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DRYLAND AGRICULTURE APPLIED RESEARCH PROJECT 608-0136

PROJECT PAPER AMENDMENT NO. 3

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AUG 30 1983

ACTION MEMORANDUM FOR THE ASSISTANT ADMINISTRATOR, NEAR EAST

FROM : NE/TECH, Kenneth H. Sherper *KS*SUBJECT: Morocco Dryland Agriculture Applied Research 608-0136
Project Paper Amendment 3

Problem: Project Authorization Amendment needs to be signed.

Discussion: The Near East Advisory Committee (NEAC) under the chairmanship of Mr. Bradshaw Langmaid, Jr., DAA/NE, approved the subject Project Amendment Three (3) on August 4, 1983. This amendment adds \$21,823,400 to the original project of \$4,500,000 and extends the project 5 years. The NEAC reporting cable was approved and sent on August 26, 1983.

The goal of the original Project Paper -- to increase basic food production in order to meet the needs of Morocco's fast-growing population; and improve income of traditional small dryland farmers -- remains the same. The purpose of this amendment is to realign project activities and enable full implementation of activities essential to the project (as determined by the recent evaluation) but not included in the original Project Paper (e.g., adopting physical technologies and cultural practices appropriate to Moroccan conditions; adapting farm equipment for small and medium size farms; collecting and analyzing socioeconomic data; and staff development and management).

The issues with which the NEAC dealt concerned evaluations (six issues), procurement of technical assistance and land for research. In summary, the actions stemming from the issues are as follows:

1. The issue of economic feasibility/financial risk must be addressed in the 1985 evaluation.
2. The 1985 evaluation should include a heavy management component to assess the implementation performance of the contractor and GOM.
3. Prior to signing the Grant Agreement the Mission should review the projected GOM contributions and determine their adequacy for reaching project objectives.
4. The evaluation in 1985 should assess the adequacy of the Moroccan staff provided by the GOM to the Aridoculture Center.

5. Continue to work with the GOM toward appropriate management skills and administrative relationships within the National Agriculture Research Institute.
6. The Mission should prepare detailed evaluation plans.
7. The NEAC agreed that MIAC continue to serve as the contractor and that the contract amendment assure provisions for U.S. fair employment practices.
8. The GOM should provide an adequate amount of land for applied agriculture research.

The Mission Director and the Agriculture Development Officer attended the NEAC meeting and concurred on the issues and the discussions concerning actions stemming from the issues. A Congressional Advice of Program Change was forwarded to Congress indicating the increased funding level, the extended life of project and an intent to obligate \$2,000,000 in FY 83 in grant funds for this project. The CW waiting period expired on July 30, 1983. There are no current human rights issues under Section 116 of the Foreign Assistance Act that would preclude provision of this assistance to Morocco. The Project Paper included a draft Project Authorization (extracted and here attached with modifications) which needs your signature to complete the approval process.

Recommendation: That you sign the attached Project Authorization Amendment for \$21,823,400 in grant funds for the Morocco Dryland Agriculture Applied Research 608-0136.

ASSISTANT
ADMINISTRATOR

FIRST AMENDMENT
TO
PROJECT AUTHORIZATION

Name of Country: Kingdom
of Morocco Name of Project: Dryland
Agriculture
Applied Research
Number of Project: 608-0136

1. Pursuant to Part I, Chapter 1, Section 103 of the Foreign Assistance Act of 1961, as amended, the Dryland Agriculture Applied Research Project (608-0136) for Morocco was authorized on June 30, 1978. That authorization is hereby amended as follows:

a. The following paragraph shall be inserted after the third paragraph in the Authorization:

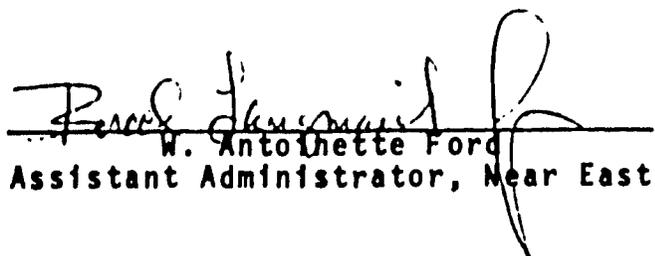
"Pursuant to Section 103 of the Foreign Assistance Act of 1961, as amended, I hereby authorize an amendment to the Dryland Agriculture Applied Research Project for Morocco involving planned obligations of not to exceed \$21,823,400 in grant funds over a five year period from date of authorization subject to the availability of funds in accordance with the A.I.D./OYB/allotment process, to help in financing the foreign exchange and local currency costs for the project amendment. The total funding for this amended Project is \$26,323,400 and the planned life of project is 10 years from the date of initial obligation."

b. In addition to the conditions precedent and covenants in the Project Agreement, conditions precedent and covenants shall be added to the Project Agreement in substance as follows:

- (1) Prior to disbursement under the Grant, or to the issuance by AID of documentations pursuant to which disbursement may be made, for the socio-economic research activity, a Memorandum of Understanding between the National Agronomic and Veterinary Institute Hassan II and AID must be signed. This Memorandum will detail the program, the budget and disbursement mechanisms for this project activity.

- (2) The Cooperating Country agrees to provide within 6 months of the signing of the Fifth Amendment to this Agreement a revised schedule for the assignment to the project of research staff necessary for the training of 32 participants to graduate degrees.
- (3) The Cooperating Country agrees to provide within 6 months of the signing of the Fifth Amendment to this Agreement a plan for financing construction and development at the Settat Center and of the research stations at Sidi El Aydi, Jemma Shaim, Tessaout, and Annaceur.
- (4) The Cooperating Country agrees to provide within 6 months of the signing of the Fifth Amendment to this Agreement an adequate amount of land in the Settat area suitable for agricultural applied research.

2. The Authorization cited above remains unchanged and in force except as hereby amended.


W. Antoinette Ford
Assistant Administrator, Near East

Date: 31 AUG 1983

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MAST-01 /027 AS 926

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DRAFTED BY AID/NE/TECH/AD-LVOTH:SOB
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TAGS:

SUBJECT: NEAC REPORTING CABLE, DRYLAND AGRICULTURE
APPLIED RESEARCH 608-0136, AMENDMENT NO. 3, AND
EVALUATION/PES 608-83-9

REF: A. : ATE 209511
.... B. RABAT 05806

1. THE NEAC MET ON AUGUST 4, 1983 WITH MISSION DIRECTOR
CHASE AND ADD MCSWAIN PRESENT. AMENDMENT NO 1 AND THE
PROJECT EVALUATION WITH PES 608-83-9 DATED JUNE 7, 1983
WERE USED AS BACKGROUND MATERIAL. THE EVALUATION
DOCUMENTS WERE PARTICULARLY USEFUL IN PREPARING THE
ISSUES PAPER.

2. THE NEAC ENDORSED THE PROJECT WITH THE UNDERSTANDING
THAT THE RECOMMENDATIONS NOTED BELOW BE INCORPORATED
INTO THE PROJECT. SUBSEQUENT TO THE NEAC, THE NECESSARY
ACTIONS WERE DISCUSSED WITH ADD MCSWAIN.

3. OF THE ISSUES DISCUSSED AT THE NEAC, THE FOLLOWING
SIX INVOLVE FUTURE EVALUATIONS:

A. ISSUE: ECONOMIC VIABILITY OF THE RAINFED AGRICULTURE
STRATEGY

DISCUSSION: THUS FAR THE MISSION RAINFED AGRICULTURE
ASSESSMENT (1982) AND THE SUBJECT PROJECT AMENDMENT HAVE
MADE THE MACRO ECONOMIC CASE THAT THERE ARE HANDSOME
POTENTIAL ECONOMIC RETURNS TO INVESTMENTS IN RAINFED
AGRICULTURE. HOWEVER, THE POTENTIAL RETURNS TO THE
ECONOMY COME INTO DOUBT WHEN VIEWED AT THE MICRO LEVEL,
ESPECIALLY IN TERMS OF THE FINANCIAL RISK TO THE SMALL
FARMER OF ADOPTING NEW TECHNOLOGY. THE FARM BUDGET DATA
RELATING TO THE 7.1 HA. FARM SUGGEST THAT THE NEW
AGRONOMIC PRACTICES/INPUTS WOULD REQUIRE AN INCREMENTAL
INVESTMENT IN PURCHASED INPUTS SOMEWHERE BETWEEN 149 TO
200 PERCENT OVER CURRENT PRACTICE. VIEWED FROM THE
PERSPECTIVE OF TOTAL COSTS, THE SHARE OF PURCHASED INPUTS

WOULD INCREASE FROM A BASE OF 16 TO 19 PERCENT TO AROUND
40 PERCENT WITH NEW PRACTICES AND MORE INPUTS. AGAINST
THESE SUBSTANTIALLY INCREASED COSTS OF PURCHASED INPUTS,
THE HYPOTHETICAL INCREMENTAL INCREASE IN REVENUES WOULD
YIELD A REVENUE/COST RATIO OF ABOUT 1.7. (PLEASE NOTE
THAT IN THIS FORM OF RISK ANALYSIS THE EMPHASIS IS PUT ON
PURCHASED INPUTS REQUIRING EITHER CASH OR CREDIT RATHER
THAN ON LABOR, THE LATTER BEING MORE DIFFICULT TO
VALUE.) THE POINT IS THAT OTHER AGENCY EXPERIENCES, E.G.
THE INTRODUCTION OF HYVS (BOTH RICE AND WHEAT) IN SOUTH
ASIA SUGGESTED A SMALL FARMER DECISION THRESHOLD OF
ABOUT 2 TO 1, INCREASED REVENUES OVER INCREASED COSTS OF
PURCHASED INPUTS, BEFORE ADOPTION OF NEW PRACTICES.
OBVIOUSLY, TO THE EXTENT THAT THE TARGET GROUP IS
COMPRISED OF SHARECROPPERS WHO PAY FOR ALL PURCHASED
INPUTS BUT SHARE THE INCREMENTAL REVENUE WITH LANDLORDS,
THE THRESHOLD, I.E. THE RISK DECISION, IS CRITICAL. IN
THIS REGARD, THE PP AMENDMENT FARM BUDGET FOR THE 7.1 HA.
FARM ASSUMED 8 PERCENT OF AREA SHARECROPPED WHILE
BENEFICIARY ANALYSIS (P. 20) INDICATES 30 PERCENT IS
SHARECROPPED OR RENTED; THUS OVERSTATING REVENUES IN THE
FARM BUDGET. UNFORTUNATELY, THE PACKAGE OF AGRONOMIC
PRACTICES AND THE INPUTS ASSOCIATED WITH RAINFED CEREALS
DO NOT APPEAR TO OFFER THE DRAMATIC INCREASES IN YIELD AT
A MINIMIZED COST, TO LEAD SMALL FARMERS EASILY AND
QUICKLY TO THE DECISION. THUS, THE CRITICAL ECONOMIC
FEASIBILITY ISSUE IS WHETHER (A) THE PACKAGE WILL BE
SUFFICIENT, (B) THE INPUT/OUTPUT PRICE RELATIONSHIPS WILL
BE SUCH, THAT (C) SMALL FARMERS WILL TAKE THE PLUNGE TO
(D) REAP THE ECONOMIC PAYOFF AT THE MACRO ECONOMIC LEVEL.

RECOMMENDATION: APPROPRIATE DATA FOR FINANCIAL AND
ECONOMIC ANALYSIS SHOULD BE COLLECTED DURING THE NEXT TWO

YEARS OF THE PROJECT. THE ISSUE OF ECONOMIC
FEASIBILITY/FINANCIAL RISK MUST BE ADDRESSED IN THE
SEPTEMBER 1985 EVALUATION, DISCUSSED BELOW, AND WILL LEAD
TO A GO OR NO-GO DECISION WITH RESPECT TO SUSTAINING AID
INVESTMENTS IN RAINFED AGRICULTURE, OR TO A SIGNIFICANT
MODIFICATION IN THAT INVESTMENT PROGRAM. FURTHERMORE,
THE CURRENT ECONOMIC/FINANCIAL ANALYSIS SHOULD BE
SCRUTINIZED FOR POTENTIAL ERRORS OR OVERSIGHTS. ONE SUCH
AREA OF POTENTIAL CONFUSION IN THE FINANCIAL RISK
ANALYSIS RELATES TO THE APPARENT USE OF ECONOMIC INSTEAD
OF MARKET PRICES (P. 48) FOR INPUTS. SINCE
REVENUE/PRODUCTION COST RATIO IS MEASURE OF FARMER RISK
RESPONSE, NOT ECONOMIC RETURN, RECOMMEND USE MARKET
RATHER ECONOMIC PRICES WHICH MIGHT BIAS INPUT COSTS
UPWARD.

B. ISSUE: PROJECT PROGRESS IN LIGHT OF EARLIER
EXPERIENCE.

DISCUSSION: THE PROJECT EVALUATION DONE IN JUNE, 1983
INDICATES THAT ALTHOUGH THE PROJECT HAD A SLOW START
BECAUSE OF CONTRACTING DELAYS AND FAILURES BY BOTH THE
GOM AND THE CONTRACTOR TO IDENTIFY PROJECT PERSONNEL AND
GET IMPLEMENTATION MOVING IN A TIMELY FASHION, THE
PROJECT HAS MADE NOTABLE PROGRESS. THE NEAC NOTED THAT,
BECAUSE OF THE SIZE AND DURATION OF THIS AMENDMENT, AID
IS ASSUMING MUCH HIGHER RISK THAN UNDER THE ORIGINAL
PROJECT, SHOULD GOM AND CONTRACTOR PERFORMANCE
DIFFICULTIES SIMILAR TO THOSE EXPERIENCED EARLIER
AGAIN. IT WAS AGREED THAT MISSION PROJECT STAFF WILL
NEED TO MONITOR PROJECT IMPLEMENTATION MORE CLOSELY THAN
IN THE PAST, WHICH SHOULD BE FEASIBLE IN LIGHT OF
AGRICULTURAL STAFF INCREASES. BECAUSE OF THE PARAMOUNT
IMPORTANCE OF SUCCESS OF THIS PROJECT IN PURSUING OVERALL
RAINFED AGRICULTURE STRATEGY, NEAC FELT STRONGLY THAT WE
SIMPLY CANNOT AFFORD RECIDIVISM ON PART OF THE

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CONTRACTOR, THEREBY IMPAIRING PROGRESS OF OVERALL RAINFED STRATEGY, PARTICULARLY IF 1985 EVALUATION SUPPORTS CONTINUATION OF EFFORTS IN THIS SECTOR.

RECOMMENDATION: NEAC CONCLUDED THAT BECAUSE IMPROVED CONTRACTOR AND GOM PERFORMANCE IS FAIRLY RECENT PHENOMENON, 1985 EVALUATION SHOULD ALSO INCLUDE HEAVY MANAGEMENT COMPONENT, ENTAILING IN-DEPTH ASSESSMENT OF CONTRACTOR AND GOM PERFORMANCE WITH OBJECTIVE OF IDENTIFYING ANY MID-COURSE CORRECTIONS WHICH MAY BE REQUIRED IN PROJECT MANAGEMENT AND IMPLEMENTATION ARRANGEMENTS CURRENTLY ENVISIONED. ALSO IN THE IMPLEMENTATION CONTRACT THE MISSION SHOULD REQUIRE THE

CONTRACTOR TO SET OBJECTIVES FOR EACH YEAR IN THEIR YEARLY WORK PLAN. THESE OBJECTIVES TO BE USED BY MISSION TO EVALUATE PROGRESS IN ACHIEVING RESEARCH TARGETS.

C. ISSUE: THE GOM'S FINANCIAL SUPPORT HAS BEEN INSUFFICIENT FOR INRA'S RECURRENT COSTS AND FOR DEVELOPMENT OF HOUSING AND RESEARCH SUPPORT FACILITIES BOTH AT THE ARIDOCULTURE CENTER IN SETTAT AND AT SELECTED SATELLITE STATIONS.

