37.9). The charge consists of DH 115 as a basic charge and DH 32 as a supplementary pumping charge. This would correspond to an annual operation and maintenance charge of US\$203 per hectare and an annual investment recovery charge of US\$118 per hectare.

The proposed water charges would together be about 400% higher than the basic water charge of DH 29 per thousand cubic meters imposed on beneficiaries of other new irrigation schemes in Morocco. Proposed recovery charges would correspond to the following percentages of net incremental value of production on different farm types (para 6.12):

Farm Type	Recovery Charges Expressed as		Recovery Charges plus Incremental Benefit Taxes Expressed as	
	% of Net Value of Production	% of Incremental Net Value of Production	% of Net Value of Production	% of Incremental Net Value of Production
2 ha Farm	32	39	34	42
5 ha Farm	32	39	34	42
25 ha Farm	43	47	45	50

Although at full development this would leave the majority of farmers with a per capita income below the projected national average, the charge is considered reasonable considering low projected incomes of the farming population in adjacent areas which do not benefit from the project. Project farm families operating less than 5 ha farms would have extra income from part time paid labor on larger farms. Proposed charges leave sufficient incentives to farmers to participate in the agricultural development. The table below indicates by income classes number of farm families and benefit recovery indexes. The figures compare with an absolute poverty level for Morocco estimated at US\$79 per capita.

Average per Capita Income ^{/1}	Representative Farm Size	Farm Families		Benefit Recovery Index
		No.	%	
US\$304/2	2 ha	1,300	40	43
US\$540	5 ha	1,640	52	43
US\$1,600	25 ha	260	8	53

/1 At full development net of all taxes and water charges.

/2 Includes US\$90 for income as laborer.

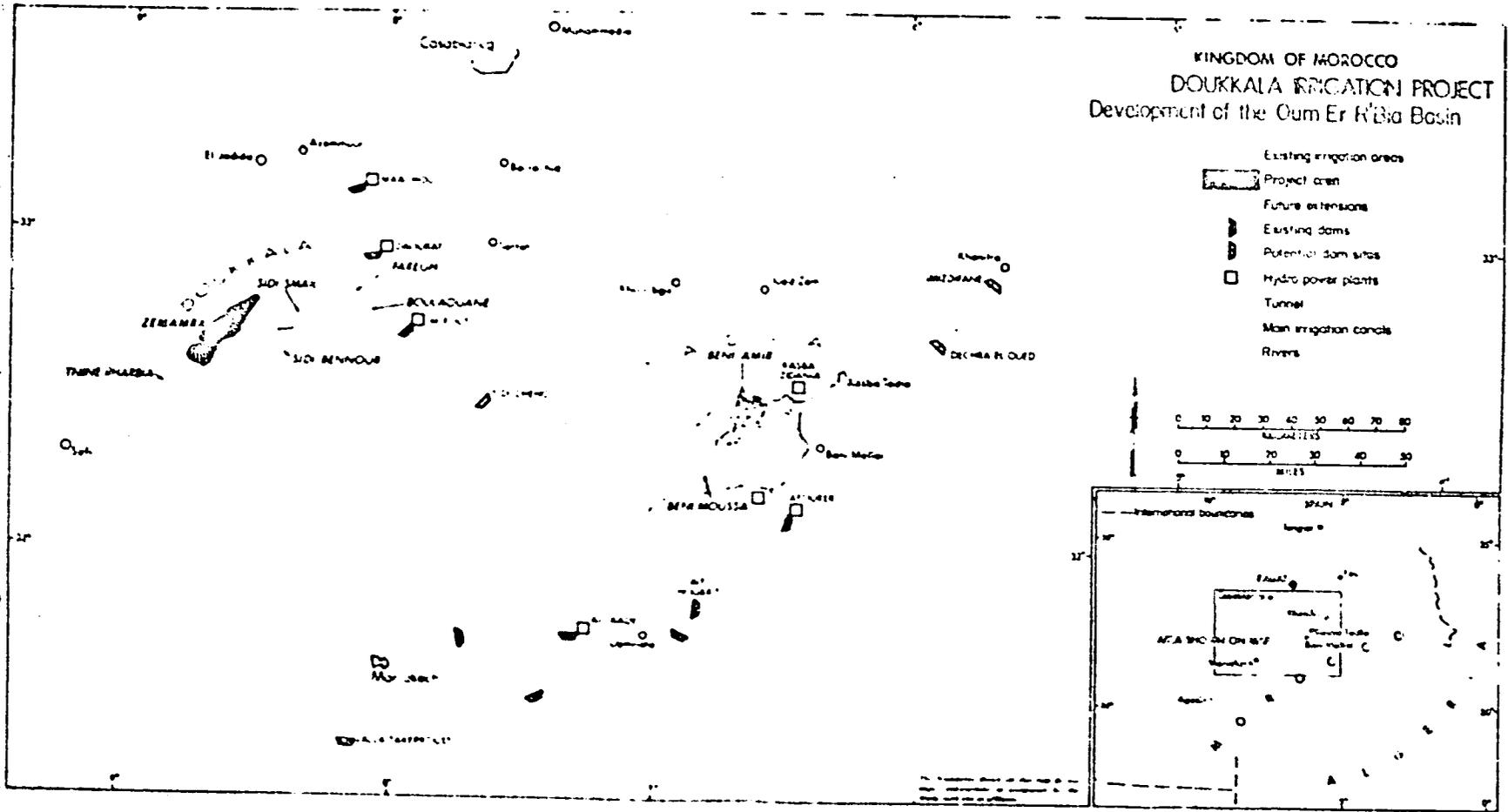
To measure the subsidy element direct project cost and project revenues were discounted at a rate of 10% over project life. The present value of costs is DH 230 million and the present value of revenues is DH 115 million, which corresponds to 50% deficiency in recovery of costs. The Government however would also benefit from (a) incremental benefit taxes, and (b) differences in prices paid to farmers and world market prices for agricultural commodities. For sugar beet the price difference is about 30% and for cotton 17% (Annex 11). These additional benefits, discounted over project life at 10% interest would amount to about DH 39 million. The Cost Recovery Index would therefore be 67%.

Because of the relative poverty of the population no direct participation of beneficiaries in investments for village infrastructure has been considered. However, in accordance with Moroccan legislation beneficiaries would pay municipal taxes and thus would indirectly contribute to recovery of these investments. Investments, operation and maintenance of classified roads are financed through taxes on gasoline.