DISCUSSION: MOROCCO HAS BEEN FACED WITH ECONOMIC DIFFICULTIES DURING RECENT YEARS DUE TO INTERNAL AND EXTERNAL FACTORS. THE GOM/MINISTRY OF AGRICULTURE/INRA HAS HAD DIFFICULTY MEETING PROJECT SUPPORT COSTS. THE GOM CONTINUES TO RECEIVE VARYING AMOUNTS OF PL-480 FROM WHICH LOCAL CURRENCY PROCEEDS ENTER THE GOM'S GENERAL ACCOUNTS WITH SOME FUNDS DESIGNATED FOR AGRICULTURALLY RELATED PROGRAMS. THE MINISTRY OF FINANCE HAS RECENTLY INDICATED IT WILL ALLOCATE GREATER AMOUNTS OF PL-480 GENERATED LOCAL CURRENCY TO AID RELATED PROJECTS. IN REGARD TO PL-480 PROGRAMS, THE NEAC INDICATED IT WOULD EXPECT VERY SPECIFIC AGREEMENTS ON PL-480 PROGRAMS IN THE FUTURE.

RECOMMENDATION: PRIOR TO SIGNING THE GRANT AGREEMENT, THE MISSION AND GOM SHOULD REVIEW THE PROJECTED GOM CONTRIBUTIONS MATERIAL, PERSONNEL AND FINANCIAL; AND DETERMINE THE GOM'S ABILITY TO MEET THESE CONTRIBUTIONS WITHOUT PL 480 TITLE I GENERATIONS AND, IF THE GOM ANTICIPATES DIFFICULTY IN MEETING ITS CONTRIBUTION TARGETS, MAKE PROVISION FOR INCLUSION OF NECESSARY AMOUNTS IN PL 480 LOCAL CURRENCY ALLOCATIONS IN FUTURE AGREEMENTS. NEGOTIATION OF AGREEMENT ON ADDITIONAL DOLS 2.5 MILLION FY 83 TITLE I TO BE PROVIDED SHORTLY MAY PROVIDE FORUM FOR RAISING THESE ISSUES. ACTUAL GOM PERFORMANCE IN PROVIDING INPUTS SHOULD BE PART OF EACH TITLE I PRE-NEGOTIATION REVIEW.

D. ISSUE: ADEQUATE GOM STAFF IS NEEDED TO SERVE AS COUNTERPARTS AND SUPPORT PERSONNEL TO U.S. TECHNICAL ASSISTANCE STAFF AND FOR PARTICIPANT TRAINING.

DISCUSSION: THE GOM HAS HAD DIFFICULTY IDENTIFYING ADEQUATE NUMBERS OF PARTICIPANT TRAINEES, COUNTERPARTS AND SUPPORT STAFF. THIS HAS CONTRIBUTED TO IMPLEMENTATION DELAYS OF THE EXISTING PROJECT. AMENDMENT NO. 3 ADDS EVEN MORE PARTICIPANTS. WITH THE INCREASING NUMBER OF PARTICIPANTS RETURNING, THE COUNTERPART CONSTRAINTS SHOULD DIMINISH. UTILIZATION IN INRA OF

GRADUATES FROM THE AGRONOMIC INSTITUTE AS COUNTERPARTS WHILE THE PARTICIPANT TRAINEES ARE AWAY WOULD PREPARE THE INTERIM COUNTERPARTS TO BE VALUABLE SUPPORT STAFF UPON THE RETURN OF THE TRAINEES.

RECOMMENDATION: THE 1985 EVALUATION SHOULD PAY

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PARTICULAR ATTENTION TO THE PROVISION OF MOROCCAN STAFF TO THE ARIDOCULTURE CENTER.

E. ISSUE: THE ADMINISTRATIVE RELATIONSHIP OF THE ARIDOCULTURE CENTER TO THE DIRECTOR OF INRA AND OTHER REGIONAL INRA DIRECTORS.

DISCUSSION: THE PROJECT'S MAIN ACTIVITIES ARE AT ONE OF THE REGIONAL STATIONS WITH THAT REGIONAL DIRECTOR ALSO BEING HELD RESPONSIBLE FOR THE PROJECT'S ACTIVITIES IN OTHER REGIONS EVEN THOUGH THE OTHER REGIONAL STATIONS ARE DIRECTED BY HIS PEERS. ESTABLISHMENT OF A SEPARATE POSITION OF DIRECTOR FOR THE PROJECT ACTIVITIES, DIRECTLY RESPONSIBLE TO THE INRA DIRECTOR, WOULD PREVENT THE PROJECT ACTIVITIES FROM BEING CONSTRAINED GEOGRAPHICALLY TO THE AREA UNDER ONE REGIONAL DIRECTOR, AND PREVENT THE ACTIVITIES FROM BEING GIVEN INADEQUATE OR VARIABLE ADMINISTRATIVE ATTENTION ON A DAY TO DAY BASIS, WHILE ASSURING ADEQUATE ACCESS TO NATIONAL-LEVEL MANAGEMENT.

RECOMMENDATION: THE MISSION CONTINUE TO WORK WITH THE GOM TOWARD APPROPRIATE ADMINISTRATIVE RELATIONSHIPS AMONG THE NATIONAL ARIDOCULTURE CENTER, THE DIRECTOR OF INRA AND THE INRA CHIEFS. MANAGEMENT, RATHER THAN SCIENTIFIC TRAINING, MIGHT BE PROVIDED FOR SOME PERSONNEL ASSIGNED TO THE ARIDOCULTURE CENTER TO STRENGTHEN THE ADMINISTRATIVE CAPABILITY OF THE CENTER (ISNAR MAY BE A POSSIBLE RESOURCE).

F. ISSUE: EVALUATION PLAN

DISCUSSION: THE PP A-3 INDICATES SPECIAL EVALUATIONS WILL BE CONDUCTED IN 1985 AND 1987. HOWEVER, THE PP PROVIDES ONLY AN EVALUATION SCHEDULE AND DOES NOT INCLUDE AN ADEQUATE EVALUATION PLAN.

RECOMMENDATION: MISSION SHOULD PREPARE A DETAILED EVALUATION PLAN WHICH SHOULD INCLUDE DETERMINATIONS FOR ANY CONTINUING SUPPORT BY USAID. EVALUATIONS SHOULD PAY PARTICULAR CONCERN TO THE APPROPRIATENESS OF THE TECHNOLOGIES BEING RESEARCHED PARTICULARLY RELATING TO THE ECONOMICS OF THE TECHNICAL PACKAGE (S) AND ESTIMATES OF ADOPTION RATES BY SMALL FARMERS.

G. OTHER ISSUES AND RECOMMENDATIONS:

A. ISSUE: PLAN TO AMEND CURRENT CONTRACT NON-COMPETITELY

DISCUSSION: NEAC AGREED THAT MIAC SHOULD CONTINUE TO SERVE AS THE CONTRACTOR. THE TECHNICAL REQUIREMENTS OF THE ACTIVITIES PROPOSED GIVE MIAC A UNIQUE CAPABILITY TO PROVIDE THE SERVICES NEEDED, BASED ON BOTH PAST EXPERIENCE IN DRYLAND AGRICULTURE CROP RESEARCH (ESPECIALLY IN CEREAL GRAIN-LEGUME ROTATIONS) AND CURRENT ACTIVITIES IN MOROCCO. NEAC FEELS THIS MEETS THE CRITERIA LISTED UNDER PARAGRAPH 7-3.101-50 (B) (3) AND PARAGRAPH 7-3.101-50 (B) (5) OF THE AID PROCUREMENT REGULATIONS. FYI, NE/TECH/AD WILL PROCEED TO CONFIRM NON-COMPETITIVE ARRANGEMENTS WITH BIFAD AND AID CONTRACT OFFICE.

RECOMMENDATION: THE MIAC CONTRACT AMENDMENT SHOULD ASSURE PROVISIONS FOR U.S. FAIR EMPLOYMENT PRACTICES, PARTICULARLY REGARDING SUB-CONTRACTING WITH MINORITY AND S-A FIRMS, PER GENERAL PROVISION NUMBER 42, AND IN VIEW OF INCREASED FUNDING.

B. ISSUE: APPROPRIATENESS OF RESEARCH CENTER LAND FOR RESEARCH.

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DISCUSSION: THE PROJECT EVALUATION STATES THAT, QUOTE, THE SITE OF THE CENTER REPRESENTS A SERIES OF PROBLEMS WHICH RAISE FUNDAMENTAL QUESTIONS ABOUT ITS LONG-TERM VIABILITY AS A MAJOR HEADQUARTERS FOR RESEARCH ON LOW-RAINFALL AGRICULTURE IN MOROCCO. THE CENTER IS LOCATED ON A SITE WHICH IS TOO SMALL AND LACKS SOIL UNIFORMITY FOR APPLIED FIELD RESEARCH PURPOSES. SURVEYS OF SOILS IN THE VICINITY INDICATE LACK OF POTENTIAL SITES SUITABLE FOR RESEARCH PURPOSES THAT ARE SUFFICIENTLY NEARBY. THUS, IT IS LIKELY THAT THE CENTER CAN BEST BE USED AS A LABORATORY, CONFERENCE AND HOUSING COMPLEX, END QUOTE.

RECOMMENDATION: THE GRANT AGREEMENT SHOULD INCLUDE A CONDITION PRECEDENT THAT THE GOM WILL PROVIDE AN ADEQUATE AMOUNT OF LAND IN THE SETTAT AREA SUITABLE FOR APPLIED AGRICULTURAL RESEARCH. DAM

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SUMMARY OF ABBREVIATIONS

- USAID** - United States Agency for International Development
AID - Agency for International Development
FAO - Food and Agriculture Organization, United Nations
UNDP - United Nations Development Program
GOM - Government of Morocco
MARA - Ministry of Agriculture (Ministere de l'Agriculture et la Reforme Agraire)
DPA - Provincial level Agriculture Development Office (Direction Provinciale D'Agriculture)
CIMMYT - International Maize and Wheat Improvement Center, Mexico
ICARDA - International Center for Agricultural Research in Dry Areas, Damascus, Syria
ICRISAT - International Crops Research Institute for the Semi-Arid Tropics, Hyderabad, India
INRA - National Agronomic Research Institute (Institute Nationale Recherche Agronomique)
NAC - National Aridoculture Center, Settlat
AIRC - Agriculture Information Resource Center, Settlat
INAV-H2 - National Agronomic and Veterinary Institute--Hassan II (Institute National Agronomique et Veterinaire--Hassan II)
DMS/INAV-H2- Department of Human Sciences, a component of the Development Division of INAV-H2
INAV/DD/E- Development Division, INAV subcomponent for Extension
GTZ - German Technical Assistance Organization
ACSAD - Arab Cereal Development Program for Semi-Arid Zones
LOP - Life of Project
DAAR - Dryland Agriculture Applied Research Project 608-0136
MIAC - Mid-America International Agricultural Consortium
FSR - Farming System Research
IBRD - International Bank for Rural Development
IFAD - International Fund for Agricultural Development

AGENCY FOR INTERNATIONAL DEVELOPMENT PROJECT DATA SHEET		1. TRANSACTION CODE <input checked="" type="checkbox"/> A = Add <input type="checkbox"/> C = Change <input type="checkbox"/> D = Delete	Amendment Number <u>3</u>	DOCUMENT CODE <u>3</u>
2. COUNTRY/ENTITY MOROCCO		3. PROJECT NUMBER <u>608-0136</u>		
4. BUREAU/OFFICE NEAR EAST <input type="checkbox"/> 03 <input type="checkbox"/>		5. PROJECT TITLE (maximum 40 characters) <u>DRYLAND AGRICULTURE APPLIED RESEARCH</u> <input type="checkbox"/>		
6. PROJECT ASSISTANCE COMPLETION DATE (PACD) MM DD YY <u>06/30/88</u>		7. ESTIMATED DATE OF OBLIGATION (Under "B." below, enter 1, 2, 3, or 4) A. Initial FY <u>78</u> B. Quarter <input type="checkbox"/> C. Final FY <u>87</u>		

8. COSTS (\$000 OR EQUIVALENT \$) =						
A. FUNDING SOURCE	FIRST FY <u>78</u>			LIFE OF PROJECT		
	B. FX	C. L/C	D. Total	E. FX	F. L/C	G. Total
AID Appropriated Total	2,096	-	2,096	20,640.3	5,683.1	26,323.4
(Grant) ARDN	(2,096)	(-)	(2,096)	(20,640.3)	(5,683.1)	(26,323.4)
(Loan)	()	()	()	()	()	()
Other U.S.	1.					
	2.					
Host Country		1300.0	1,300	--	11,936.4	11,936.4
Other Donor(s)						
TOTALS	2,096	1300.0	3,396	20,640.3	17,619.5	38,259.8

9. SCHEDULE OF AID FUNDING (\$000)									
A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH CODE		D. OBLIGATIONS TO DATE		E. AMOUNT APPROVED THIS ACTION		F. LIFE OF PROJECT	
		1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan
1) ARDN	121	023		4,342	--	21,823.4	--	26,323.4	--
2)									
3)									
4)									
TOTALS				4,342	--	21,823.4	--	26,323.4	--

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each)					11. SECONDARY PURPOSE CODES				
021	073	312	963						
12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)									
A. Code	BS	R/AG	TECH	EQTY					
B. Amount									

13. PROJECT PURPOSE (maximum 480 characters)

To establish an applied agronomic research program which will (a) adapt existing technology to local conditions in order to increase the productivity of the dryland farmers; (b) train adequate Moroccan staff to operate the program and transmit the results to farmers; and (c) develop a program whereby suitable farming equipment can be made accessible to small farmers; and to establish a socioeconomic research program which will give a better understanding of the behavior of the dryland farmers and provide a basis for effective extension programs.

14. SCHEDULED EVALUATIONS					15. SOURCE/ORIGIN OF GOODS AND SERVICES				
Interim	MM YY	MM YY	Final	MM YY	<input checked="" type="checkbox"/> 000	<input type="checkbox"/> 941	<input checked="" type="checkbox"/> Local	<input type="checkbox"/> Other (Specify)	
	08/85			11/87					

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a _____ page PP Amendment)

This amendment increases AID funding by 21,823,400. to finance 712 person years of additional technical assistance, 47.25 person years of additional participant training, additional project commodities, and additional assistance with project local costs.

The PACD is also extended to 06/30/88.

17. APPROVED BY	Signature	18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION		
	Title	Date Signed	MM DD YY	MM DD YY
	Mission Director		01/04/87	01/11/83

USAID PROJECT COMMITTEE

DORAL WATTS	PROJECT OFFICER
ARLAN MCSWAIN	FOOD & AGRICULTURE OFFICER
JOHN DORMAN	AGRICULTURAL ECONOMIST
WILLIAM ERDAHL	PROGRAM OFFICER
HARRY PETREQUIN	DEPUTY DIRECTOR
DONALD WALLS	CONTROLLER

AID/W PROJECT REVIEW COMMITTEE

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GEORGE LEWIS	NE/NENA
KATHRYN CUNNINGHAM	CM/ROD/NE
ROBERT MEYER	SGT/AGR
ALBERT MERCKER	FVA/FFP
ROBERT ZIMMERMAN	NE/DP/PAE
WALLY BOWLES	NE/DP/ENG

PROJECT PAPER AMENDMENT
MOROCCO - DRYLAND AGRICULTURE APPLIED RESEARCH
(PROJECT 608-0136)

I. SUMMARY AND RECOMMENDATIONS

- A. Grantee: The Government of Morocco (GOM)
- B. Implementing Agencies: Ministry of Agriculture and Agrarian Reform (MARA)
National Agronomic Research Institute (INRA)
Hassan II National Agronomic and Veterinary
Institute (INAV)
- C. Amount: U.S. \$ 21,823.400 Project Paper Amendment increasing LOP
costs of the Dryland Agriculture Applied Research project from
U.S. \$4.5 Million to U.S. \$26,323.400.
- D. Total Project Cost: Total project cost (including this amendment) is
estimated at U.S. \$ 38,259.800. These costs,
broken out by source, foreign exchange and local
currency are projected as follows.

U.S. DOLLARS

<u>SOURCE</u>	<u>FX</u>	<u>LC</u>	<u>TOTAL</u>
A. I. D. GRANT	20,640.300	5,683.100	26,323.400
GOM		11,936.400	11,936.400
TOTALS	20,640.300	17,619.500	38,259.800

- E. Project Goal: The goal of the original project paper--to increase basic
food production in order to meet the needs of Morocco's fast-growing
population; and improve income of traditional small dryland farmers--
remains the same.

Project Purpose: The project purposes remain (1) to establish an
applied agronomic research program which will (a) adapt existing tech-
nology to local conditions in order to increase the productivity of the
dryland farmers; (b) train adequate Moroccan staff to operate the program
and transmit the results to farmers; and (c) develop a program whereby
suitable farming equipment can be made accessible to small farmers; and
(2) to establish a socioeconomic research program which will give a
better understanding of the behaviour of the dryland farmers and thus
provide a basis for effective extension programs.

F. Project Description:

Problem Statement: The semi-arid region of arable land in Morocco is defined as receiving from 250 mm to 450 mm annual rainfall, with erratic annual amount and distribution. This semi-arid region comprises approximately one-half the tillable land and provides a living for over one-fifth of rural inhabitants. The majority of farms involved are less than 20 hectares and characterized by extreme fragmentation, sharecropping and other forms of insecure tenancy (exacerbated by inheritance customs and rural-urban migration). Soils are highly calcareous, rocky, shallow, non-uniform and deficient in nutrients. Farm implements used, cultural practices employed, and other agronomic and climatic conditions, constrain farm productivity, with yields estimated at 30 percent of potential.

It is assumed that available improved production techniques and inputs adopted by large-scale commercial farmers are not available/known to the majority of small and medium-scale farmers, and/or may not be appropriate to farms of these sizes; that the increased cost of available production recommendations in some cases are perceived as too high given likely increases in output, and income from sale of such output; and/or that significant alterations in cultural practices will increase risk to unacceptable levels given the micro variations characteristic of the zone.

Additionally, highly complex social and politico-economic relationships characterize the milieu in which small and medium-scale farmers operate. Although these generalizations describe the global characteristics of constraints to increased productivity and profitability, a major premise is that supplementary sub-zone-specific information is needed about certain dimensions of these assumptions.

The GOM has long emphasized the development of irrigated perimeters in an attempt to maximize production of high-value export crops which earn needed foreign exchange. The last decade has witnessed an imbalance between domestic supply and demand for basic cereal grains associated with rapidly expanding populations, increased income levels, and accelerating urbanization. The result has been growing food imports. Because of the potential social and political problems represented by this situation, the GOM has turned its attention toward stimulation of domestic agricultural production in the extensive less-favorable rainfed area.

Past emphasis of GOM investments on irrigated perimeters and the most favorable rainfed area has impacted on development of the national agricultural research system, research priorities and training/assignment of research personnel. Investment in institutional and human resources development has neglected the rainfed regions. In 1975, USAID established a dialogue with the GOM regarding this weakness in research capacity to address agricultural production constraints in the semi-arid region. As a result, the GOM responded with authorization for establishment of a national aridoculture research program and center. This new program focused significant GOM domestic resource investments in institutional infrastructure and personnel to develop appropriate technologies and improve on-farm productivity to increase production in the semi-arid regions. AID was requested to provide assistance.

The Project Goal: In 1978, USAID prepared the Dryland Agriculture Applied Research Project (DAAR) in recognition that a firm basis for bilateral cooperation had been established. USAID and the GOM mutually agreed on the importance of increasing the development focus on semi-arid areas in terms of national food (cereal) grain security, and the international comparative advantage of the U.S. in providing technical assistance. The Dryland Agriculture Applied Research Project was designed with the GOM to increase basic food production in order to meet the needs of Morocco's fast-growing population and improve income of traditional small dryland farmers.

3. Time Phasing: A period of ten to fifteen years may be required to fully realize the project goal of increased food, forage and livestock feed production throughout the rainfed areas. Therefore, the Project is planned for an initial period of ten years in the First Phase. The technical work planned for implementation under the Project cannot be divorced from critical institution-building elements. Under this Project, institution building entails not only physical and human resources development, but important attitudinal shifts in the official government and scientific community. U.S. technical assistance will play a crucial role in demonstrating practical benefits of "hands-on" applied research. In spite of initial implementation delays, it is anticipated that significant progress in both technical and institutional aspects of the Project will be accomplished during Phase I, which will span the period of FY 1978-88. Depending on the results of an in-depth evaluation in FY 87, additional Project documentation may be provided in FY 1988 in support of a proposed Phase II Project.

Target Areas: Project activities will be limited primarily to regions with average annual rainfall between 250 mm and 450 mm. The provinces included in the target area are: 1) Settat, 2) Khouribga, 3) East section of Beni Mellal, 4) Marrakech, 5) Essaouira, 6) Safi, 7) El Kella and El Jadida. The Project target area includes approximately 35,366 km², or a little under half of the total arable area of Morocco. The area accounts for approximately 3.2 million rural inhabitants, or one-fifth of the total Moroccan rural population.

Project Outputs: The specific outputs projected are: 1) integrated, multi-disciplinary applied research for cereals, edible grain legumes, and forages which develops and demonstrates improved technologies/cultural practices determined to be suitable for extension to farmers in the target area once they have been successfully tested with selected farmers on their fields; 2) an institutionalized capacity to design and implement a program of socioeconomic research which examines the potential social acceptability, economic feasibility and financial profitability of proposed technological innovations; 3) a functioning, fully-staffed and equipped National Aridoculture Research Center, capable of supporting and maintaining the applied research program, and integrating into it results from related applied research carried out under the auspices of other MARA entities. For realization of these outputs, the following sub-outputs are identified as necessary: a) trained Moroccan research scientists, administrative and support personnel; b) research substations equipped with support facilities including basic field equipment, repair and maintenance equipment

and tools: c) adjusted field research and demonstration methodologies; d) an agricultural research reference library; e) multidisciplinary seminars to enable GOM and Project personnel to develop and review work plans and progress annually.

Project activities will concentrate on applied research to increase production under existing constraints and capabilities of semi-arid zone farmers. Focus will be on improvement of cereal and forage varieties and crop management practices, which provide the greatest soil-water use efficiency. Activities will be conducted jointly by the National Agricultural Research Institute (INRA) and the contractor on designated INRA research stations. Findings of socio-economic research implemented by INAV will be integrated into research design, as will data from the Agriculture Information Resource Center (AIRC). Programs at these stations will be upgraded and promising results and practices from on-station research will be validated with research trials on farmers fields as early as is feasible. After validation, yield increasing technologies will be extended to farmers through a farming systems process developed jointly with programs under proposed Project 608-0170.

Project Inputs: The inputs required to produce the outputs specified include U.S. technical assistance; Peace Corps Volunteers; GOM staff; in-country, third country and U.S. training; commodities; land; physical facilities and their construction; operating expenses; and other financial resources necessary for miscellaneous expenses and inflation. The amended project will be jointly funded by the GOM and AID. AID will finance all foreign exchange costs and a portion of the local currency costs. The GOM will finance approximately 31 % of the total additional project inputs, primarily in the form of INRA staff expenses, operating expenses, and facility construction and maintenance expenses. Input costs are presented in Section III and further detailed in Annex 2.

a. Technical Assistance: The U.S. technical assistance team under the Project will be expanded from five members to twelve members by adding seven long term research positions to increase long term TA assistance from 16.25 person years to 62.4 person years. Short-term TA will increase from 3.3. person years to 11.2 person years. The U.S. backstopping assistance will increase from 7 person years to 26.25 person years. These additions will meet the needs of the extended LOP until FY 88. The twelve long term TA positions are a) Team Leader/Agricultural Research Specialist, b) Soil/Water/Fertility Management Research Specialist, c) Cereal Variety Specialist, d) Forage Agronomist, e) Agriculture Research Equipment Maintenance Specialist, f) Cereal Agronomist, g) Soil/Plant/Water Laboratory Specialist, h) Senior Plant Breeder, i) Agricultural Equipment and Tillage Research Specialist, j) Pest Protection Management/Crop Loss Appraisal Research Specialist, k) Agricultural Economist, and l) Rural Sociologist. Five Peace Corps Volunteer positions lasting from 1984 to 1988 will be added under this amendment. Four of these positions are for Agricultural Research Equipment Maintenance Specialists, and the fifth position is for an Agricultural Research Data Statistical Processor. The scopes of work for the additional U.S. TA team members are shown in Annex 7.

b. GOM Staff: The amended Dryland Agricultural Applied Research Project, will have a fairly high staff requirement, due to the necessity to staff programs in satellite research stations, as well as the National Aridoculture Center. 32 researchers and 128 INRA technicians and support staff will be added to the Project over the LOP. No addition will be needed to carry out the central administration of the Project since this requirement will continue to be met by INRA staff included in these totals. Only a portion of the research staff will be permanently assigned to the Aridoculture Project. The remainder will be drawn from the entities within MARA such as INAV. The latter will be associated with the Project while maintaining their current institutional affiliations. All salaries will be paid by the GOM.

c. Training: Short-term training will be provided for approximately 294 individuals. Long-term training will include U.S. graduate education (15 MS and 17 Ph.D). The majority of long term participant trainees will carry out their thesis/dissertation research in Morocco, under joint Moroccan-U.S. professorial supervision.

d. Construction: In 1978 the GOM agreed, under the terms of the PL-480 Agreement, to allocate four million dirhams for the construction of a National Aridoculture Research Center. The center is to have facilities to service the technical and support requirements of the national program. These facilities would include: 1) laboratory for soil and forage analysis; 2) one seed house for drying, processing, storing and handling of seed and experimental plant materials; 3) one machine shop equipped for service and maintenance of field equipment and Project vehicles; 4) storage rooms for fertilizers and chemicals; 5) offices for all center staff; 6) housing for permanent research personnel; 7) a scientific reference center, and 8) a pest management laboratory. Additional facilities will be added at both the Aridoculture Center and at satellite stations. These are detailed in Annex 2.

e. Commodities: The principal additions to the commodities financed in the original PP are project vehicles, field machinery, laboratory equipment, machine shop equipment, spare parts and tools, interior furnishings for the center facilities and houses, library equipment, professional library reference materials, office equipment and limited microcomputing hard/software.

f. Land and Physical Facilities: The GOM has made significant INRA resources available for Project activities. Under this amendment, it will be necessary to identify long term land requirements more definitively and to construct support facilities. These will include adequate research areas near the Settat headquarters and on four satellite stations. At least one of these must have adequate water to allow development of extensive simulated rainfall facilities and to act as a major sub-center.

g. Operating Expenses and Other Expense Categories: To support Project activities with adequate liquidity beyond support provided by recurrent GOM budget allocations, limited budgetary support will be provided to research activities, equipment/machinery service and maintenance operations. These AID contributions will phase out as increased budgetary allocations are made available from the GOM. These funds will be available to the U.S. technical assistance contractor for unanticipated local purchases, payment of actual field expenses associated with Project U.S. and Moroccan personnel working away from Settat, field work logistical support costs, temporary rental of office space in Settat until the Center facilities are ready for occupancy, temporary leasing of land for research trials, purchase of project office equipment and supplies, rental and maintenance of U.S. staff quarters in Settat, minor reproduction and printing costs, and other miscellaneous expenses (not to exceed LOP\$786,000 in local currency).

Administrative/Management Responsibilities:

a. Project Organization:

1. GOM: A GOM institutional reorganization occurred since preparation of the Project in 1978. The Ministry of Agriculture and Agrarian Reform originally encompassed straight line authority over all agricultural research and extension and other functions. Administrative encumbrances of this organizational approach were found to have diluted research work, so in early 1980, national responsibility for research was embodied in a new Institute, INRA, a semi-autonomous agency of MARA. The INRA Director is responsible to the Minister of Agricult. and INRA's annual budget is presented to, and received from, the Ministry of Finance through MARA. As a consequence of this institutional reorganization, original requirements for advisory and coordinating committees have been superceded.

Project administrative responsibilities have been streamlined, with delegation of limited authority from the INRA Director to the Director of the National Aridoculture Center. The GOM makes no differentiation between the Project and the program of work for the Center. The Project has been named "Project Aridoculture" by the GOM, and the establishment of the Center and the research program are part of the project. Major implementation issues, research policy, budget requirements and program review remain under the purview of the INRA Director.

Under a related decentralization policy, MARA has created the DPA's (Agricultural Production Departments) at the provincial level. The Settat DPA Director exercises significant influence over activities. He works closely with the provincial Governor and his Deputy. Over the medium and long term, this Project will have significant local impact, and will create increased demand for a range of services from the provincial government of Settat. In recognition of this, Project administration explicitly includes close cooperation and coordination with the DPA.

Under the original PP, a separate socioeconomic studies component was included, which would provide the baseline socioeconomic data for integration into agronomic applied research planning as well as for subsequent project evaluation. This component has been implemented by Hassan II National Agronomic and Veterinary Institute, Department of Human Sciences. No U.S. technical assistance has been involved in this component to date, although it was recommended in the MIAC pre-project design study.

Under the amended Project, support to INAV would continue for an expansion of socioeconomic data collection and analysis commenced under the first PP, as well as for the design and implementation of the Agriculture Information Resource Center. In the period since the original DAAR project was approved, INAV has reorganized itself along U.S. Land Grant university lines, and now has Directorates for Instruction, Research and Development/Extension. Continued support for the socioeconomic studies and the AIRC will, therefore, be provided to INAV, but will be implemented by the staff of the Development/Extension Directorate, some of whom may also concomitantly be staff of the Department of Human Sciences, and by contract, researchers workings for INAV. It is anticipated that support for this component will continue throughout the entire LOP. The rural sociologist on the U.S TA team will divide his activities between Settat and the DD/E at INAV in Rabat; relative duration in each location is likely to change over the

expanded LOP (see Annex 10).

2.a. Technical Assistance Contractor: The technical assistance team will function in two capacities: advisory and operational. This role is necessitated by the nascent stage of INRA institutional development. INRA will collaborate with the project technical assistance team in order to accomplish a number of important institutional changes and complete the selection of urgently needed technological developments required to boost production in the semi-arid areas encompassing the project zone. The TA team members will serve under the leadership of the U.S. TA Team Leader. The team leader is responsible for project work plan development and actual implementation schedule as agreed by INRA, the contractor and USAID. Departures from the approved work plan will require written concurrence by INRA, the contractor, and USAID. Statements of work for the additional TA team positions are provided in Annex 7.

b. Management Responsibilities: Responsibility for project implementation will lie with the Government of Morocco institutions involved, under the direction of the Minister of Agriculture. The U.S. TA team together with U.S. backstop personnel at the home U.S. institutions, will also have operational responsibility for administration of the project long and short-term participant training, invitational travel of Moroccan project personnel, and procurement of commodities. These will be carried out expeditiously and in accordance with AID policy unless specifically waived on a case-by-case basis, in writing, by AID.

AID responsibilities are to monitor, manage, and evaluate AID-financed project inputs in a manner congruent with AID policy and agricultural development objectives. The USAID Project Officer will be responsible for monitoring overall implementation progress related to project purpose and objectives, and the means of achievement defined in the Project Authorization and conditions specified in the Bilateral Grant Agreement. The Project Officer will be responsible for clarifying AID policy, advising the U.S. contract TA team and the GOM implementing agencies, and coordinating project development with other appropriate USAID officials during negotiations of the terms and conditions of this amendment with the GOM and during the TA contract amendment.

3. Grantee Contribution:

The GOM will contribute staff, land, research facilities, equipment, equipment operating costs and logistics, equaling approximately 31 percent of the total project cost.