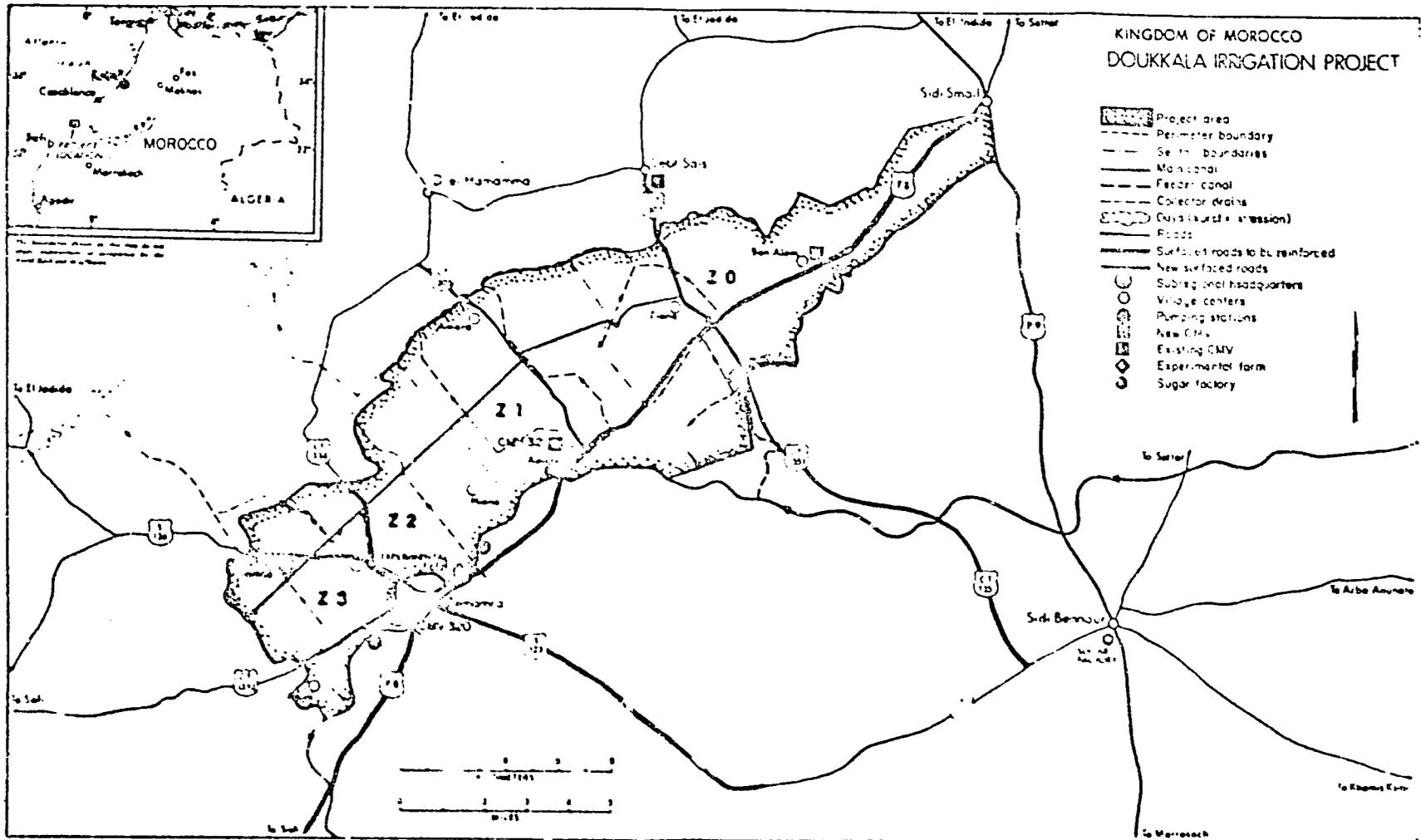
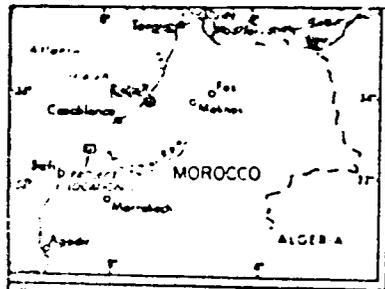
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KINGDOM OF MOROCCO
 DOUKKALA IRRIGATION PROJECT
 Development of the Oum Er R'bia Basin



1971
 BY ZIANT



ENVIRONMENTAL CONSIDERATIONSBackgrounds

The potential for increased food production through irrigation and improved agricultural practices in the Oum Er R'bia River Basin and the Doukkala Plain of Morocco has been studied for several decades. During this period, approximately 50% of the potentially irrigable land has been brought under irrigated cultivation.

A recent feasibility study and master plan by SCET-INTERNATIONAL (March, 1975) provides the basis for irrigating the remainder of the Doukkala Plain, of which the proposed project is a part. Using this study, the World Bank began developing specific irrigation projects, and AID began coordinating its consideration of a Doukkala irrigation project with the World Bank. The proposed project, therefore, is a combined effort to provide sprinkler irrigation to 15,400 hectares in the Zemamma subdivision of Abda Doukkala area, with World Bank financing of \$30.0 million, AID financing of \$13.0 million and a Government of Morocco component of \$51.4 million equivalent of local costs. The AID component of cost will cover equipment for pumps, sprinklers, and hydrants; operation and maintenance equipment for the irrigation system; and reimbursing the local costs of building the pumping stations for the irrigation system and installing village water supplies.

Because the World Bank took an early lead in the defining of the project, they also took the lead in investigating the environmental consequences of the project. AID has, therefore, accepted the World Bank's findings rather than undertaking a separate investigation covering the same ground.

This action is consistent with AID Policy Determination 63 which reads in part, "When AID's potential involvement is that of a minor contributor it will look to and encourage the major controlling donor to prepare a comprehensive assessment that meet the needs of both AID and all other participating donor institutions."

Environmental Impacts

The Bank took cognizance of the environmental aspects of the project as a part of refining the project design and satisfied itself that the only problem that would need attention in connection with the

project was the potential for the spread of Bilharzia as a possible adverse environmental impact. The Bank found that the question of soil erosion does not arise since the area is substantially flat-lying terrain. Irrigation water is to be added by the project in controlled quantities at controlled rates by sprinkler irrigation that enable easy prevention of erosion by water. No new land is being opened to wind erosion by the project. The area is already cultivated with less moisture than will be available with irrigation. The project will also add planted windbreaks so that overall the risk of wind erosion will be reduced.

The possibility of building up the salt content of the soil arises from the water quality described in Annex 1. The relatively saline water of the Upper River has already been used for irrigation for several decades in Tadla without adverse results. Between there and Doukkala water of lower salinity from the tributaries of the Oued Er R'bia River is mixed in, especially in the season of heavy irrigation in Doukkala. GOM is moving ahead on the construction of a storage dam at Sidi Cheho (Annex 18) which will insure a firmer year-round supply of higher quality water and hence less of a salinity problem by dilution of the Upper River water. Further, the annual rainfall of 36 centimeters in the project area will aid in flushing the soil through an adequate drainage system which the project also will install. Storm water run-off will be drained through the natural seepage sumps described in Annex 1. Thus, it is considered that there is low risk of increasing salinity in the soil of the project area.

The development of new villages in the project is to follow a pattern already widely used successfully in other areas by the GOM. The plan is also included in an earlier Bank irrigation project in the Souss. The plan would provide village water supplies with public taps and no house connections. Household waste disposal will be by pit privy as in the present habitations of the population.

To deal with the potential for the spread of Bilharzia as a possible adverse environmental impact, the Bank arranged for this problem to be thoroughly investigated by Dr. Andrew L. Gram, Public Health consultant to the World Bank and an expert on the transmission and control of Bilharzia.

In summary, Dr. Gram determined that although the project area is now being intensively dry farmed, there is no apparent transmission of Bilharzia in the project area at present. Because the project area will be irrigated entirely by sprinkler systems, there will be little opportunity for creation of new snail habitats. The only new open

water will be six kilometers of canal leading to one pumping station, elevated pressure regulating reservoirs of 1,000 cubic meters each, and about 100 kilometers of main drainage ditches. Because of the good control of water application afforded by the spray type system to be used, it is expected that flow in the drains will be minimal, and that the drains and their terminal Kerat sumps may never contain enough permanent moisture to permit the establishment of snail colonies.

Recommended Control Measures:

However, there is an existing gravity irrigated area in the Doukkala perimeter although it is not contiguous with the project area. Although there is no apparent transmission of Bilharzia in the gravity irrigated area, a greater potential exists for future transmission in that area. Therefore, a recommendation is given for a control program to be initiated in the gravity irrigated oriented toward (1) surveillance of the area to detect and destroy any colonies of vector snails before they can become infected, and (2) elimination of snail habitats in the gravity irrigated area through control of canal leakage and overflows. The surveillance program so initiated for the gravity irrigated area where the serious threat of future transmission exists would be extended to the project area as a precautionary measure.

CERTIFICATION PURSUANT TO SECTION 611 (c)
OF THE FOREIGN ASSISTANCE ACT OF 1961, AS AMENDED

I, Albert P. Disdier, Director, the principal officer of the Agency for International Development in Morocco, having taken into account, among other things, the maintenance and utilization of projects in Morocco previously financed or assisted by the United States, do hereby certify that in my judgment Morocco has both the financial capability and the human resources capability to effectively maintain and utilize the capital assistance project on the Doukkala irrigation system.

This judgment is based upon general considerations discussed in the capital assistance paper to which this certification is attached.

Albert P. Disdier
Albert P. Disdier
Director

Unofficial Translation

July 16, 1973

No. 2180/EG/1

To the Director of USAID Mission
Embassy of the United States of America

RABAT

c/o The Minister of State in charge of
Foreign Affairs

RABAT

SUBJECT: Agricultural Production in the Doukkala Perimeter

Dear Sir:

I have the honor to remind you that in the course of the meetings which were held last May in your presence and that of Ambassador Kourouma and Mr. Rooter of USAID, I had the occasion to express the point of view of my Government as to possible participation by USAID in the financing of the project, the "Second Phase of the Irrigation of the Doukkala".

As you know, this project for which a feasibility study was prepared by the World Bank and the F.A.O., comprises development of 32,000 hectares which will be irrigated by aspersion and will include all the infrastructure, equipment and installations for pumping stations, regulatory reservoirs, production centers, milk collection centers, experimental farms, rural work centers, agro-industrial units, etc.

The total cost of this project as calculated by the IBRD is approximately 260 million dollars of which 90 million dollars are in hard currency.

Of the 32,000 hectares referred to above, the Zemmara sector comprises some 6,000 hectares which have already been reclassified/reallocated and which can be put into production rapidly.

Hard currency credits alone needed to render this sector productive have been estimated by the IBRD at \$25 million.

The Government of His Majesty the King is presently discussing with the World Bank conditions for financing the entire project and it would like to see USAID/the IEZO jointly participate in it. The Commission believes, however, that it is not advisable to overly diversify sources of financing by recourse to assistance from several friendly partners, and hopes that the Government of the United States will give particular attention to the realization of this project and can provide it with an important sum of credits.

I would therefore be grateful to you if you would inform responsible officials of your Organization of the foregoing and apprise them of the wish of the Government of His Majesty the King to see USAID assure the financing of the totality of the Zemmara sector which, as stated above, comes to 125 million U.S. dollars.

This wish, I am convinced, will be viewed favorably by these responsible officials since you as well as Ambassador Hermann have confirmed to me on several occasions the desire of the Government of the United States to assist Morocco in the realization of this important project.

In the hope that you will consider the present letter as an official loan request, please accept, Mr. Director, the assurance of my high consideration.

The Minister of State in Charge of
Cooperation and Training

/s/ Dr. Benhina

TRANS:PROG:ACMacArthur:nfb:7/17/75

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Dear Mr. Minister:

This is in reply to your letter of July 16, 1975, requesting a loan of twenty-five million dollars to the Government of Morocco to assist in financing the foreign exchange costs for the Djukkala Irrigation Project.

I have been authorized to inform you that A.I.D. is prepared to consider financial participation in the project jointly with the IBRD and the Arab Development Fund at a level of thirteen million dollars (\$13,000,000) subject to the availability of funds and if the project meets A.I.D.'s normal criteria. Among other requirements these will include the assurance of both the economic and technical feasibility of the project and a plan for equitable distribution of the land and the benefits from the project to the small farmer. Furthermore, it is our understanding that an IEDD team is scheduled to arrive in Morocco in the near future to undertake an environmental impact study, the results of which will be of interest to AID in its final evaluation of the project.

If I can be of further assistance in explaining any aspects of this letter, I would be pleased to meet with you.

Sincerely yours,

Albert P. Disdier
Director

His Excellency
Mohamed Bahine
Minister of State, in charge of
Cooperation and Training of Cadres
Rabat

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DE MOON:DTL:mms _____

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ANNEX B

Description of the Project
for
Loan Agreement
Annex 1

The project consists of the construction of a sprinkler irrigation system to make possible the conversion of 15,400 hectares from dry farming to irrigated farming. This land forms part of the Doukkala area ("perimeter") of which 27,100 hectares are already served by a gravity irrigation system.

The water source for the project is the catchment basin of the Oum Er R'Bia River above the Im Fout Dam, from which water is carried by gravity through a 17 km tunnel and then in an open canal past the project area. Four pumping stations will send water from the canal in underground pipes throughout four sectors where moveable sprinkler sets will supply adjacent fields on a rotating schedule. Three sites are adjacent to the main canal, which will be improved and fitted with flow-regulating equipment. The fourth pumping station will require a branch canal to connect it to the main canal and all four stations will require power line and telephone connections. An open drainage system will be constructed in the irrigated area. Land preparation involves subsoiling in about 4000 hectares, consolidation and realignment of all land holdings, combined with the construction of access roads.

Development centers will be built, extension service and maintenance service staffs will be reinforced, and milk collection centers established. Seven village centers with treated water supply, paved roads, public lighting, schools, and telephone connections will be built.

AID Loan No. _____

Project No. _____

CAPITAL ASSISTANCE LOAN AUTHORIZATION
Provided from: Food and Nutrition Funds
Morocco: Doukkala Irrigation Project

Pursuant to the authority vested in the Administrator of the Agency for International Development ("A.I.D.") by the Foreign Assistance Act of 1961, as amended, and delegations of authority issued thereunder, I hereby authorize the establishment of a loan pursuant to Part I, Chapter 1, Section 103, Food and Nutrition, and Part 1, Chapter 2, Title 1, the Development Loan Fund, to the Government of Morocco ("the Borrower") of not to exceed five million dollars (\$5,000,000), such funds to be made available to assist in financing foreign exchange costs of equipment and vehicles and local currency costs incurred in the construction of civil works and village infrastructure required for an irrigation project involving approximately 15,000 hectares in the Doukkala region of Morocco. The Loan is to be subject to the following terms and conditions:

1. Terms of Repayment and Interest Rate

This loan shall be repaid by the Government of Morocco within forty (40) years after the date of the first disbursement thereunder, including a grace period of not to exceed ten (10) years from the date of first disbursement. The interest on the outstanding balance of the loan, including any due and unpaid interest thereon, shall accrue from the date of the first disbursement at the rate of two percent (2%) per annum during the grace period and at the rate of three percent (3%) per annum throughout the remaining life of the loan.

2. Currency of Repayment

Provision shall be made for repayment of the loan and payment of the interest in United States dollars.

3. Other Terms and Conditions

- a. Unless A.I.D. otherwise agrees in writing, equipment, materials and services financed under the loan shall have their source and origin in Code 941 countries and in Morocco;
- b. The Loan Agreement shall contain covenants to the effect that:

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- i. the Borrower or its agents shall levy and collect taxes in the form of water charges and supplementary pumping charges in accordance with local law in order to recover each year beginning in the fifth year of irrigation, all actual operating and maintenance costs of the irrigation facilities, and to recover over the life of the irrigation facilities a maximum portion of the actual capital costs thereof allowable under local law. Such levies and charges shall take into account the beneficiaries' capacity to pay;
 - ii. the Borrower shall monitor agricultural production in the areas benefitting from the project and carry out in 1980 a sample survey of production and income of representative farms in order to evaluate the actual benefits derived from the project;
 - iii. the Borrower shall establish a Project Coordination Committee with composition, powers, and terms of reference satisfactory to A.I.D.;
 - iv. the Borrower shall continuously monitor the incidence of Bilharzia in the areas benefitting from the project and take such steps as necessary to prevent any increase in such incidence;
- c. Not to exceed the equivalent of three million dollars will be used to finance local costs;
 - d. No items procured prior to March 1, 1976 will be financed;
 - e. Such other terms and conditions as A.I.D. may deem advisable.

Administrator

Date

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Department of State

TELEGRAM

ANNEX C
Page 1

~~UNCLASSIFIED~~

PAGE 01 STATE 014528

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ORIGIN AID-31

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DRAFTED BY NE/CD:HRSLUSSER:CK
APPROVED BY AA/NE:RHNOOTER
NE/CD:SAYAUENBLATT
NE/NEA:GLAUDATO(DRAFT)
NE/NEA:ASCHWARZWALDER(DRAFT)
NE/DP:BLANGMAID(DRAFT)
GC/NE:MGKITAY(DRAFT)
PPC/RC:JHEYL(DRAFT)
DESIRED DISTRIBUTION

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YAGS:

SUBJECT: DOUKKALA IRRIGATION LOAN

REF: RABAT 192

PROPOSED TEXT FOR LETTER TO MINISTRY OF COOPERATION AS
FOLLOWS:

"DEAR :

"PURPOSE OF THIS LETTER IS CONFIRM SUBSTANCE OF OUR RECENT
DISCUSSIONS IN WASHINGTON CONCERNING THE INTENTIONS OF
THE UNITED STATES GOVERNMENT WITH RESPECT TO FUNDING FOR
DOUKKALA IRRIGATION PROJECT. THIS AGENCY'S BUDGET AND IT

UNCLASSIFIED



Department of State

TELEGRAM

ANNEX 6
Page 2

UNCLASSIFIED

PAGE 02 STATE 014320

PUBLISHED 'FISCAL YEAR 1976 SUBMISSION TO THE CONGRESS'
PROPOSE THAT A TOTAL OF DOLS. 13,000,000 BE LOANED TO
PROJECT DURING PERIOD EXTENDING UNTIL SEPTEMBER 30, 1976
WE PROPOSE MAKE DOLS. 5,000,000 AVAILABLE PRIOR JUNE 30,
1976 AND REMAINING DOLS. 8,000,000 AVAILABLE WITHIN THREE
MONTHS THEREAFTER. IT HAS BEEN OUR UNDERSTANDING BASED
UPON EXISTING FINANCIAL PLAN FOR PROJECT THAT PROPOSED
COMMITMENT OF A.I.D. FUNDS IN TWO TRANCHES WOULD NOT
ADVERSELY AFFECT OR DELAY PROJECT.