4. Statutory Checklist: All statutory criteria have been met (see Annex 11).

5. Recommendations: That the Dryland Agriculture Applied Research Project 608-0136 Amendment No. 3 be approved and an additional grant to the Government of Morocco in the amount of \$21,823,400 be authorized. Of this total, \$17,230,170 will finance the dollar costs, the remaining \$4,673,700 will finance part of local currency costs. The \$21,823,400 provided in this amendment will be in addition to the original AID authorization of \$4.5 million, which was composed of \$3,409,600 in foreign exchange and \$1,009,400 in local currency costs. It is further recommended that the Project Assistance Completion Date (PACD), be extended to 6/30/88.

II. PROJECT RATIONALE AND DESCRIPTION

A. Background: In 1978, the USAID signed a grant agreement with the Government of Morocco for the implementation of an applied agricultural research program in the semi-arid regions of Morocco. AID project funding totaling \$4.5 million provided inputs to strengthen applied research in agronomy, varietal selection, farm mechanization, agricultural economics and rural sociology. The project provided support for professional development and training of Moroccan research personnel. The applied research focused on technology development to increase farm production of major cereals (wheat and barley), edible legumes and grain/forages in regions receiving less than 450 mm of average annual rainfall. This region is responsible for an estimated 70% of national barley production and 45% of all wheat production. Increased forage production is a critical variable for increasing cereal production due to the role weeds currently play in animal nutrition and it is also a major research problem for the semi-arid region of Morocco. The bilateral grant stipulates that U.S. technical assistance and other inputs will be utilized to develop improved technologies and cultural practices which will be socially acceptable, economically feasible, and financially profitable for adoption by small and medium-scale farmers within this semi-arid region, and to assist in building the institutional base required to maintain a dynamic applied research program. This applied agronomic research would be closely integrated with the socioeconomic research program.

The implementing agency for the GOM is the Ministry of Agriculture and Agrarian Reform (MARA). Actual implementation is carried out by two semi-autonomous institutes under the supervision of MARA, the agronomic research with the National Agronomic Research Institute (INRA) and the socioeconomic research by the Hassan II National Agronomic and Veterinary Institute (INAV).

Implementation of the socioeconomic studies component of the Project by INAV/DHS began substantially before implementation of the agronomic applied research component. Funding for the socioeconomic component initially came from a prior project (608-0134). The socioeconomic research component was implemented in two phases. In Phase I, a substantial number of Third Cycle M.S. theses were prepared, covering a variety of topics which were identified as providing requisite background information for the subsequent project-specific studies carried out in the next phase. Topics included soil classification, food consumption, wages and employment, evolution of farm size, and the impact of mechanization.

In addition, a number of INAV student stages, during which students gathered data about farm level agricultural variables in the field, were partially funded under this first phase. The resultant stage reports cover a variety of topics, including the evolution of cooperatives in the agrarian reform sector, labor costs by farm type, contributions of various sub-regions to the regional herd, etc.

Under Phase II, work began on a survey of 1079 farm households in the project area, providing the basis for sample selection of a smaller number of farms of various types which would be the object of a long-term, cross-sectional study of farming systems in the area. The final 51-farm sample then provided the basis for a study carried out over one and one-half years, exploring a number of dimensions of the farming system. Farms included in the sample were representative of 19 farm types drawn from 8 groups. A concomitant study of price fluctuations for key commodities was carried out at six souks (markets) in the project area. Data from these two long term studies have partially been analyzed, and several reports have been submitted to USAID. Analysis of the remaining data is on-going.

Lessons learned include: a) that smaller, subsistence farmers engage in significant amounts of off-farm employment, as do other members of their families; b) there is still a very significant amount of sharecropping in the project area, and proprietors are unlikely to contribute toward costs of inputs on sharecropped land while, at the same time, they often dictate what crops are to be grown; c) women make a significant contribution as family and wage laborers to agricultural production, as do children of school age; d) young men (and some young women) tend consistently to out migrate; 3) most smaller farmers exhaust their cereal stocks relatively soon after harvest and then buy grain and/or flour for home consumption; f) grain legumes are almost exclusively a cash crop, as is bread wheat; g) project area farmers are very much against the GOM policy of land reconcentration; h) credit is a significant constraint to improved productivity; i) smaller farmers virtually never benefit from government target prices for cereals. (See Beneficiary Analysis Annex 8.)

Original USAID plans called for project implementation to begin in FY 1979. The implementation plan required that a U.S. scientific team be fielded to begin development of a multidisciplinary applied research program and that a cadre of Moroccan personnel be simultaneously enrolled in advanced-degree programs in the U.S. during the initial year of the project. This time phasing was critical to enable the achievement of the project objectives within the project time frame. Implementation was disrupted by slow performance of all parties. The U.S. technical assistance contractor initially failed to field an appropriately qualified team of French-speaking scientists and the GOM construction of facilities at the central research station has experienced extremely slow progress, only now nearing partial completion. The selection of Moroccan personnel to be enrolled in advanced-degree programs was seriously delayed by the institutional reorganization of MARA. During the first two years of field work (1981-83) climatic conditions resulted in limited data from the research experiments established.

After implementing delays spanning three years, Project activities are accelerating. The failure of the Contractor and INRA to implement activities on schedule, compounded by an under-designed, overly-ambitious and under-funded project plus the impact of inflation, has caused the erosion of grant resources available for implementation. As originally designed, the Project has little chance of meeting its goal of increasing farm productivity and production of major cereals in the semi-arid region of Morocco.

It is the judgement of the USAID--and that of a special evaluation team--that the administrative causes of implementation delay have been ameliorated and the Project is now proceeding with reasonable dispatch. The technological and institutional objectives, as well as the methods of objective achievement, as structured in the original Project Paper, remain valid. Therefore, the purpose of this amendment is to realign the project activities with a new implementation schedule and to provide additional financial and technical resources to enable full implementation of activities envisioned in the original Project Paper.

B. The Agronomic Research Program and Current Activity Status:

The Dryland Agriculture Applied Research Project provided for the implementation of a multidisciplinary field research program in agronomy, soil science, crop variety selection and farm mechanization, with an explicit focus on building linkages between GOM agricultural research and extension personnel, with emphasis on field trials and on-farm demonstrations. A significant amount of advanced-degree training was included. The design strategy was to field a U.S. technical assistance team of two agronomists and one soils scientist to design and implement a program of field research specifically for resolution of agronomic constraints to increased production and productivity in semi-arid areas. A cadre of 23 GOM personnel were to be enrolled in U.S. university advanced-degree programs. This cadre of professionals would return to overlap with the U.S. TA team

for the remaining years of LOP and would form the critical mass required to carry on the research program designed and initiated by the U.S. scientists in collaboration with designated INRA scientists. PP amendment No. 1 increased the long term participant training from 10 MSc and 13 Ph.D's up to 10 MSc and 15 Ph.D's.

The major constraints to increased on-farm productivity and production in the semi-arid zone have been identified as follows:

- a. Limited annual rainfall, i.e. 250-450 mm, compounded by erratic spatial and temporal distribution, and production practices which waste significant amounts of available soil moisture;
- b. Shallow soils underlain by calcareous material with a low soil moisture holding capacity correlated with highly variable soil depth;
- c. Low soil fertility, especially nitrogen availability and phosphorous deficiencies;
- d. Unsuitable tillage implements which lead to poor seedbed preparation and loss of soil moisture.
- e. Inadequate drills for proper seeding, fertilizer application and weed control equipment, along with improper operation and calibration of equipment resulting in non-uniform planting depth, uneven crop population densities, and excessive early weed competition;
- f. Delays in the development and release of improved varieties well adapted to drought stress and resistant to insect and disease problems found in the Project region;
- g. Inefficient harvesting and threshing practices which reduce quality of grain and cause excessive harvest losses;
- h. Inadequate crop rotation management due to limited land availability, restrictive land tenure system, lack of seed and testing of adapted forage crops for use in rotations for livestock feed;
- i. Poor livestock management due to untimely availability of feed, low quality of available feed, and livestock populations that generate excessive per hectare grazing and gleaning demands;
- j. Inadequate agricultural infrastructure for physical and services support, e.g. appropriate quality and quantity and timely availability of seed, fertilizer, herbicide and pesticide, excessive farm to market distances, inadequate transportation and lack of sufficient operating credit;
- k. Lack of appropriate production technologies for the region and viable systems to extend information on improved inputs to local farmers with poor resource management capability.

Some of these constraints are susceptible to relaxation over time through validated research, and extension. Constraints such as rainfall patterns and shallow soils are not susceptible to intervention; however, crops and production systems can be adapted to the soil-climate complex. The economic and cultural environment is complex, but must be understood in relation to its impact on eventual adoption of improved technology. The major objective of the establishment of a national aridoculture applied research program and institutional capacity is the continuing generation of applied research and/or development of practical improved techniques judged to be profitable to the farmer and adopted over time through subsequent extension efforts.

Problems of low production and productivity in the region have not been solved since the original 1978 DAAR Project design. The strategy presented in the original Project Paper for problem resolution and achievement of project objectives is still valid, although some alterations in approach and level of effort are recommended.

Currently, the U.S. technical assistance field team consists of an agronomist, a soils scientist, and a water management specialist. In FY 1982, additional locally-hired services of a U.S. variety selection specialist and an agricultural equipment specialist were contracted for by the USAID under PSC's. These are presently additions to the MIAC team. They are assisted by two INRA agronomists and a technician, as well as the INRA station directors and support staff of cooperating research stations. Administrative support is received from the Settat Regional Station Director, also currently serving as Director of the National Aridoculture Center, and the INRA Director in Rabat.

The agronomic research program has concluded two years of field research. Field research operations are limited by rainfall and temperature to the period November through mid-June in most years. During this "rainy" season, the precipitation may be neither timely, regular nor consistent.

During the two years of field experimental work, the U.S. TA team focused primarily on plant/nutrient relationships, establishing alternative crop rotations, levels of seedbed preparation and on-farm research trials of traditional vs. improved practices. Typically, for semi-arid zone research, the rains were late and not temporally evenly distributed, which impeded normal plant growth and development. This resulted in extremely low yields and data which were neither susceptible to analysis nor useful to evaluate yield potentials because of excessive error overwhelming the intervention being studied.

Research experiments were located on three different stations with considerable geographic spread in relation to the central Settat Region. On-farm research trials were conducted on farmers' fields distributed throughout the region. Although limited data were collected, the team gained valuable experience on machinery calibration and operations, planting methods and crop culture, and a better general understanding of the constraints involved in working in the region. There were also some useful leads on the value of specific practices

tested. Additionally, the field experience has pointed to certain operational bottlenecks, such as insufficient transportation, shortages of appropriate field equipment and the need for a wider diversity of U.S. scientific expertise to enable the conceptual approach of multidisciplinary problem identification and analysis to be successful. The TA team responsibilities in the area of institution building have shown the need to upgrade capacity in an array of functions requiring more than a commitment to academic training.

Prior to this amendment, twenty-five Moroccan participants were scheduled to go to the U.S. for graduate work. Three departed in 1980, two additional in 1982, and the rest were placed in language training for departure in 1983. Three of those have since been rejected by MIAC and will need to be replaced. Upon the participants return, they will conduct their research for the thesis/dissertation under the guidance of the appropriate U.S. field team member and an advisor from the faculty of INAV and/or from the faculty of the U.S. university. Degrees will be awarded by INAV whenever appropriate, or else by the U.S. university. The previously authorized participants included 15 at the Ph.D level and 10 at the MS level.

C. Current Socioeconomic Activities:

The Ministry of Agriculture, in keeping with standard practice, utilized its semi-autonomous relationships with INAV/DHS to implement the socioeconomic studies under the Project. Although U.S. TA was contemplated in the original Project Paper, none was initially provided, partially due to the perceived competence of INAV/DHS to conduct agriculture-related social/science research. Once the funds were made available to INAV/DHS the program of work was initiated. The grant agreement stipulates the geographic location(s) and type(s) of research conducted will be selected and developed on the basis of compatibility with work conducted under the agronomic research program of INRA to maximize the utility of the information flowing from research.

An objective of the socioeconomic research program was to develop a more detailed understanding of the technical and economic factors which affect decision-making by farmers under varying perceptions of risk, and the key aspects of the social environment in which these decisions are made. Risk assessment is considered a crucial factor in the farmers' decisions to adopt new/improved cultural practices and techniques under semi-arid conditions. This work is being undertaken in an attempt to ensure that the innovations and subsequent recommendations flowing from the agronomic research will be compatible with existing farming systems and non-technical constraints facing the small-scale producer.

A second objective of the program is to increase the capability of INAV/DHS to apply more rigorous quantitative analytical methods to the process of data collection analysis. Further, this project seeks to strengthen the working relationships between social scientists (INAV/DHS) and those in the biological, agronomic and engineering sciences (INRA) to further encourage multidisciplinary problem identification, research design, and quantification of production coefficients and constraints. In this way the project seeks to introduce and institutionalize an improved scientific research method within the institutes.

It is anticipated that research results will be produced which more nearly reflect on-farm conditions to assist other scientists, government officials and extension workers in the selection of appropriate technologies for small-scale producers under semi-arid conditions.

Under the 51-Farm Study, cross-sectional quantitative and qualitative data collected for all farm types include:

- Household composition (e.g. size, labor available, consumption units);
- Land per farm enterprise (including type of tenancy);
- Allocation of labor and mechanization to crop production activities (land preparation, plowing seeding, fertilizing, weeding, harvesting, threshing, storage/handling, transporting and marketing--by person and machine hours per farm/hectare/crop);
- Household labor used in these tasks, less household labor supplied in off-farm wage activities, plus labor hired (including cost estimates and method of payments);
- Allocation of labor to livestock production activities by type of animal (vaccinating, herding, dipping, stall-feeding, fodder gathering/preparation, breeding, milking marketing);
- Physical inputs (seed, pesticide, fertilizer) by crop, hectare, farm;
- Physical inputs by livestock enterprise;
- Estimated whole farm production by enterprise;
- Utilization of farm enterprise production (household consumption, exchange or sale) with market prices reported as applicable.

These data are being analyzed manually and using computer facilities available at INAV. Parts of this analysis have been completed and provided to the USAID. They will provide basic data for research planning under this project and for the production/extension component of project 608-0170. This will help establish the basis for the two projects to form a farming systems research and extension/production model utilizing this general socioeconomic study area for a pilot demonstration program.

The market price study for six representative regional farmer markets focused on the generation of data on prices asked/received for all crops and animals marketed in the region. Data on animal by-products: cheese, milk, eggs, etc., were not collected. Data included prices paid for 12 key consumption staples (e.g. sugar, flour, tea, etc.) giving price ranges. A major purpose of

this data collection activity was to observe the behavior or market prices paid for cereal grains (bread and durum wheat and barley) over the course of several agricultural years to deduce the farm-gate price received and the relationship of official procurement target prices to actual farm-gate prices. The research hypothesis is that the gap is large, and that the farm-gate prices actually received are sufficiently lower than the "official" price that producers do not have adequate economic incentive to increase cereal production or adopt new production technologies with higher production costs. Analysis of study indicate that this is, in fact, the case.

In summary, the program of work implemented by INAV/DHS includes three activities: (1) conduct of field research for purposes of MS thesis, or field study papers in topical areas related to the objectives of the project; (2) the conduct of a 51 Farm Study to enable the systematic development of a socio-economic profile of representative farms in the project target area; and (3) conduct a market price study. The analysis of the large volume of data collected is progressing.

The research activities (51-Farm Study and Market Price Study) were started in November, 1981, thus the data collected reflect the abnormality and subsequent production/market distortions resulting from the devastating drought of the prior agriculture year (November 1980-81). This has been followed by two more years of similar drought. Data collection methodologies have been refined with special assistance from the USAID because there is an apparent disparity between disciplinary training and requisite analytical skills in the INAV/DHS farm management program.