"WHILE PROPOSED COMMITMENT OF SECOND TRANCHE OF FUNDS TO
PROJECT IS STILL SUBJECT TO APPROPRIATION ACTION BY THE
UNITED STATES CONGRESS, WE HAVE EVERY EXPECTATION THAT
CONGRESSIONAL ACTION WILL BE FORTHCOMING WITHIN NEXT FEW
MONTHS."

FYI: IF ADDITIONAL LOAN FUNDS AVAILABLE BEFORE END FY
1976, WE WILL CONSIDER INCREASING FY 1976 TRANCHE
SUBJECT TO SECTION 113 CONGRESSIONAL NOTIFICATION. END
FYI. SISCO

UNCLASSIFIED

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6-3-75

CHECKLIST OF STATUTORY CRITERIA

The following abbreviations are used:

FAA - Foreign Assistance Act of 1961, as amended.

FAA, 1973 - Foreign Assistance Act of 1973.

App. - Foreign Assistance and Related Programs Appropriation Act, 1974.

MMA - Merchant Marine Act of 1936, as amended.

BASIC AUTHORITY

1. FAA § 103; § 104; § 105;
§ 106; § 107. Is loan being made

- a. for agriculture, rural development or nutrition;
- b. for population planning or health;
- c. for education, public administration, or human resources development;
- d. to solve economic and social development problems in fields such as transportation, power, industry, urban development, and export development;
- e. in support of the general economy of the recipient country or for development programs conducted by private or international organizations.

The primary purpose of the loan is to help install irrigation on about 15,000 hectares of land presently dry-farmed, improve agricultural services and build infrastructure facilities, thus providing a large number of small farmers with the means to increase production and with it their cash incomes, and improve their general standard of living.

COUNTRY PERFORMANCE

Progress Towards Country Goals

2. FAA § 201 (b) (5), (7) & (8); § 202

A. Describe extent to which country is:

- (1) Making appropriate efforts to The GOM Five Year Plan (1973-77) is

increase food production and improve means for food storage and distribution.

placing emphasis on completing existing irrigation perimeters, intensifying rainfed cropping and livestock production. About 17% of public sector investment is targeted for the agricultural sector. The country already possesses good storage and distribution facilities. Among GOM programs aimed at increasing food production are an agrarian reform program aimed at distributing more land to poor farmers, continued irrigation development, and extension, research and credit programs.

(2) Creating a favorable climate for foreign and domestic private enterprise and investment.

The GOM promulgated a new Investment Code in 1973 which provides attractive incentives to potential foreign investors, e.g., liberal tax holidays. The Ministry of Cooperation sent a mission to the U.S. a year ago to familiarize U.S. businessmen with Moroccan business opportunities. A Moroccanization program has encouraged Moroccans to become more involved in domestic private enterprise and investments.

(3) Increasing the public's role in the developmental process.

Over 65% of Morocco's population is rural. The 1969 Agricultural

- Investment Code provides for greater distribution of lands formerly under colonial control to dispossessed farmers. Agricultural credit has been extended to reach farmers with incomes as low as \$250 per year. Crop demonstrations, fertilizer, and rotation programs acquaint farmers with modern production techniques. Education, health and housing are receiving twice the share of public investment that they received under the preceding Plan, or 23% of total government investment.
- (4) (a) Allocating available budgetary resources to development.
- (b) Diverting such resources for unnecessary military expenditure (See also Item No. 20) and intervention in affairs of other free and independent nations.) (See also Item No. 11)
- Defense expenditures for 1975 were budgeted at about 9% of total government expenditures. The major portion of GOM resources is going towards sustaining real growth of 7.5% per year through the current Plan period. The Government is not engaged in intervention in other free countries' affairs.
- (5) Making economic, social, and political reforms such as tax collection improvements and changes in land tenure arrangements, and making progress toward respect for the rule of law, freedom of expression and of the press, and recognizing the importance of individual freedom, initiative, and private enterprise.
- Social reform is underway through the allotting of former colonial land to farmers giving expression to individual freedom and private enterprise. A progressive tax structure is in place. Large government subsidies are in effect to maintain stable prices for such commodities as cereals, Morocco's major food production. Certain consumer items such as vegetable oil and sugar are also subsidized to make the cost acceptable to low income groups.
- (6) Willing to contribute funds to the project of program.
- The GOM will contribute about \$51 million in local currency to realization of this project, or about 55% of the cost. In addition, Moroccan staff from the Regional Development Office of the Doukkala will administer the project, chargeable to the GOM Operating Budget.

(7) Otherwise responding to the vital economic, political, and social concerns of its people, and demonstrating a clear determination to take effective self-help measures.

B. Are above factors taken into account in the furnishing of the subject assistance?

The 1973-77 Five Year Plan is placing increasing emphasis on social objectives improving the distribution of growth benefits through land distribution, more emphasis on rainfed farming where the majority of the people gain their livelihood, large increases in government spending on social services and low-cost housing, and changes in wages.

Yes.

Treatment of U.S. Citizens and firms.

3. FAA § 620(c). If assistance is to a government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen for goods or services furnished or ordered where (a) such citizen has exhausted available legal remedies and (b) debt is not denied or contested by such government?

We are unaware of any cases that would make Morocco ineligible under this section.

4. FAA § 620(e) (1). If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect or nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities?

Under its Moroccanization program which came into full swing in 1974, Morocco has established that all foreign owned or controlled enterprises in Morocco must be at least 50% under the control of Moroccans. Terms for the application of this government decree have been negotiated with individual companies. Settlements have been reached with most of the U.S. companies, while some negotiations are still underway.

5. FAA § 620(o): Fisherman's Protective Act § 5. If country has seized, or imposed any penalty or sanction against, any U.S. fishing vessel on account of its fishing activities in international waters,

No.

a. has any deduction required by Fisherman's Protective Act been made? Not applicable.

b. has complete denial of assistance been considered by A.I.D. Administrator? Not applicable.

Relations with U.S. Government and Other Nations.

6. FAA § 620(a). Does recipient country furnish assistance to Cuba or fail to take appropriate steps to prevent ships or aircraft under its flag from carrying cargoes to or from Cuba. No such assistance has been furnished nor has Morocco failed to take appropriate steps as required by the statutes.
7. FAA § 620(b). If assistance is to a government, has the Secretary of State determined that it is not controlled by the international Communist movement? The Secretary of State made such a determination on October 11, 1961.
8. FAA § 620(d). If assistance is for any productive enterprise which will compete in the United States with United States enterprise, is there an agreement by the recipient country to prevent export to the United States of more than 20% of the enterprise's annual production during the life of the loan? Not applicable.
9. FAA § 620(f). Is recipient country a Communist country? No.
10. FAA § 620(i). Is recipient country in any way involved in (a) subversion of, or military aggression against, the United States or any country receiving U.S. assistance, or (b) the planning of such subversion or aggression? Morocco provided military support to the Arab side against Israel during the October 1973 war, however, no such assistance has been provided since.
11. FAA § 620(j). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction, by mob action, of U.S. property? The country has not so permitted nor failed to take adequate measures.
12. FAA § 620(l). If the country has failed to institute the investment guaranty program for the specific risks of expropriation, in convertibility or confiscation, has the the A.I.D. administration within the past year considered denying assistance to such government for this reason? An Investment Guaranty Agreement was signed with Morocco March 31, 1961.

13. FAA § 620(n). Does recipient country furnish vessels to North Viet-Nam or permit ships or aircraft under its flag to carry cargoes to or from North Viet-Nam? No.
14. FAA § 620(o). Is the government of the recipient country in default on interest or principal of any A.I.D. loan to the country? No.
15. FAA § 620(t). Has the country severed diplomatic relations with the United States? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption? No. Remainder of question not applicable.
16. FAA § 620(u). What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearages taken into account by the A.I.D. Administrator in determining the current A.I.D. Operations? Year Budget? Morocco is up to date in its U.N. obligations.
17. FAA § 461. Has the government of recipient country failed to take adequate steps to prevent narcotic drugs and other controlled substances (as defined by the Comprehensive Drug Abuse Prevention and Control Act of 1970) produced or processed, in whole or in part, in such country, or transported through such country, from being sold illegally within the jurisdiction of such country to U.S. Government personnel or their dependents, or from entering the U.S. unlawfully? No.
18. FAA § 659. If (a) military base is located in recipient country, and was constructed or is being maintained or operated with funds furnished by U.S., and (b) U.S. personnel carry out military operations from such base, has the President determined that the government of recipient country has authorized regular access to U.S. correspondents to such base? The President has so determined.

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Military Expenditures

19. FAA § 620(s). What percentage of country budget is for military expenditures? How much of foreign exchange resources spent on military equipment? How much spent for the purchase of sophisticated weapons systems? (Consideration of these points is to be coordinated with the Bureau for Program and Policy Coordination, Regional Coordinators and Military Assistance Staff (PPC/RC).)

Defense expenditures in 1975 were budgeted at 9% of total government expenditures. The recent government review pursuant to Section 620(s) found that Morocco did not exceed the comparative norm of defense expenditures.

CONDITIONS OF THE LOAN

General Soundness

20. FAA § 201(d). Information and conclusion on reasonableness and legality (under laws of country and the United States) of lending and relending terms of the loan.
21. FAA § 201(b)(2); § 201(e). Information and conclusion on activity's economic and technical soundness. If loan is not made pursuant to a multilateral plan, and the amount of the loan exceeds \$100,000, has country submitted to A.I.D. an application for such funds together with assurances to indicate that funds will be used in an economically and technically sound manner?

The loan calls for a repayment period of 40 years including a grace period for repayment of principal of 10 years. The interest rates are 2% during the grace period and 3% thereafter. The terms are reasonable and are legal under U.S. and Moroccan law.

The project's technical and economic soundness is discussed in Part III A and D of the project paper. Morocco has submitted the necessary application and assurances.

22. FAA § 201(b)(2). Information and conclusion on capacity of the country to repay the loan, including reasonableness of repayment prospects. Morocco has no particular debt servicing problem and the prospects for repayment are good.
23. FAA § 201(b)(1). Information and conclusion on availability of financing from other free-world sources, including private sources within the United States. Worldwide high interest rates during 1974 and 1975 have precluded Morocco's seeking financing for this activity from other sources.
24. FAA § 611(a)(1). Prior to signing of loan will there be (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the United States of the assistance? An amount larger than the A.I.D. loan is also being obtained by Morocco for this project from the IBRD. Additional funding is not available on terms approaching the A.I.D. terms.
25. FAA § 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of the purpose of the loan? Yes. The loan paper provides the financial analysis and cost of assistance to the United States. See Parts 2.B, 3.A. and B, and Annexes 1 through 12.
26. FAA § 611(c). If loan is for Capital Assistance, and all U.S. assistance to project now exceeds \$1 million, has Mission Director certified the country's capability effectively to maintain and utilize the project? No further legislative action is required within Morocco.
- Yes. See Annex D.

27. FAA § 207; § 113. Extent to which assistance reflects appropriate emphasis on: (a) encouraging development of democratic, economic, political and social institutions; (b) self-help in meeting the country's food needs; (c) improving availability of trained manpower in the country; (d) programs designed to meet the country's health needs; (e) other important areas of economic, political, and social development, including industry; free labor unions, cooperatives, and Voluntary Agencies; transportation and communication; planning and public administration; urban development, and modernization of existing laws; or (f) integrating women into the recipient country's national economy.
- (a) The project will assist in the development of local farmer associations such as water users associations.
- (b) The project will increase agricultural production through irrigation, assisting the country to meet its food needs.
- (c) To the extent farmers learn new production techniques under irrigated conditions, the loan will meet this objective.
- (d) The project will provide new village centers with potable water systems and other infrastructure facilities and services, many of which will contribute to the health needs in the project area. There is also provision for monitoring to prevent the spreading of Bilharzia in the project area.
- (e) The loan will help to encourage local processing industries related to food, as well as service industries (e.g., equipment repair). It will encourage the growth of banks and financing institutions as income increases in the area. It is expected to have a substantial impact on urban growth including establishment of schools and health services in areas adjacent to the perimeter. There is an efficient public administration in place to cope with this development. Transportation, power supply, communication and urban development are all elements of the plan for new village centers.
- (f) Women will share importantly in the benefits of the project through the increase in rural incomes and the broader improvement in standard of living.

28. FAA § 209. Is project susceptible of execution as part of regional project? If so, why is project not so executed?
- This project is not susceptible of execution as part of a regional project.
29. FAA § 201(b)(4). Information and conclusion on activity's relationship to, and consistency with, other development activities, and its contribution to reliable long-range objectives.
- The activity is consistent with the USAID Development Assistance Program goals for FY 1975-79, namely to improve the quality of life for Morocco's rural poor and small-scale farmers through introduction of better agricultural technology and farm inputs and creation of employment.
30. FAA § 201(b)(9). Information and conclusion on whether or not the activity to be financed will contribute to the achievement of self-sustaining growth.
- The activity will create small viable farms and the assurance of a dependable water supply will help guarantee self-sustaining growth dependent on erratic and scant rainfall.
31. FAA § 209. Information and conclusion whether assistance will encourage regional development programs.
- The loan is not designed for such effect.
32. FAA § Section 111. Discuss the extent to which the loan will strengthen the participation of the urban and rural poor in their country's development, and will assist in the development of cooperatives which will enable and encourage greater numbers of poor people to help themselves toward a better life.
- The loan is intended to benefit the rural poor directly, specifically farmers owning less than 10 acres with per capita incomes averaging about \$110 /year.
33. FAA § 201(f). If this is a project loan, describe how such project will promote the country's economic development taking into account the country's human and material resource requirements and the relationship between ultimate objectives of the project and overall economic development.
- The loan will contribute to the country's economic development by increasing the productivity of land which previously had been dependent on irregular and inadequate rainfall. It will increase total food supply to Morocco's needs increase due to population increase. The ultimate objectives of the project, to increase food production and employment, to improve the standard of living, are consistent with overall economic development.

34. FAA § 281(a). Describe extent to which the loan will contribute to the objective of assuring maximum participation in the task of economic development on the part of the people of the country, through the encouragement of democratic, private, and local governmental institutions.
- See answer to question 27 above.
35. FAA § 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civic education and training in skills required for effective participation in governmental and political processes essential to self-government.
- The project is in keeping with needs of Morocco's rural people for increased income, better income distribution and increased employment opportunities; establishment of farmer cooperatives and associations should familiarize farmers with political processes.
36. FAA § 201(b)(3). In what ways does the activity give reasonable promise of contributing to the development of economic resources or to the increase of productive capacities?
- Provision of irrigation water will provide the means for exploiting land resources, add to agricultural production capacity, and provide agricultural raw materials for expanding industry.
37. FAA § 601(a). Information and conclusions whether loan will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture, and commerce; and (f) strengthen free labor unions.
- (a) The loan will accelerate agricultural production, some of which will be exported. (b) It will encourage the growth of agricultural processing industries, services and trades under competitive private ownership. (c) It will encourage formation of farmer cooperatives. It will stimulate growth of savings institutions as a result of increased farmer incomes. (d) Concern over monopolistic practices is not applicable. (e) The loan will greatly improve technical efficiency of agriculture through modern irrigation, consolidation of holdings, better supplies and improved practices. (f) Increased incomes and greater employment opportunities may encourage and strengthen free labor unions.