The current methods of analysis utilized within the DHS attempt to infer, from massive data sets, generalizations within an ideological framework of political economy. This rather inductive approach to the treatment of research hypothesis lacks the quantitative rigor of econometrics and statistical analysis applied to economic data among U.S. researchers. The currently employed scientific method also lacks the rigor of problem specification before data variables to be collected are specified. As a result, a number of variables relevant to farm budget analysis (costs of production) and quantitative risk assessment have been omitted from the data collection activities. There also appears to be an imbalance between the disciplinary specializations (rural sociology) of the researchers at INAV and the type of analysis (agricultural economics) which is contemplated/underway. Although the research program clearly has scope for both studies in rural sociology and agricultural economics, little--if any--problem specification in the former discipline has been elaborated. Consequently, the data being collected are suitable primarily for economic analysis; however, data omissions are present for optimal use of this type of analytical work. This will need correction in follow-up work.

The market price study of six representative regional farmer markets was well organized and is producing useful analyses. However, price data were being collected on a quarterly basis. It would be preferable to increase data frequency for reliability and to smooth out possible distortions from too few data points with a volatile market environment caused by the droughts that have effected production. Information was not recorded on the size/type of market; types of merchants and the marketing role each plays; price ranges paid by merchant type; input availability, market price by type and volume of sales; prices paid for animal by-products, etc. These factors need correction in the future.

The thesis research in general was well structured and produced valid and useful information. However, there are many social and institutional questions which remain. These could provide the basis for additional thesis work.

Given the importance of the socioeconomic work in terms of making a significant contribution to the potential success of the overall project, USAID now believes that INAV/DD/E would benefit greatly from carefully structured U.S. technical assistance. This type of assistance was contemplated in the original pre-PP design study, but was not included in the original PP.

D. Detailed Project Description--The Amendment Activities

1. Project Purposes:

The two project purposes remain the same as presented in the original PP. They are, 1) to establish an applied agronomic research program which will a) adapt existing technology to local conditions in order to increase the productivity of the dryland farmers; b) train adequate Moroccan staff to operate the program and transmit the results to farmers; and c) develop a program whereby suitable farming equipment can be made accessible to small farmers; and 2) to establish a socioeconomic research program which will give a better understanding of the behavior of the dryland farmers and thus provide a basis for effective extension programs.

2. Project Outputs:

Anticipated project outputs have changed slightly since the original PP design. Anticipated outputs are as follows:

1. Adapted physical technologies and cultural practices appropriate to Moroccan conditions that will increase productivity and profitability of dryland farming;

2. Adapted farming equipment suitable for small and medium-scale farmers and an appropriate sequence of use developed for maximum benefit;

3. Socioeconomic data collected and analyzed allowing a better understanding of the socio-cultural and economic environment in which dryland farmers operate, yielding baseline information needed for establishing farming systems research/extension programs and for project evaluation, and for development of economically feasible and socially appropriate technologies;

4. A functioning Agricultural Information Resource Center which serves as a repository for agronomic and socioeconomic data, and which provides timely information to project staff, GOM personnel in the DPAs and CTs in the project area, and to farmers;

5. Staff development and management systems for the implementation and monitoring of an effective applied research program for semi-arid areas;

6. Staff development and research design systems for the implementation and monitoring of an effective socioeconomic applied research program;

7. A functioning National Aridoculture Center with a research reference library and research laboratories, plus staff housing, conference and recreation facilities that serves the needs of farmers in semi-arid zones.

8. Functioning satellite research stations for the National Aridoculture Center.

9. A cadre of professional biological and social scientists working to address the national research needs for the semi-arid areas of Morocco supported by appropriate technical and support staff, and with a requisite operating budget.

3. Project Inputs:

The inputs required to achieve these outputs include long term U.S. technical assistance; Peace Corps Volunteers; short-term technical assistance; GOM staff; in-country, third-country and U.S. training; commodities; land; physical facilities and their construction; operating expenses; and other financial resources necessary for miscellaneous expenses and inflation. The amended project will be jointly funded by AID and the GOM. AID will finance all foreign exchange costs and a portion of the local currency costs. The GOM will finance approximately 31% of total overall project inputs, primarily in the form of INRA staff expenses, operating expenses, and facility construction and maintenance expenses. Input costs are presented in Section III and further detailed in the Estimated Expenditure Budget, Annex 2, and the Logical Framework, Annex 3.

4. The Agronomic Research Program:

The primary scope of work for technical assistance remains as originally proposed. This amendment recommends additional technical assistance and related costs to enable a more complete treatment of the identified constraints to increased agricultural production and improved productivity in the semi-arid zone. The Project implementation difficulties experienced to date have demonstrated the need for a broadening of U.S technical assistance in order to provide the variety of scientific disciplines required to initiate a multidisciplinary approach to problem identification and resolution. Without the interaction provided by breadth of scientific perspectives, it is anticipated that field experiments will be too narrowly focused to generate acceptable results. It is easy to see from the list of production constraints identified that they form a relatively complex farming system in the semi-arid zone. It is therefore proposed that seven persons be added to the resident scientific team: (1) a forage agronomist; (2) a senior plant breeder/advisor; (3) a farm machinery/tillage specialist; (4) a pest management/crop loss appraisal specialist; (5) a rural sociologist; (6) an additional soil/water systems specialist; and (7) a production economist. These persons, in addition to the cereals agronomist, water management specialist, soils scientist, variety selection specialist and equipment maintenance engineer will form the core contractor field team. These will be supplemented by five Peace Corps positions. Draft statements of work for these specialists and Peace Corps Volunteers are included in Annex 7.

The reorganization of MARA, with the creation of INRA has provided the opportunity for the INRA Director to examine the research system and its operational efficiencies and accomplishments. As a part of this effort, INRA has requested additional technical assistance to organize, evaluate and synthesize voluminous amounts of past semi-arid zone research results in unutilized files. Often, Moroccan research programs have failed to generate results applicable to practical problems. It will be of great benefit to INRA and the progress of the project research to ascertain what has been learned from previous GOM-sponsored research. Therefore, the inclusion of 12 person months of short-term TA and limited amounts of statistical computing equipment are recommended at the Aridoculture Center for the analysis of these data.

Experience gained by the U.S TA team during the first years of field work and construction of the Aridoculture Center facilities near Settat have highlighted major oversights in the original design of the Project. These oversights include lack of adequate technical assistance for machinery maintenance and repair compounded by lack of repair and maintenance shop facilities, spare parts and skilled mechanics. These are coupled with unskilled machinery operators who cause frequent mechanical breakdowns. Since the project is purchasing a considerable amount of farm machinery and vehicles and supervising various construction and renovation activities as critical inputs supporting the technical program of work, it is recommended that the U.S. equipment maintenance specialist position added through previous project amendment be continued throughout the LOP.

The purpose of this continuing technical assistance will be to assist INRA to develop the institutional capacity to plan and manage a system of machinery and equipment inventory, control, repair, maintenance and modification of equipment and facilities focusing on the cooperating project research stations. The specialist will be located in Settat and will be responsible for all Project equipment/vehicles on the various research stations. The specialist will be assisted by 4 Peace Corps Volunteer mechanics, one being located at each research station. Limited commodity procurement will be required to support this activity in the form of shop equipment and tools, operating expenses, and two vehicles. There will be a large local practical skills training component associated with this element of institution building. This program is discussed and elaborated in Section IV

Improved interdisciplinary research planning and information exchange will be developed through a series of annual Project Seminars providing formal collegial review of research results, for planning future programs and to establish interdisciplinary implementation teams under a research network design that can bridge GOM organizational constraints and act as a mechanism for including programs of other AID and donor projects. The original Project Paper embraced the concept of a multidisciplinary approach to problem-solving in agricultural research and development programs as a major operational premise. The concept remains valid; however, achieving this in practice will require a carefully-planned effort.

Although a multidisciplinary approach to problem solving will be emphasized, complete integration of all research activities under the Project is neither possible nor desirable. The research work underway or planned for implementation involves at least ten scientific disciplinary specialists working in the project area consisting of seven provinces. However, a skillfully-developed annual reporting and research network planning system can avoid perceptual and conceptual error in research design, implementation and evaluation. It also will permit use of the resources of various agencies and donor programs without requiring organizational change and will minimize administrative resistance to collaboration. This process should be developed with short-term TA assistance experienced in this type of network planning and management. This process should result in professional association and peer review in a way to develop professional pride and satisfaction that will lead to high-quality performance on a long-term basis. One desired outcome might be the development of one or more national professional societies or organizations to maintain this type of momentum.

The recent special evaluation of this project concluded that to date, insufficient use had been made of AID centrally-funded projects which have a bearing on dryland agriculture. Therefore, under the amendment, it is proposed to create a reference center at the Aridoculture Center which would include, among other documents, the large variety of AID-sponsored documentation which flows from these centrally-funded projects, and which is available from S & T/DIU, as well as from individual university contractors/cooperating institutions.

5. The Socioeconomic Program:

The recently completed special evaluation concluded that at present the major research activities have progressed well. Surveys and sampling methods have been appropriately employed to allow data collection to begin. Data have been collected on specific variables in a consistent manner on 51 farms and at six farmer markets. These data are in the process of analysis, with some reports completed and others pending. Analytical models and methods are currently the subject of INAV/DD/E debate. The institutional linkage between INAV and INRA has not been sufficiently well integrated at the working level, and remained until very recently as a collegial relationship between the two project component directors. Consequently, without additional intervention by USAID, the objectives of the sociological and agricultural economics research are unlikely to be fully realized.

Although the Project clearly advances the concept of integrated multidisciplinary research which attempts to incorporate economic feasibility, financial profitability and social acceptability of proposed technology developments, there is no real mechanism, at present, to achieve these results from the research programs underway. The administrative and functional separation of INAV and INRA project implementation responsibilities, and the lack of capacity in agricultural economics of both Institutes, leaves an inadequate situation. This type of integrated approach complements AID Farming Systems Methodology which should be utilized as the basis for training and TA support as appropriate. The proposed FSR Extension/Services Production Project 608-0170 will complement the efforts of this project to incorporate farming systems concepts within the INRA institution.

As is outlined in Annex 7, the rural sociologist who will be a member of the U.S. contract team will have an important role to play as an advisor to the researchers at the INAV Direction de Developpement. In the first year of the amendment LOP, the rural sociologist will be based primarily in Rabat, to work closely with the socioeconomic researchers there (before the AIRC is operational in Settat), to assist in design and analysis methodology formulation. Together with the contract team's Agricultural Economist, he/she will assist the researchers in prioritizing the research which will be funded under the component, in drawing up work-plans for carrying out the research, and in determining the best mix of students/direct-hire researchers/contract researchers to accomplish each research task.

In the second year, when the AIRC is operational, and when there is a higher level of effort in the agronomic research component which will reflect the presence of the new contract TA team members, the rural sociologist will be located primarily in Settat, and will continue to work closely with the INAV researchers in the field, as well as with the other members of the U.S. contract team, to assure integration of the design and results of the two research components under the project.

To accommodate the current status and program weaknesses, and provide the requisite resources to enable an acceptable level of achievement of the original project objectives for the conduct of socioeconomic research, various changes and additions are proposed under this amendment, as follows:

(1) Extension of Studies in Haute Chaouia. Results obtained from the 51-Farm Study and the Souk Price Study in the Haute Chaouia area have been sufficiently significant that it is recommended that these studies be extended. Unfortunately, funding constraints and delays in the data analysis phase have precluded the continuation of these studies during the 1982-83 agricultural cycle, although some impressionistic data have been collected in the course of analysis. It is recommended that, as of September, 1983, these two studies be continued, under the supervision of full-time and contract researchers at INAV's Development and Extension Directorate (INAV/DD/E).

(2) Development of an Agriculture Information Resource Center. INAV has proposed to the USAID for over a year, the creation of an Agriculture Information Resource Center in Settat. This center would, in the first phase, gather and evaluate micro-climatological data, price data, data on availability and prices of inputs, and other key information of use to extension/production personnel of the GOM in the area, and to farmers. These data would be summarized and released in the form of an agriculture information bulletin on a bi-weekly to bi-monthly basis. During this phase, the bulletin would be made available to the contract team and INRA staff, and to staffs of the DPA and CTs, as well as to personnel under the proposed FSR Extension/Production Project.

Under a second phase, the bulletin would be modified, and, together with radio spots and other extension media, make available to farmers in the project zone, up-to-date information on these topics to assist them in making timely management decisions at key points during the cropping cycle. Funding for the creation and operation of this center would include salaries for 6 contract Moroccan researchers, some commodities, and some travel allowances for interviewers and researchers. These researchers would also supervise the continuation of the 51-Farm and Souk Price Studies in the area.

(3) Further Micro-Level Studies. At present, items 1 and 2 above appear likely to provide sufficient cross-sectional baseline data to meet the immediate needs of the agronomic research team, and also their needs in the medium term if the project is extended to include other socio-ecological areas. If this project is expanded geographically to include a much different zone--i.e., the favorable rainfed region--then further baseline data of this kind will be needed.

(4) Thesis Research and Special Studies. For both the purposes of institution building and provision of appropriate sub-regional level data for agronomic research priority formulation--as well as for baseline data for Project 0170 extension/production activities--it is desirable to continue to fund some M.S. thesis research and thesis preparation, as well as particular special studies. Care, however, should be taken to ensure that timeliness requirements for research planning and extension design purposes are respected in allocating topics between thesis research and special studies which will be carried out by senior researchers. There remain a variety of social and institutional questions which

need to be answered about small and medium farmers and farm communities in the project area, both for the planning of agronomic research and as background to the proposed extension/production activities under Project 0170. It is anticipated that further topics will emerge as these two processes continue to develop over the life of this project. To date, an illustrative list of topics includes:

- The farm household decision-making process and the role of various household members in it (e.g., production, consumption, savings, and investment decisions);
- The woman's role in farm production and other income generating activities, as well as in household decision-making;
- Informal/formal credit systems as related to production and investment credit (e.g., sources, rates of interest by source, access to various sources, consumer preferences, transaction costs, rates of repayment by source);
- Input distribution/utilization and access channels (e.g., by farm type, and by land tenure situation);
- Changes in food consumption patterns and composition of farm family diets by size of farm and income group (this would amplify the results of a study already completed);
- Farmer interaction with the formal extension service and other means of exposure to innovative information, i.e., whom do small-scale farmers emulate, and under what conditions;
- Impact of formal education on farm family size, farm production decisions by farm size, land tenure arrangements;
- The role of local/regional "notables" as a conduit/constraint to information dissemination, land brokerage, credit brokerage and access to means of production.
- Time/labor allocation study for crop production (family and hired labor).

Given the importance of the socioeconomic work in terms of making a significant impact on the potential success on the overall project, and of its linkage to activities under Project 0170, it is recommended that INAV/DHS and/or Direction de Developpement would benefit greatly from carefully-structured U.S. technical assistance under this project. The role of the proposed U.S. rural sociologist would include provision of such assistance to INAV - II 2 , as well as activities in the field at the project site.

(5) Student Stages. The stage system is an integral part of the training of all students at INAV, and is now run by a separate Stage Department. These stages provide a wealth of data on the basis of which it is possible to design special studies to be carried out later by more advanced students, contract researchers, and INAV faculty. The main constraint to date has been the lack of financial resources at INAV to carry out sufficient and timely analysis of these data. It is recommended, therefore, that under the expansion of the socio-economic studies component of this project, funding be provided for non-salary costs of stages for one year in a mutually agreed-upon area of the project zone, and for subsequent data analysis to be carried out by contract researchers.

(6) In the past there has been insufficient coordination between the research carried out under the socioeconomic and agronomic project components. Although the situation has improved significantly in recent months, a further effort will be required to ensure that the findings of socioeconomic research are taken into account in the formulation of the agronomic research plan, and vice versa. In order to ensure that this is probable, funds should be provided for adequate seminars and networking. It is proposed that these activities take place each year after the harvest, when yields have been assessed and at other appropriate times during the agricultural cycle when there are particularly significant results arising from either project component's research efforts.