38. FAA § 619. If assistance is for newly independent country; is it furnished through multilateral organizations or plans to the maximum extent appropriate?

Morocco is not a newly independent country.

Loan's Effect on U.S. and A.I.D. Program

39. FAA § 201(b)(5). Information and conclusion on possible effects of loan on U.S. economy, with special reference to areas of substantial labor surplus, and extent to which U.S. commodities and assistance are furnished in a manner consistent with improving the U.S. balance of payments position.
40. FAA § 202(a). Total amount of money under loan which is going directly to private enterprise, is going to intermediate credit institutions or other borrowers for use by private enterprise, is being used to finance imports from private sources, or is otherwise being used to finance procurements from private sources.
41. FAA § 601(b). Information and conclusion on how the loan will encourage U.S. private trade and investment abroad and how it will encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).
42. FAA § 601(d). If a capital project, are engineering and professional services of U.S. firms and their affiliates used to the maximum extent consistent with the national interest?

The loan will finance equipment produced in the United States and reimburse the cost of locally procured services and commodities. The local currency may be generated by means of a Special Letter of Credit with a commercial U.S. Bank. The letter of credit will cover the importation of commodities from the U.S. by private Moroccan importers, thus improving the U.S. balance of payments position. Local currency deposited by the private importers will be used to finance local activities.

The entire loan will be used directly to finance procurement of equipment and services from private sources.

Commodities to be procured for the project requiring foreign exchange will be purchased from private enterprise. If a Special letter of Credit is used to generate local currency will be used exclusively to finance U.S. source commodities.

No U.S. professional services are contemplated under this loan which is intended to finance imported equipment and the local costs of construction to be performed by qualified Moroccan contractors.

43. FAA § 602. Information and conclusion whether U.S. small business will participate equitably in the furnishing of goods and services financed by the loan. Procurement of equipment will follow A.I.D. procedures for assuring equitable participation by U.S. small business.
44. FAA § 620(h). Will the loan promote or assist the foreign aid projects or activities of the Communist-Bloc countries? No.
45. FAA § 621. If Technical Assistance is financed by the loan, information and conclusion whether such assistance will be furnished to the fullest extent practicable as goods and professional and other services from private enterprise on a contract basis. If the facilities of other Federal agencies will be utilized, information and conclusion on whether they are particularly suitable, are not competitive with private enterprise, and can be made available without undue interference with domestic programs. No technical assistance is being provided under this loan. Facilities of other federal agencies are not expected to be utilized.

Loan's Compliance with Specific Requirements

46. FAA § 110(a) ; § 208(e). In what manner has or will the recipient country provide assurances that it will provide at least 25% of the costs of the program, project, or activity with respect to which the loan is to be made? The loan agreement to be signed by the U.S. and Government of Morocco will contain such a provision. The U.S. input will be about \$13.0 million, the IERD input \$30.0 million, and the GOM input about \$51.4 million which constitutes over 25% of the cost of the project.

ANNEX B
PAGE 11

47. FAA § 660. Will loan be used to finance police training or related program in recipient country? No.
48. FAA § 114. Will loan be used to pay for performance of abortions or to motivate or coerce persons to practice abortions? No.
49. FAA § 201(b). Is the country among the 20 countries in which development loan funds may be used to make loans in this fiscal year? Yes.
50. FAA § 201(d). Is interest rate of loan at least 2% per annum during grace period and at least 3% per annum thereafter? Yes.
51. FAA § 201(f). If this is a project loan, what provisions have been made for appropriate participation by the recipient country's private enterprise? Commodities and services to be procured for the project using local currency will be purchased from Moroccan suppliers, most of them privately owned. Construction will be contracted mainly to Moroccan firms.
52. FAA § 604(a). Will all commodity procurement financed under the loan be from the United States except as otherwise determined by the President? Commodity procurement will be from Code 941 countries.
53. FAA § 604(b). What provision is made to prevent financing commodity procurement in bulk at prices higher than adjusted U.S. market price? The loan agreement shall ensure reasonable prices for commodities procured, as required by this section.

54. FAA § 604(d). If the cooperating country discriminates against U.S. marine insurance companies, will the loan agreement require that marine insurance be placed in the United States on commodities financed by the loan?
- The loan agreement shall so provide.
55. FAA § 604(e). If offshore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity?
- No such procurement is contemplated.
56. FAA § 604(f). If loan finances a commodity import program, will arrangements be made for supplier certification to A.I.D. and A.I.D. approval of commodity as eligible and suitable?
- Not applicable.
57. FAA § 608(a). Information on measures to be taken to utilize U.S. Government excess personal property in lieu of the procurement of new items.
- U.S. Government excess property will not be needed under this project.
58. FAA § 611(b), App. § 101. If loan finances water or water-related land resource construction project or program, is there a benefit-cost computation made, insofar as practicable, in accordance with the procedures set forth in the Memorandum of the President dated May 15, 1962?
- A cost benefit analysis is included in Part 3.D of the project paper.
59. FAA § 611(c). If contracts for construction are to be financed, what provision will be made that they be let on a competitive basis to maximum extent practicable?
- The loan agreement will cover this requirement. Selection of local contractors will be made on a competitive basis in accordance with Moroccan law.
60. FAA § 612(b); § 636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies
- The loan will finance activities requiring a minimum of foreign exchange which the country is prepared and able to finance. Morocco is financing 55% of the project costs.

owned by the United States are utilized to meet the cost of contractual and other services.

There are no U.S. owned local currencies available to finance this activity.

61. Section 30 and 31 of PL 93-189 (F.A.A. of 1973). Will any part of the loan be used to finance directly or indirectly military or paramilitary operations by the U.S. or by foreign forces in or over Laos, Cambodia, North Vietnam, South Vietnam, or Thailand? No.
62. Section 37 of PL 93-189 (F.A.A. of 1973); App. § 111. Will any part of this loan be used to aid or assist generally or in the reconstruction of North Vietnam? No.
63. FAA § 612(d). Does the United States own excess foreign currency and, if so, what arrangements have been made for its release? Morocco is not an excess currency country.
64. FAA § 620(g). What provision is there against use of subject assistance to compensate owners for expropriated or nationalized property? The loan agreement shall ensure that loan funds are not used for this purpose.
65. FAA § 620(k). If construction of productive enterprise, will aggregate value of assistance to be furnished by the United States exceed \$100 million? Not applicable.
66. FAA § 636(f). Will any loan funds be used to finance purchase, long-term lease, or exchange of motor vehicle manufactured outside the United States, or any guaranty of such a transaction? No.
67. App. § 103. Will any loan funds be used to pay pensions, etc., for military personnel? No.
68. App. § 105. If loan is for capital project, is there provision for A.I.D. approval of all contractors and contract terms? The loan agreement shall so provide