It is recommended that a U.S. rural sociologist be appointed to the Project to assist the INAV/DD/E project director in the development of the conceptual framework for analysis of the data, development of the analytical models to be employed, and in the conduct of these analyses. The sociologist will be responsible for encouraging the liaison between the contract field team located in Settat and INAV. Through this liaison the critical link to the agronomic program of work will be formed. The specialist, together with the members of the INRA Contractor agronomic team will identify the key questions and base-line data relevant to agronomic research needs and of cultural/social acceptability of proposed technology developments. The Haute Chaouia data will be utilized to provide critical insights needed as an input in this process. U.S. technical assistance in agricultural economics will be jointly used with the rural sociologist for this purpose.

It is proposed that one U.S. agricultural economist be assigned to the Project field team in Settat. The economist will be responsible for collaboration with the other Project scientists in the design of appropriate studies in agricultural economics which contribute directly to the economic feasibility and financial profitability of proposed technology developments. This work will include appropriately structured studies in agricultural marketing, risk perception, costs of production, labor allocation and cost/return of proposed

technology adoption under alternative climatic and/or market conditions. To assist the economist in this program of work, 18 months of short-term technical assistance is proposed.

6. The Training Program: Training is a critical element under this Project. Through a wide variety of training experiences, a Moroccan cadre of motivated individuals with proper skills will emerge to provide the institutional base required to maintain a quality applied research program beyond the term of U.S. participation. The training program has been designed in recognition of the wide range of developmental requirements of INRA as a newly-formed national research institute.

a) Long-Term Training: U.S. academic education to prepare 15 individuals for the MS degree and 17 individuals for the Ph. D degree is projected. The long-term U.S. academic program of training has already begun with most of the 32 participant trainees either in the U.S. or in language training prior to departure. The following Table represents the proposed areas of study and the numbers of persons to be trained to a specific degree level in the U.S., including additions under the amendment.

Long Term Training Summary

The following breakdown clarifies the emphasis on strengthening selected agricultural research specializations in order to establish a competent INRA cadre to conduct research at the Aridoculture Center based in Settat at the end of the project:

	Amendment PP No. 1		Additional Need		Total Amendment PP No. 3	
	Masters	PhD	Masters	PhD	Masters	PhD
Cereals:	2	2	-	-	2	2
Cereal Breeding:	-	3	-	1	-	4
Edible legumes:	1	1	-	-	1	1
Forages:	1	3	-1	-	-	3
Soil fertility:	2	2	-	-1	2	1
Soil Chemistry:	-	-	-	1	-	1
Soil Management:	1	1	1	1	2	2
Plant Pathology:	1	1	-	1	1	2
Agricultural Economics:	-	1	-	-	-	1
Statistics:	-	-	1	-	1	-
Weed Science:	-	1	1	-1	1	-
Entomology:	2	-	-	-	2	-
Vertebrate Pest Control:	-	-	1	-	1	-
Tillage Equipment Engineering:	-	-	2	-	2	-
Subtotal	10	15	5	2	15	17
TOTAL	25		7		32	

Further detail on the long term participant training component is provided in Annex 6.

b) Short-term training

Short-term training is to provide funding for on-the-job training and specific technical skill upgrading in those areas which will assure adequate management and technical competence within the INRA cadre to encourage effective project implementation. Short-term technical training for 218 INRA staff is authorized. English language training for 76 INRA staff is also authorized. The table below summarizes this program:

	Number of INRA Staff						Total
	FY 78-83	FY 84	FY 85	FY 86	FY 87	FY 88	
<u>English Training</u>							
Long term Participants	26	5	1	--	--	--	32
Short-term Participants	4	9	9	8	8	6	44
U.S. Training	4	4	4	4	4	2	22
3rd Country Training	1	5	5	5	5	5	26
in-country training	20	25	40	45	20	20	170
Total	55	48	59	62	37	33	294

In-country short-term training of INRA personnel will be provided to approximately 170 persons in such skills areas as agronomic research procedures, machinery operation, pesticide handling and storage, machinery repair/maintenance, etc.

U.S. short-term training of INRA personnel will be provided to approximately 22 persons in the areas of soils/cereals/forage laboratory techniques, experimental farm operations, research administration, instrument maintenance and repair, mechanization and grain storage/marketing. These persons will receive a total of approximately 264 months of English language training in order to satisfy AID Handbook 10 Participant language requirements before departing for the U.S.

Funding is provided for third-country training for 26 INRA personnel. In 1984, it is proposed that four persons attend a short-course in India focusing on Animal Trac-tion and Equipment. In 1985, four persons are proposed to attend a short-course in farming systems research and in 1986, four persons are proposed to attend an ICRISAT short-course in small farm tillage systems for water conservation. Fourteen additional people will be programmed for appropriate short-courses at other International Research Centers such as CIMMYT or ICARDA. The contractor and INRA will formulate more detailed short-term training programs annually within the context of the joint annual work plan approved by USAID.

E. Relationship to Program Objectives

1. Relation to GOM Objectives

During the past two decades, the GOM has given high priority to the development of irrigated cash crops such as vegetables and citrus for export. Over 50% of total annual agriculture sector investment has been directed at large-scale irrigation over the period 1958-78. While investments in large-scale irrigation continue to average about 50% of planned expenditure in agriculture, the GOM has increasingly focused atten-tion, and increasing investment allocations, to small-scale rainfed agriculture. Despite the current GOM budgetary crisis, attempts are continuing to maintain this shift in empha-sis. Development of agriculture projects which directly contribute to import substitution, rural labor mobilization and increased labor productivity are high priority areas of GOM targeted investment.

The expanding GOM investment in the rainfed subsector is in part attributable to IBRD integrated rural develop-ment projects, as well as AID activities in Dryland Agri-culture Applied Research. The availability of expertise and research capabilities pro-vided in these fields has formed the basis for these new GOM initiatives.

The Dryland Agriculture Project addresses the stated GOM Five Year Plan priorities for the agriculture sector since the Project goal is to increase on-farm productivity and production of major cereals, legumes and forages in the semi-arid rainfed region of Morocco. The cereal grains and pulse legumes form the basis of the rural Moroccan diet, while meat produced from the feed

and fodder crops also provides an important element of farm income. While it is generally recognized that Morocco cannot realistically expect to completely eliminate imports of cereal grains, the GOM is firmly committed to reducing its' reliance on the uncertain and volatile import market.

The Project also supports the GOM institutional reorganization of the MARA. The divestiture of agricultural research line functions from MARA, the creation of INRA as an organization solely responsible for mission-oriented agronomic research, and the establishment of a National Aridoculture Research Program is substantively supported by this Project. An assessment and integration of past agronomic research in semi-arid regions will be made through the Project. This will give INRA the baseline data needed to establish a comprehensive program of applied research resulting by the identification, adaptation and/or development of improved technologies for increasing yields under semi-arid agronomic conditions.

This project is given a key role by the MARA Directorate of Plant Production, which has been responsible for elaborating, with FAO assistance, a National Cereals Plan. In allocating project objectives to other donors, the DPV continues to assume that the AID Dryland Agriculture Research Project will provide the required research results to complement cereal production initiatives under these other projects. Examples are the proposed African Development Bank project for Settat, and the proposed IFAD project for Safi.

2. Relations to AID Objectives

The FY 1984 CDSS Agriculture Sector Strategy has articulated support for two GOM priorities: (1) increased equity by directing activities and resources to small and medium-scale farmers; (2) achievement of a greater degree of food self-sufficiency, especially in cereals (the largest item in the import budget). The equity and cereals objectives argue for concentration in rainfed areas outside the irrigated perimeters.

The extent to which gains can be achieved in cereal production will depend on that availability of improved practices which are technically, financially and culturally acceptable to small-scale farmers. The consensus of Moroccan and ex-patriate technicians is that such technical innovations have been developed elsewhere in the world, but must be tested for suitability and adaptability in Morocco,

The semi-arid region of Morocco comprises slightly less than half the available arable land base and provides a living for approximately one-fifth of the total rural population. The current contribution to national production of these significant land and human resources is estimated at only approximately 30% of potential.

The lack of demonstrated improved production technologies, low productivity of the factors of production in the semi-arid regions, and the subsequent impact on farm income are the concerns to be resolved by this Project. The project seeks to establish an institutional capacity within the GOM to adapt existing technologies to Moroccan agronomic, economic and social conditions. Where no suitable technology exists, the Project will provide the capacity and methods needed to increase both productivity and production of major cereals, legumes and forages.

3. Other Activities in Related Areas:

1. Other Donors: Six other international donor agencies have or propose activities which relate to the AID-financed applied research in the rainfed areas: the World Bank-IBRD; the Federal Republic of Germany; the FAO; the African Development Bank, IFAD and ACSAD.

The IBRD agriculture sector activities in Morocco have been primarily focused on large-scale infrastructure developments and credit operations, emphasizing the irrigated sub-sector. However, beginning in 1975, the Bank entered into its first activity which exclusively addressed the constraints to improving the productivity of rainfed agriculture, the Meknes Agricultural Development Project. The Project involves the GOM redistribution of 30,000 hectares of land, mainly ex-foreign owned farms. The redistribution would benefit 8,500 rural families who in 1975 were landless or marginal land-holders, 85% of whom earned incomes of less than one-third the average national per-capita income. This IBRD project was designed with an integrated rural development approach, providing farmer cooperatives with essential infrastructure, provided for minimal research in crop production focused primarily on higher value crops, such as sugar beet.

The second Bank involvement in the rainfed sub-sector is the Fes-Karia-Tissa project which is also an integrated rural development project focused on a limited geographic area. The primary activities of the project are rural infrastructure improvements and increasing the availability of critical production inputs to approximately 33,000 farmers within the project area, including credit. The project provides limited training for three Moroccan research personnel in the cultivation of medics in wheat rotation.

The Federal Republic of Germany (FRG) is providing limited assistance to the GOM commercial seed multiplication and distribution authority, SONACOS, for the technical improvement of seed cleaning and treatment processes prior to sale to farmers. SONACOS purchases seed from INRA research/experiment stations and private farmers under contract. The FRG through this GTZ technical assistance program is providing long term TA, supporting equipment and operational funding for specific forage research activities with INRA on a national basis.

ACSAD has a cereal variety testing project which has been in operation since 1981. Some of the variety testing is carried out at satellite stations in the 0136 project area, including Sidi-el-Aidi. This project has imported a limited amount of trial machinery --two combines, two seed drills, three head threshers, and a number of vehicles to strengthen INRA research capability. The ACSAD research assistance to INRA also includes funding for micronutrient research on cereal crops. Current ACSAD activities are complimenting the achievement of Project 0136 purposes and objectives.

FAO has recently provided technical assistance to the GOM/MARA to develop a new rainfed agriculture production improvement strategy as a 10-20 year National Cereals Plan (Plan Cerealier). This includes recommendations for increased rainfed agricultural research for increasing national cereal production.

The African Development Bank is currently in the final stages of development, with MARA, of an Integrated Development Project for Settat. IFAD is in the preliminary stages of developing a similar project for Safi province.

III. Cost Estimate and Financial Plan

The broad outlines of the budget analysis as discussed in the original project paper remain essentially unchanged as they apply to the amendment. The primary additions to the project budget are the resident U.S. technical specialists, and Peace Corps Volunteer support. Additional funds are provided for the expansion of the Socioeconomic Research Component. Implementation experience also demonstrated the need for additional funding of certain input items, particularly field research operating costs, lab/field equipment and increased levels of academic and technical skills training.

Since the amendment activities are to be carried out as fully-integrated extension of the Dryland Agricultural Applied Research Project, the additional funds will be fully fungible with the original financing within each category, allowing maximum flexibility during implementation for use of each input to the best purpose. The following budget estimates have been developed to cover the needs of the project extension. It is expected that some adjustment within categories will be necessary as project implementation proceeds. However, line item flexibility among budget categories will be in accordance with AID regulations and specified in sub-obligation documents during implementation.

The AID-financed total life of Project contribution to the Dryland Agriculture Applied Research Project Amendment No. 3 is U.S. \$26,323,400 over the ten year period FY 1978-88. The GOM total life of Project contribution to the Project is approximately \$EQ 11,936,400. Thus, the GOM LOP contribution is estimated at 31%. The total combined AID and GOM Project financing totals \$ 38,259,800.

The following tables summarize the estimated project expenditure by fiscal year and clarify the consolidated project budget:

ESTIMATED PROJECT EXPENDITURE SUMMARY BY FISCAL YEAR
(\$000)

Year	FY 78-83		FY 84		FY 85		FY 86		FY 87		FY 88		subtotal		Total LOP
Funding Source	AID \$	GOM	AID \$	GOM	AID \$	GOM	AID \$	GOM	AID \$	GOM	AID \$	GOM	AID \$	GOM	
Budget Line Item															
U.S. Technical assistance	1740		1891		2019		1973		1967		1684		11,274		11,274
GOM Salaries	--	238	--	300	--	400	--	420	--	510	--	683	--	2551	2,551
Training	665	337	534	239	531	288	383	341	226	329	140	327	2,479	1861	4,340
Commodities	829.2	52	2113	139	212.8	103	173	95	113	27	35	30	3,481	446	3,927
Other	1265.8	169	1212	133	1179	148	1040.1	256	1038.5	282	755	332	6,488.4	1320	7,808.4
Construction	--	1535	--	1430	--	1440	--	--	--	--	--	--	--	4405	4,405
Subtotal A	4500	2331	5755	2241	3941.8	2379	3569.1	1112	3344.5	1148	2614	1372	23,722.4	10583	34,305.4
Inflation	--	--	--	--	433.5	297.4	606.7	228	789.7	327.2	771.1	500.8	2,601	1353.4	3,954.4
Subtotal B	4500	2331	5755	2241	4375.3	2676.4	4175.8	1340	4134.2	1475.2	3385.1	1872.8	26,323.4	11936.4	38,259.8
LOP Total	6,831.0		7,996.0		7,051.7		5,515.8		5,609.4		5,257.9		38,259.8		

SUMMARY FINANCIAL PLAN
CONSOLIDATED BUDGET (\$000)

TABLE III D-3

	AID			GOM			LOP TOTAL		
	TO DATE	AMENDMENT	TOTAL	TO DATE	AMENDMENT No. 3	TOTAL	TO DATE	AMENDMENT No. 3	TOTAL
1. PERSONNEL	1,740.0	9,534.0	11,274.0	238.0	2,313.0	2,551.0	1,978.0	11,847.0	13,825.0
2. TRAINING	1,230.0	1,249.0	2,479.0	337.0	1,524	1,861.0	1,567.0	2,773.0	4,340
3. COMMODITIES	829.2	2,651.8	3,481.0	52	394	446.0	881.2	3,045.8	3,927.0
4. CONSTRUCTION	--	--	--	1,535.0	2,870.0	4,405.0	1,535.0	2,870	4,405.0
5. OTHER	700.8	5,787.0	6,488.4	169	1,151	1,320.0	869.8	6,938.6	7,808.4
SUB TOTAL	4,500	19,222.4	23,722.4	2,331.0	8,252.0	10,583.0	6,831.0	27,474.4	34,305.4
INFLATION	--	2,601.0	2,601.0	--	1,353.4	1,353.4	--	3,954.4	3,954.4
TOTAL	4,500	21,736.4	26,323.4	2,331.0	11,630.4	11,936.4	6,831	31,428.8	38,259.8

Inflation calculated at: (according to State 0.15265, Jan. 83)	1985	1986	1987	1988
Morocco :	8% (1.125)	8% (1.205)	8% (1.285)	8% (1.365)
U.S. :	7% (1.11)	6% (1.17)	6% (1.235)	6% (1.295)