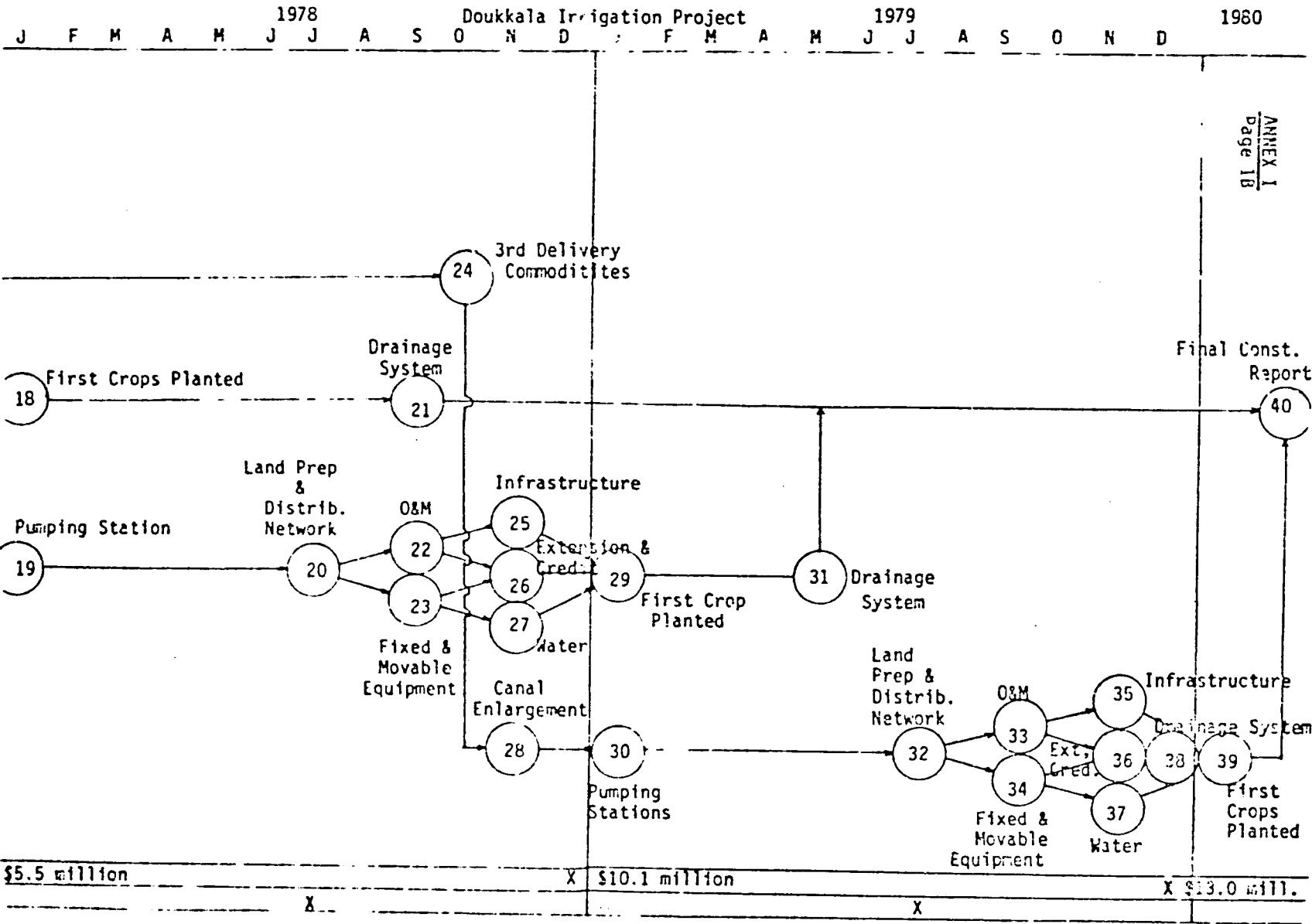
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69. App. § 107. Will any loan funds be used to pay UN assessments? No.
70. App. § 108. Compliance with regulations on employment of U.S. and local personnel. (A.I.D. Regulation 7). The loan agreement shall ensure compliance.
71. App. § 110. Will any of loan funds be used to carry out provisions of FAA § 209(d)? No.
72. App. § 112. Will any of the funds appropriated or local currencies generated as a result of AID assistance be used for support of police or prison construction and administration in South Vietnam or for support of police training of South Vietnamese? No.
73. App. § 113. Describe how the Committee on Appropriations of the Senate and House have been or will be notified concerning the activity, program, project, country, or other operation to be financed by the Loan. The Committees have been notified at least fifteen days in advance of obligation.
74. App. § 601. Will any loan funds be used for publicity or propaganda purposes within the United States not authorized by Congress? No.
75. App. § 604. Will any of the funds appropriated for this project be used to furnish petroleum fuels produced in the continental United States to Southeast Asia for use by non-U.S. nationals? No.
76. EMM § 501.b; FAA § 640C.
(a) Compliance with requirement that at least 50 per centum of the gross tonnage of commodities (computed separately for dry bulk The loan agreement shall include a provision to ensure compliance with this section.

carriers, dry cargo liners, and tankers) financed with funds made available under this loan shall be transported on privately owned U.S.-flag commercial vessels to the extent that such vessels are available at fair and reasonable rates.

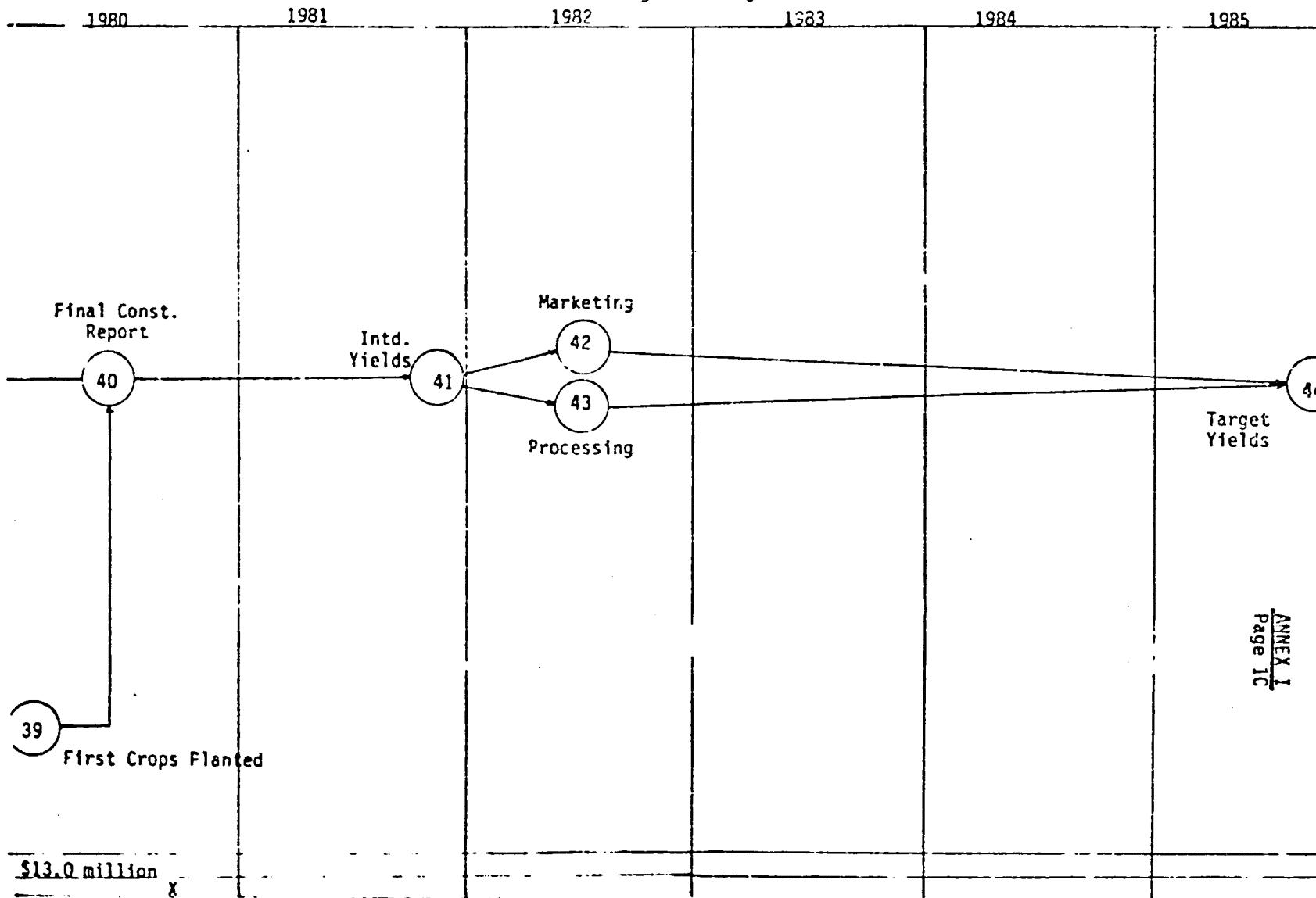
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ANNEX I
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Doukkala Irrigation Project



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PROJECT PERFORMANCE TRACKING NETWORK