DRYLAND AGRICULTURE APPLIED RESEARCH PROJECT 608-0136

PP AMENDMENT No. 3 - BUDGET SUMMARY

	PP Amendment No. 1		Amendment Shifts		PP Amendment No. 3	
	PM	\$000	PM	\$000	PM	\$000
Technical Assistance						
1. Short term US consultant	40	357	94	1,484.0	134	1,841.0
a. Graduate advisor TDY			42	461.0	42	461.0
b. Technical TDY	40	357	52	1,023	92	1,380.0
2. US Backstop office staff	84	412	231	652	315	1,064.0
a. Coordinator	30	200	54	139	84	339.0
b. Assistant Coordinator	24	129.5	54	139	78	268.5
c. Secretary	30	82.5	54	157	84	239.5
d. Junior Assistance			57	176.0	57	176.0
e. Technical Information spec.			12	41.0	12	41.0
3. Resident US Field Team	195	971	527	7,398.0	722	8,369.0
a. Team Leader	54	215	15	685.0	69	900.0
b. Soil, Water/Fertility	39	215	18	470.0	57	685.0
c. Cereal Variety Spec.	31	163	49	685.0	80	848.0
d. Forage Agronomist	42	215	45	685.0	87	900.0
e. Ag Equipment maintenance	29	163	45	685.0	74	848.0
f. Cereal Agronomist			76	900.0	76	900.0
g. Soil/plant lab spec			24	274.0	24	274.0
h. Senior Cereal Breeder			57	685.0	57	685.0
i. Tillage Equipment research			57	685.0	57	685.0
j. Plant protection			48	548.0	48	548.0
k. Agricultural Economist			45	548.0	45	548.0
l. Rural sociology			48	548.0	48	548.0
Subtotal A	319	1,740	852	9,534.0	1,171	11,274.0
Commodities						
a. Vehicles	20	124.0	14	171.0	34	295.0
b. Households Effects	4 sets	72.0	9 sets	180.0	13 sets	252.0
c. Field Equipment		308.7		460.0		768.7
d. Ag. Extension Material		5		20.0		25.0
e. Socio-Economic		17.2		60.0		77.2
f. Soil laboratory		68.9		35.0		103.9
g. Cereal laboratory		40.9		150.0		190.9
h. Forage laboratory		36.8		150.0		186.8
i. Laboratory chemicals		16.5		20.0		36.5
j. Administration		27.5		183.0		210.5
k. Participant support		25.0		100.0		125.0
l. Meteorological station		2.0		2.0		4.0
m. Machinery development		84.7		150.8		225.5
n. Laboratory modification				50.0		50.0
o. Greenhouse				180.0		180.0
p. Pathology laboratory				250.0		250.0
q. Entomology laboratory				150.0		150.0
r. Weed Science laboratory				50.0		50.0
s. Resource library				300.0		300.0
Subtotal B		829.2		2,651.8		3,481.0

PP Amendment No. 3

	PP Amendment No. 1		Amendment Shifts		PP Amendment No. 3	
	PM	\$000	PM	\$000	PM	\$000
<u>Participant Training</u>						
1. Long Term	1,032	1,048.0	- 154	642.0	878	1,690.0
2. Short-Term	62	182.0	721	607.0	783	789.0
Subtotal C	1,094	1,230.0	567	1,249.0	1,661	2,479.0
Other Costs						
Subtotal D	--	700.8	--	5,787.6	--	6,488.4
Summary:						
Subtotal A	319	1,740	852	9,534	1,171	11,274.0
Subtotal B	--	829.2	--	2,651.8	--	3,481.0
Subtotal C	1,094	1,230.0	567	1,249.0	1,661	2,479.0
Subtotal D	--	700.8	--	5,787.6	--	6,488.4
Subtotal E	1,493	4,500.0	1,419	19,222.4	2,832	23,722.4
Inflation	--	--	--	2,601.0	--	2,601.0
LOP TOTAL	1,413	4,500.0	1,419	21,823.4	2,832	26,323.4

SI = 0.5 IN GOMs = \$/SEQ	FY 78 - FY 83			FY 84			FY 85			FY 86		
	AID \$	AID SEQ	GOM SEQ	AID \$	AID SEQ	GOM SEQ	AID \$	AID SEQ	GOM SEQ	AID \$	AID SEQ	GOM SEQ
Summary												
U.S. TA No.1	1,617	125	-	1,723	168	-	1,839	180	-	1,705	268	-
Training No.2	467	198	557	418	116	239	446	85	288	315	65	341
GOM Salaries	-	-	258	-	-	300	-	-	400	-	-	420
Commodities	617.6	211.4	52	1,517	601	139	135.8	77	103	125	48	95
Construction	-	-	1,535	-	-	1,430	-	-	1,440	-	-	-
Other Costs	788.8	477	169	750	462	133	766	413	148	672	368.1	256
Total	3,490.6	1,009.4	2,551	4,408	1,347	2,241	3,186.8	755	2,379	2,820	749.1	1,112
Inflation	-	-	-	-	-	-	350.5	83	297.4	479.4	127.5	228
LOP Total	3,490.6	1,009.4	2,551	4,408	1,347	2,241	3,537.3	838	2,676.4	3,299.4	876.4	1,340
TOTAL	4,500		2,551	5,756		2,241	4,375.3		2,676.4	4,175.8		1,340
TOTAL	6,851.0			7,996			7,051.4			5,525.8		
SI = 0.5 IN GOMs = \$/SEQ	FY 87			FY 88			TOTAL LOP					
	AID	AID	GOM	AID	AID	GOM	AID	AID	GOM	AID	GOM	
U.S. TA No.1	1,699	268	-	1,440	244	-	10,023	1,251	-	11,274	-	
Training No.2	146	80	529	50	90	327	1,845	634	1,861	2,479	1,861	
GOM Salaries	-	-	510	-	-	683	-	-	2,551	-	2,551	
Commodities	70	43	27	35	-	30	2,500.6	980.4	446	3,481	446	
Construction	-	-	-	-	-	-	-	-	4,405	-	4,405	
Other Costs	738	300.5	282	598	157	332	4,321.8	2,175.6	1,320	6,486.4	1,320	
Total	2,653	691.5	1,148	2,123	491	1,372	18,560.6	5,161.8	10,583	23,722.4	10,583	
Inflation	623.5	166.2	327.2	626.3	144.5	500.8	2,079.7	521.3	1,353.4	2,601	1,353.4	
LOP Total	3,276.5	857.7	1,475.2	2,749.3	635.5	1,872.8	20,640.3	5,683.1	11,936.4	26,323.4	11,936.4	
TOTAL	4,134.2		1,475.2	3,365.1		1,872.8	26,323.4		11,936.4	38,259.8		
TOTAL	5,609.4			5,257.9			38,259.8					

IV. Research-Economic Analysis

A. Economic and Financial Analysis

1. Cost Effectiveness of Research

There is increasing evidence in the literature of agricultural economics that there is a consistently high internal rate of return associated with research projects. Furthermore, current literature in the field indicates that rates of return are generally higher in developing countries than in the developed world. A recent study, "Valuing the Productivity of Agricultural Research"¹ looked at the IRR's associated with 32 different agricultural research and extension projects throughout the world conducted between 1938 and 1975. The study estimated the return from investment in agricultural research, obtained by using index numbers and regression analysis, and found that:

Almost all investigations reported high returns on investment, well above the 10 to 15 percent realized on typical investments. The pattern of high returns extends across different commodities and countries, confirming both their generality and the strength of the methods used in their estimations.

In addition to benefits accruing from research and extension activities, higher rates of return can be expected as a result of human capital formation (participant training, and other specific in-country and third country training) of the project.

While the rates of return on the 32 projects ranged from 11-12% (Colombian Wheat, 1953-72) to 95-110% (Canadian Rapeseed, 1960-75) the aggregate average IRR for research conducted in the United States was approximately 30%; the figure for the less developed world was well over 50%. As a result, the study concluded,

"Agricultural research is like an undervalued stock whose price earnings ratio is low. In nearly every case ... a nation could have earned a rate of return far higher than from almost any other investment."

Since a research project does not generate direct revenue benefits and estimating costs to extend resulting technologies are subjective, the preceding ex post facto evaluations of research projects should more than suffice for this exercise. However, the Mission presents the following analysis to illustrate the anticipated high economic and financial return per representative farm and for the project.

^{1/} Resource Allocation and Productivity in National and International Research, by Arndt, Dalrymde and Ruttan, Editors. University of Minnesota Press, Minneapolis, 1975.

2. Population Expansion and Increased Food Requirements

With its present population, Morocco must import substantial amounts of cereals and other food products. With an annual population growth rate of about 3% and about 50% of its population under the age of 18, continuing rapid growth in population for the next twenty years seems certain. The need for added food will increase accordingly. The population will increase by three million in five years, the proposed duration of the first phase of the applied research project. If this increased food need is not generated by increased production within the country, it will have to be imported and will constitute a considerable burden on foreign exchange earnings.

3. Land Use in the Project Area ^{2/}

About 2 million ha. are cultivated annually in the project area. They represent 36% of the total cropland planted in Morocco. The project area accounts for 36% of the national barley area. 33% each of the durum and bread wheat, and 83% of the maize. Pulses are produced on only 152,000 hectares, or 8% of the cropland cultivated annually in this area, but they represent 29% of the total hectares devoted to pulses in Morocco. They are no doubt grown in the better land areas as well as on irrigated lands.

<u>Crop</u>	<u>Hectares</u>	<u>% of Country Total</u>
Durum Wheat	459,000	32.5
Bread Wheat	164,000	32.7
Barley	707,000	35.8
Maize	380,000	82.6
Pulses	152,000	28.6
Other Crops	94,000	11.5
Total in Cultivation	1,056,000	34.3

4. Crop Yields

The average yield data for the three major crops in the project zone during the 12 year period 1969-81 provide some interesting observations that are significant in terms of future productivity. The relative stability of yields during the 12 years indicate that the combination of fall and winter rains plus the cool weather provide the right environment for maximum production in the fall and early winter and harvested in the spring. Yields of wheat and barley, which dominate the cereal crops in the dryland arable area

^{1/} Provinces: Settat, Khouribga, El Jadida, Safi

dropped sharply during the drought of 72/73 and 80/81. The 1982 harvest, considered a good year, shows a 16% increase in barley yields and a 14% increase in wheat yields.

AVERAGE YIELDS OF CEREAL GRAINS AND PULSES IN PROJECT ZONE

1969-81 and 1982

CROP	1969-74	1976-81	1982
	Q/ha	Q/ha	Q/ha
Wheat, durum	9.96	9.80	10.0
Wheat, bread	9.0	9.65	11.6
Barley	11.0	12.1	14.0
Pulses ¹⁾	6.2	6.0	6.0

4. Development of Farm Budgets

The following analysis is drawn from recent farm budgets prepared by the socio-economic research team in the Haute Chaouia funded by this project. Two sets of budgets are examined. The first is a somewhat larger farm, 26 hectares, in a relatively more productive ecological zone in N.W. Chaouia with 66% of soils being of self-mulching tips. The second is based on a typical small farm in Settât Province. Less agronomic research has been carried out in this region than in higher rainfall zones, and large gains from improved technology lie further down the road. Substantial yield increases due to use of HYV seeds, improved herbicides and fertilizer use are possible. There is also considerable scope for improving forage production to support livestock and to improve the nitrogenous content of soils. It is conceivable that forage systems using cereals-legumes mixtures could replace low yielding maize and weed fallow. See the Annex 12 for assumptions indicated in the farm models of the 26 and 7 ha farm.

Development of a 7 Hectare Farm in Settât Province

The budgets for this farm are illustrated in Table A which follows. Certain simplifying assumptions were made to facilitate the benefit cost analysis. (See Annex Economic & Financial Analysis.)

¹⁾ Broadbeans, chick and green peas, and lentils.

TABLE A

FARM PROFILE

7.1 HA. FARM, Settai Province, Family
 Size: 6.3 People, Soils: BIAD 49% easy to work soils
 HANRI, 21X, 1982

CROP GROWN	<u>REVENUE</u>			YIELDS	TOTAL PRODUCTION	MKT. PRICE DM/QT	REVENUE (1/2 of share-crop)	<u>COSTS OF PRODUCTION</u>		
	AREA OWNED	SHARE CROPPED	TOTAL					PER HA.	TOTAL	SALES-COSTS
Durum Wheat	.44	.02	.46	8 QT	3.68(3.6)	158	569	835	384	185
Bread Wheat	.46	.13	.6	9 QT	5.4 (4.7)	122	573	681	409	164
Barley	2.28	.21	2.49	14 QT	34.9 (33.43)	78	2,607	681	1,696	911
Maize	.37	.03	.4	5 QT	2. (1.92)	98	188	540	216	-28
Straw	—	—	—	1 MT	3.54(3.36)	500/MT	1,680	—	—	1,680
Legumes	.01	—	.01	6 QT	.06	248	15	900	9	6
Forage	.09	—	.09	—	—	—	—	—	—	—
Fallow	2.66	.2	2.85	—	—	—	—	—	—	—
							5,632		2,683	2,918
<u>LIVESTOCK</u>	<u># OF HEAD OWNED</u>	<u>SOLD</u>	<u>SALE</u>	<u>WOOL SALES</u>	<u>MILK SALES</u>	<u>LIVESTOCK REVENUES</u>	<u>FEED</u>	<u>NET REVENUES</u>		
Bovine	2.2	1	4,000	—	960	4,960	800	4,060		
Sheep/Goats	33	10	4,000	300	—	4,300	2,760	1,540		
Donkey	2	—	—	—	—	—	900	-900		
						14,892	4,560	4,700		
										TOTAL FARM INCOME 7,618

Note: This profile includes all labour costs; the analysis is returns to management.

TABLE B:**PROJECTED COSTS & YIELD INCREASES**

**CASH FLOW, 7 HA. FARM, Assumes no change
In Ratio of Land Owners/Land Exploited**

<u>REVENUES</u>	<u>PRESENT</u>	<u>YEAR 2</u>	
Durum Wheat	569	759	
Bread Wheat	573	764	
Barley	2,607	3,476	
Maize	188	188	
Straw	1,680	1,848	
Legumes	15	15	
TOTAL CROP SALES	<u>5,632</u>	<u>7,050</u>	25%
 <u>LIVESTOCK</u>			
Bovine	4,960	4,960	
Sheep/Goats	4,300	4,300	
Total	<u>9,260</u>	<u>9,260</u>	
TOTAL REVENUE	<u>14,892</u>	<u>16,310</u>	
 <u>PRODUCTION COSTS</u>			
Durum Wheat	384	450	
Bread Wheat	407	475	
Barley	1,696	2,024	
Other	225	225	
Total	<u>2,719</u>	<u>3,174</u>	17%
 <u>Livestock</u>			
Bovine	900	900	
Sheep/Goats	2,760	2,760	
Donkey	900	900	
Total Livestock	<u>4,560</u>	<u>4,500</u>	
TOTAL PRODUCTION COSTS	<u>7,274</u>	<u>7,674</u>	
 NET INCOME	 <u>7,618</u>	 <u>8,636</u>	 13%

Financial Picture

The budgeted net return to land and management is 7.6 thousand Dirhams, which is approximately the median family income in Morocco.

A vigorous extension and production program in this region is projected to result in a modest increase in crop yields. Technologies which will be recommended are weed control, improved fertilizer use, improved seed. (See Table B, for change in revenue/costs from year 1 to year 2.) The implementation of improved practices could increase the net income by 13%.

Research on HYV's, fertilizer use and weed control is part of the strategy of this project. With the higher level of production of forages as a result of the change, livestock production, milk and lambs will increase.

The benefit-cost summary is shown in Table 2 in the Annex. Increased costs of .9 thousand dirhams give an increased value of production of 1.2 thousand and a resulting ratio of 1.3:1 with benefits and costs valued at their estimated economic prices. The benefit-cost ratio for the small farm in Serrat Province is somewhat smaller than the larger 26 hectare farm, discussed below. Little of the difference can be attributed to farm size but one major element stands out, i.e., the large farm is more susceptible to combine harvesting of cereals than was the smaller and at about half the rate of hand harvest.

A. Development of the 26.4 hectare Farm

The size of the farm is somewhat larger than the average in the area, Table C follows. Approximately 60% of the area farmed is owner operated and the remaining 40% is sharecropped. The crop mix with current practices reflects the statistical distribution of these crops and fallow in 1981-82 and yields are area-wide for that season. Livestock holdings are representative to those of several operators.