Doukkala Irrigation Project

<u>Step</u>	<u>Description</u>	<u>Responsibility</u>
1.	IFB for civil works contracts completed	ORMVAD
2.	AID/COM Loan Agreement signed	AID/COM
3.	Final Engineering Design and Specs completed and approved	SCET/ORMVAD
4.	Conditions Precedent satisfied	COM
5.	Procurement contracts for Bank-funded commodities signed and previous procurement approved	ORMVAD/IBRD
6.	Delivery of commodities at a level to enable construction in sector Z 1	ORMVAD
7.	Completion of enlargement of main supply canal and installation of automatic flow regulators	ORMVAD
8.	A.I.D.-funded procurement contracts awarded and previous procurement approved	ORMVAD/AID
9.	Completion of pumping station, sub-station and power supply in sector Z 1	ORMVAD, ONE
10.	Completion of land consolidation in all sectors and completion of land preparation and installation of distribution network in sector Z 1	ORMVAD
11.	O&M equipment delivered and installed and O&M capability of ORMVAD established in sector Z 1	ORMVAD
12.	Installation of fixed and movable equipment in section Z 1	ORMVAD
13.	Delivery of commodities at a level to enable construction in sector Z 0	ORMVAD

<u>Step</u>	<u>Description</u>	<u>Responsibility</u>
14.	Infrastructure completed including project roads, telephone facilities and buildings in sector Z 1, also 2 village centers completed in Z 1 with roads, electricity, treated water and schools	ORMVAD, Education, Public Works, ONE
15.	Increased availability of credit and extension services to farmers in sector Z 1	ORMVAD, QMVs, Credit Insts.
16.	First water delivered to 4150 Ha in sector Z 1	ORMVAD
17.	Completion of feeder canal serving Z 0 pumping station	ORMVAD
18.	First Crops planted in sector Z 1	ORMVAD, QMVs Farmers
19.	Completion of pumping station and power supply in sector Z 0	ORMVAD, ONE
20.	Completion of land preparation and installation of distribution network in sector Z 0	ORMVAD
21.	Drainage system operational in sector Z 1	ORMVAD
22.	O&M equipment delivered and installed and O&M capability of-ORMVAD established in sector Z 0	ORMVAD
23.	Installation of fixed and movable equipment completed in sector Z 0	ORMVAD
24.	Delivery of commodities at a level to enable construction in sectors Z 2 and Z 3	ORMVAD
25.	Infrastructure completed, including project roads, telephone facilities and buildings in sector Z 0, also 2 village centers completed in sector Z 0 with roads, electricity, treated water and schools	ORMVAD, Education, Public Works, ONE

<u>Step</u>	<u>Description</u>	<u>Responsibility</u>
26.	Increased availability of credit and extension services to farmers in sector Z 0	ORMVAD, CMVs, Credit Institutions
27.	First water delivered to 5900 Hectares in sector Z 0	ORMVAD
28.	Completion of enlargement of main supply canal and installation of automatic flow regulators in sectors Z 2 and Z 3	ORMVAD
29.	First Crops planted in sector Z 0	ORMVAD, CMVs Farmers
30.	Completion of pumping stations and power supply in sectors Z 2 and Z 3	ORMVAD, ONE
31.	Completion of land preparation and installation of distribution network in sectors Z 2 and Z 3	ORMVAD
32.	Drainage system operational in sector Z 0	ORMVAD
33.	O&M equipment delivered and installed and O&M capability of ORMVAD established in sectors Z 2 and Z 3	ORMVAD
34.	Infrastructure completed, including project roads, telephone facilities and buildings in sectors Z 2 and Z 3, also 3 village centers completed in sectors Z 2 and Z 3 with roads, electricity, treated water and schools	ORMVAD, Education, Public Works, ONE
35.	Installation of fixed and movable equipment in sectors Z 2 and Z 3 completed	ORMVAD
36.	Increased availability of credit and extension to farmers in sectors Z 2 and Z 3	CMVs, Credit Institutions

<u>Step</u>	<u>Description</u>	<u>Responsibility</u>
37.	First water delivered to 5360 Ha in sectors Z 2 and Z 3	ORMVAD
38.	Drainage system operational in sectors Z 2 and Z 3	ORMVAD
39.	First crops planted in sectors Z 2 and Z 3	ORMVAD, CMVs Farmers
40.	Final construction report submitted	ORMVAD
41.	Yields obtained at * % of target	ORMVAD, CMVs Farmers
42.	Marketing facilities expanded to meet target yields	ORMVAD, other GOM corps.
43.	Processing facilities expanded to meet target yields	ORMVAD, other GOM corps.
44.	Target yields obtained	ORMVAD, CMVs Farmers

* To be determined.

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PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORKLife of Project: _____
From FY _____ to FY _____
Total U.S. Funding: _____
Date Prepared: _____

Project Title & Number: MOROCCO: Doukkala - Zemama Irrigation

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS												
<p>Program or Sector Goal: The broader objective to which this project contributes:</p> <ol style="list-style-type: none"> To increase agricultural production for import substitution and for export. To increase employment in rural areas. 	<p>Measure of Goal Achievement:</p> <ol style="list-style-type: none"> Target yields and target cropping intensities met (See Annex 2 for details) Increased employment in agricultural and ag related processing, marketing and service jobs in Doukkala region by 270%. 	<ol style="list-style-type: none"> GOM records. GOM stats. 	<p>Assumptions About Linkage Between Purpose and Program Sector Goal:</p> <ol style="list-style-type: none"> Processing and Marketing facilities will be expanded to meet increased production levels. Water quantity and quality levels and water mgmt capabilities remain acceptable. 												
<p>Project Purpose:</p> <p>To establish irrigated agriculture on 15,410 ha in the Doukkala region by 1979.</p>	<p>Conditions that will indicate purpose has been achieved: End of project status:</p> <ol style="list-style-type: none"> System being used and maintained. Ag. Mgmt and Ag Credit Services being used. Village infrastructure being used. 	<ol style="list-style-type: none"> Scheduled evaluations, ORMVAD records OMV, CLCA, CRCA, and ORMVAD records SOI stats, school records, ONE records, Water use records, scheduled evaluations. 	<p>Assumptions About Linkage Between Outputs and Purpose/Project:</p> <ol style="list-style-type: none"> ORMVAD continues to effectively organize credit, purchasing, marketing, and milk collection co-ops. ORMVAD G&M capability is est. Farmers successfully adopt irrigation practices. 												
<p>Outputs:</p> <ol style="list-style-type: none"> Sprinkler Irrigation System and Drainage System installed. Expanded Agricultural Mgmt Services and Ag Credit. Construction of Project and Village Infrastructure. 	<p>Magnitude of Outputs:</p> <table border="1"> <thead> <tr> <th>1. Sector</th> <th>Area (ha)</th> <th>First Water Del. (CY)</th> </tr> </thead> <tbody> <tr> <td>21</td> <td>4150</td> <td>77</td> </tr> <tr> <td>20</td> <td>5900</td> <td>78</td> </tr> <tr> <td>22 & 23</td> <td>5360</td> <td>79</td> </tr> </tbody> </table> <ol style="list-style-type: none"> JOMs built and staffed and 6 milk collection centers built, \$2.5M increase in credit availability, expansion of experiment station and increased staff. 193km roads built or reinforced 50km telephone line operational 7 village centers w/roads, electricity, water, schools. 	1. Sector	Area (ha)	First Water Del. (CY)	21	4150	77	20	5900	78	22 & 23	5360	79	<ol style="list-style-type: none"> Construction reports, ORMVAD records Construction reports, OMV, CLCA, CRCA ORMVAD records Construction reports 	<ol style="list-style-type: none"> ONE, MTPC, M of Health, M of Ed assume their respective financing and maintenance responsibilities.
1. Sector	Area (ha)	First Water Del. (CY)													
21	4150	77													
20	5900	78													
22 & 23	5360	79													
<p>Inputs:</p> <p>Land Planning, design and supervision Construction equipment and materials Labor, capital (see Annex 8, 9, 10, and Part 3, A for details.)</p> <p>Total Project Cost \$ 94.0M USAID Contribution 13.0M ISID Contribution 20.0M GSM 61.0M</p>	<p>IMPLEMENTATION TARGET:</p> <p>See Annex 8, 9, 10</p>	<p>GOM, ISRD, and USAID reports On-site inspection (USAID)</p>	<p>Assumptions About Linkage Between Inputs and Outputs:</p> <ol style="list-style-type: none"> Timely construction and effective contractor performance. Timely allocation of funds from donors and GOM. Timely delivery of commodities. Land consolidation continues. 												

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