Custom hire of tractor drawn tillage equipment and of combines for cereals harvest, simplifying assumptions, are common in Morocco for farms of this size. The owner-operator and share-cropper have access to credit from the CLCA. Development potential for this farm exists. Cereal yields could be higher still with the use of improved tillage and seeding method. By using a seed drill, rather than broadcasting planting, he could reduce the amount of wheat seed by .25 quintals and barley seed by .6 quintals. The implementation of improved cultural practices as a total to increase yields and reduce costs could increase the net income of the farmer by 18 per cent, see Table D.

TABLE C:

FARM PROFILE

26 HA. FARM; Family Size: 7.5 people
Soils: 66% TIRS (self-mulching; 15% biad); 1982

CROP GROUP	<u>REVENUE</u>							<u>COSTS OF PRODUCTION</u>		
	AREA OWNED	SHARE-CROPPED	TOTAL	YIELDS	TOTAL PRODUCTION	HE/QT	REVENUE (1/2 of share-crop)	PER HA.	TOTAL	NEW-COSTS
Durum Wheat	4.38	2.28	6.66	10 QT	66.6 QT	158 HE/	8,721	922	6,140	2,580
Bread Wheat	1.48	2.32	3.8	12 QT	45.6(31.68)	122	3,865	883	3,355	510
Barley	3.04	1.71	4.75	14 QT	66.5(54.53)	78	4,253	824	3,914	339
Maize	2.7	4.02	6.72	5 QT	33.6(23.5)	98	-2,310	510	3,121	-811
Straw	—	—	—	1 HT	12 HT	DHS500/HT/HA	6,000	—	—	6,000
Legumes/Market	1.	.02	1.02	6 QT	6.12	248 QT	1,488	900	918	530
Forage	.84	.03	.87	—	—	—	—	—	—	—
Fallow/Other	1.07	.41	1.48	—	—	—	—	—	—	—
TOTAL LAND	15.57	10.9	26.47	—	—	—	—	—	—	—
										9,148
<u>LIVESTOCK</u>	<u># OF HEAD</u>	<u>SOLD</u>	<u>REVENUE</u>	<u>WOOL SALES</u>	<u>MILK SALES</u>		<u>TOTAL REV.</u>	<u>FED</u>		<u>TOTAL</u>
Bovine	3	1	4,000	—	1,776		4,776	1,620	1,620	3,156
Sheep/Goats	42	15	6,000	400	—		6,400	3,240	3,240	3,160
Donkey	2	—	—	—	—		—	900	900	-900
							<u>11,176</u>	<u>5,760</u>		<u>5,416</u>
										14,564
							TOTAL			34,066

-41-

41

41

TABLE D:PROJECTED COSTS & YIELD INCREASES

CASH FLOW, 26 HA. FARM; Assumes no Change
In Ratio of Land Owned/Exploited

<u>REVENUES</u>	<u>PRESENT</u>	<u>YEAR 2</u>	
Durum Wheat	8,721	11,628	
Bread Wheat	3,865	5,153	
Barley	4,253	5,671	
Maize	2,310	2,310	
Straw	1,488	1,488	
TOTAL CROP SALES	26,637	32,850	18%
 <u>LIVESTOCK</u>			
Bovine	4,776	4,776	
Sheep/Goats	6,400	6,400	
Total Livestock	11,176	11,176	
TOTAL REVENUES	37,813	<u>44,026</u>	
 <u>PRODUCTION COSTS</u>			
Durum Wheat	6,140	6,500	
Bread Wheat	3,355	4,043	
Barley	3,914	4,849	
Other	4,037	4,039	
Production Costs	17,448	19,431	10%
 <u>Livestock</u>			
Bovine	1,620	1,620	
Sheep/Goats	3,240	3,240	
Donkey	900	900	
Total	<u>5,760</u>	<u>5,760</u>	
TOTAL PRODUCTION COSTS	23,208	<u>25,191</u>	
NET INCOME	<u>14,605</u>	<u>18,835</u>	18%

TABLE E :

BENEFIT COST ANALYSIS

(\$000)

Year	Capital Costs	Annual Costs	Production Costs	Total Costs	Total Crop Benefits	Annual Incremental Benefits
1984	8005	900	3,050	11,955	-	-11,955
1985	5020	900	3,854	12,774	6,873	- 5,901
1986	4575	900	16,849	22,321	29,766	7,445
1987	4443	900	38,543	43,886	68,733	24,847
1988	3967	900	57,814	62,681	103,100	40,419
1989	-	900	57,814	58,714	103,100	44,386
1990	-	900	57,814	58,714	103,100	44,386
1991-2005	-	16,200	57,814/yr.	58,714/yr.	103,100/yr.	44,386/yr.

Internal rate of return=80%

Expected Effects of Improved Technology on
The Project Zone

A.

The early basis of research output is expected to be the result of testing and in some cases modification of technological innovations utilized in other countries or by a select group of farmers in Morocco. The various innovations most likely to flow from research for on-farm testing or general introduction during the next few years are outlined in a technical agronomic report prepared by MIAC and used as the technical analysis for the original project paper and the subsequent project paper amendments.¹

B.

The preceding Benefit/Cost Analysis is based on increased yields of the major cereal crops by 30% and on increasing adoption rate of farmers in the project zone. The adoption rate is calculated as an increase in available hectareage of 2%, 1985, 10%, 20%, 30% in respective successive years utilizing expected improved techniques. The internal rate of return is consistent with the high paying research project results. The high yield increase expected from improved technologies including factoring--the adoption rate over a large area of the project zone shows excellent benefits from agriculture research.

In summary, the economic and farm financial analyses of the project show that the goals of the project are both economically and financially sound. The basic benefit-cost analysis, Table E, shows only direct benefits in terms of net farm profits from the 3 dominant cereal crops. Because of the expected increase in forage production and straw, increase livestock offtake is anticipated. Inclusion of project costs financed by AID and the GOM are taken from the budget tables. Annual costs are calculated as the collaborating agricultural extension getting the results to farmers but not included are actual transference of technology which would include labor costs of farmers searching for, learning about, and experimenting with new techniques generated through research. Production costs and total crop benefits are drawn from the working table in Annex 12, Economic and Financial Analysis.

ECONOMIC ANALYSIS ASSUMPTION

Potential Yield Increases Through Technology Introduction = 30%.

New Varieties of Barley, Durum and Bread Wheat

First Farmer Use	1985
5% of hectares using	1986
10% of hectares using	1987
20% of hectares using	1988
30% of hectares using	1989

Yield increase average of 30%--or 15% national production increase by 1990.

Proper Herbicide Use

Extension Campaign started in	1985
2% usage in	1986
10% usage in	1987
20% usage in	1988
30% usage in	1989

Average yield increase will be 35% (herbicide use alone).

¹ Applied Agronomic Research Program for Dryland Farming in 200-400 mm Rainfall zones of Morocco, MIAC, January, 1977.

ECONOMIC ANALYSIS ASSUMPTION
(Cont.)

Combined Use of Proper Rates of N & P With New Varieties and Weed Control in the Higher Rainfall Areas (Lower Rainfall Will Be 35% of Higher Rainfall)

2% adoption in	1986
10% adoption in	1987
20% adoption in	1988
35% adoption in	1989

Yield increase from total package of new variety, weed control and fertilizer will be at least a doubling of yield on adopting farms. Assume 35% package adoption.

Pulse Crop Improvement

2% adoption	1988
10% adoption	1989
20% adoption	1990

Forages

5% adoption	1990
10% adoption	1992
30% adoption	1995
50% adoption	2000

Improved Tillage

5% adoption	1986
15% adoption	1987
25% adoption	1988
35% adoption	1989
50% adoption	1990

Estimated yield improvement in 450 mm and below zone is 5%, tillage cost reduction is 25%.

Improved Seeding Methods

. adoption	1987
10% adoption	1988
20% adoption	1989
30% adoption	1990
50% adoption	1991

Average yield improvement should be 30%.

V. IMPLEMENTATION PLAN & SCHEDULE

The project activities funded by this Amendment will be implemented as a continuation of the research programs and training activities underway within the Dryland Agriculture Applied Research Project. It is expected that there will be no significant delays, normally associated with project "start-up", if non-competitive procurement for activities under the amendment is approved, since MIAC contract amendment will follow directly from the amendment of the bilateral grant agreement. Details on the Project contracting implementation are provided in Annex 17.

As has been discussed in the section on administration and management responsibilities, the technical assistance team members added by this amendment will be part of the original TA team. The purpose of this amendment is to provide sufficient financial and human resources, as well as additional time, to enable the achievement of project objectives as originally envisioned and approved.

The implementation plan, which is summarized in the schedule below, has been developed to supercede the schedule presented in the original Project Paper and to be compatible with the consolidated budget shown in Section III. Implementation planning for training is handled separately and presented in Annex 5 and 6.

<u>ACTIVITY</u>	<u>ESTIMATED DATE</u>
Project Paper Approved	July 1983
Bilateral Grant Agreement Amendment	July 1983
1983 Fieldwork Begins	October 1983
AID-MIAC Contract Amended	November 1983
Additional Project Vehicles Ordered	November 1983
Additional Field Equipment Ordered	November 1983
Additional Laboratory Equipment Ordered	November 1983
NAC Furnishing Ordered *	December 1983
Statistical Hard/Software Ordered	December 1983
NAC Construction Complete *	December 1983
Contract with INAV/DD/E for additional Socioeconomic Studies approved.	December 1983
Peace Corps Volunteers arrive in-country for language training.	January 1984
Peace Corps Volunteers arrive at INRA research station assignments	March 1984

* National Aridoculture Center, Settat.

<u>ACTIVITY</u>	<u>ESTIMATED DATE</u>
NAC Furnished and Occupied	April 1984
TDY Reference Center Development	May 1984
Reference Center Materials Ordered	May 1984
Agricultural Information Resource Center Initiated	May 1984
TDY Research Assessment	June 1984
Research Seminar to Review '83 Field and Socioeconomic Results	July 1984
Arrival of Additional U.S. TA Field Team--	
- Forage Agronomist	April 1984
- Machinery/Tillage Specialist	April 1984
- Production Economist	June 1984
- Cereal Breeder/Advisor	July 1984
- Soil/Water Specialist	September 1984
- Rural Sociologist	September 1984
- Pest Management/Crop Loss Appraisal Specialist	September 1984
Peace Corps Volunteers	September 1984
51-Farm & Six Souk Studies 1984 begin	September 1984
1984 Fieldwork Begins	October 1984
TDY Research Assessment	January 1985
Research Seminar to Review '83 Field and Socioeconomic Results	July 1985
51-Farm and Six Souk Price Studies 1984 End	August 1985
51-Farm & Six Souk Price Studies 1985 begin	September 1985

<u>ACTIVITY</u>	<u>ESTIMATED DATE</u>
Project Evaluation	Sept., 1985
1985 Fieldwork Begins	October 1985
Peace Corps Volunteers arrive in-country for language training	January 1986
Peace Corps Volunteers arrive at INRA research station assignments to overlap with departing PCV's	March 1986
TDY Reference Center Development	June 1986
Additional Reference Materials Ordered	June 1986
Research Seminar to Review 85 Field Results	July 1986
51-Farm & Six Souk Price Studies 1985 End	August 1986
1986 Fieldwork Begins	October 1986
Research Seminar to Review '86 Field and Socioeconomic Results	July 1987
1987 Fieldwork Begins	October 1987
Project Evaluation	December 1987
Peace Corps Volunteers Complete Service	April 1988
TA Team Complete Contract Assistance	June 1988
Contractor End of Project Report Submitted	June 1988

MONITORING AND EVALUATION PLAN

While this addition to the Project involves no fundamental conceptual departure from that of the original project, it does place significant reliance on the conceptual importance of multidisciplinary problem identification, the effective structure and conduct of applied research and scheduled evaluation of research results. This conceptual modus operandi is the basis for the request for additional U.S. technical assistance, additional funding, and extended PACD.

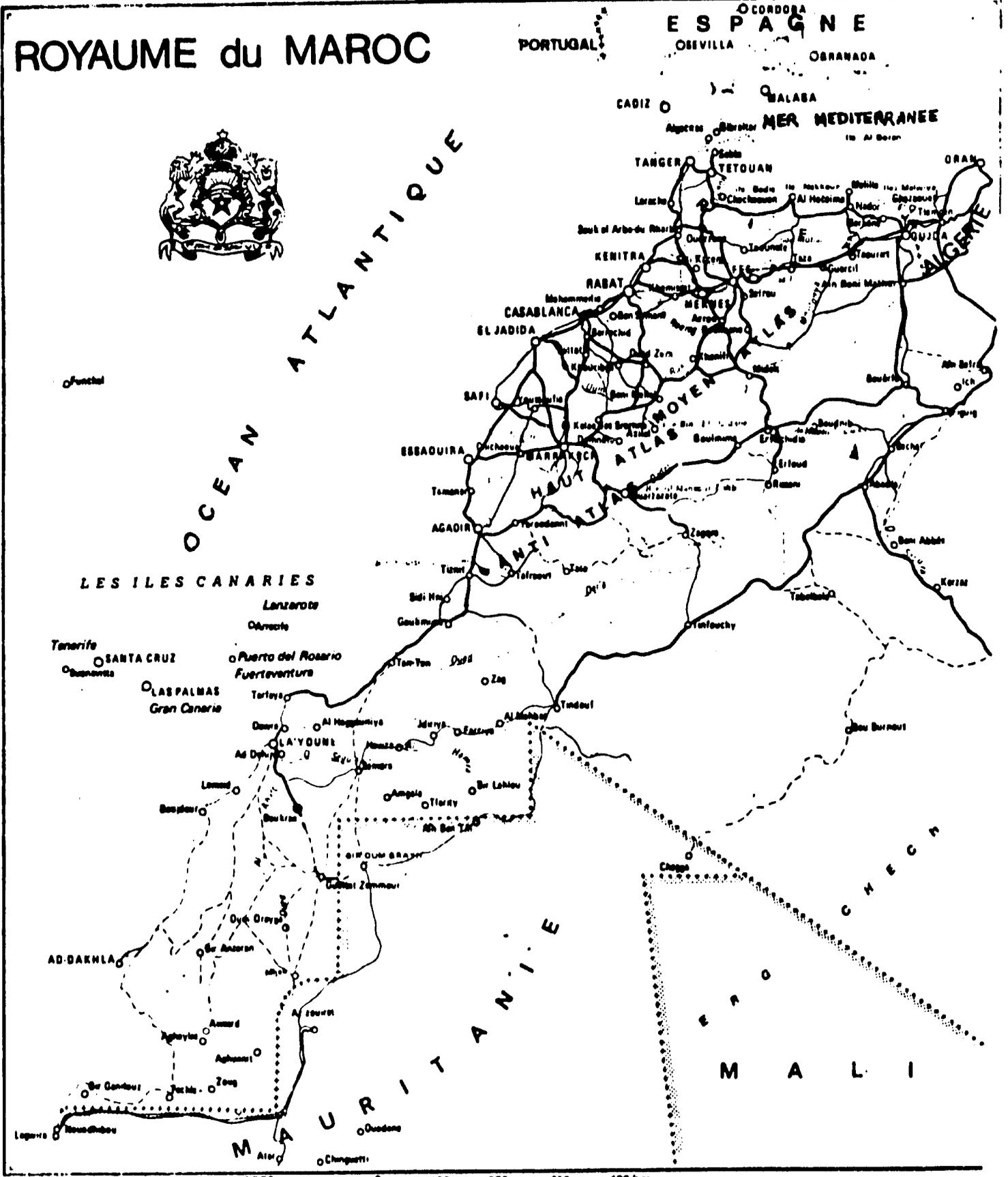
The project provides a total of \$80,000 Fx and EQ\$12,000 for two external evaluations to be conducted in 1985 and 1987. The Mission anticipates contracting in advance for the evaluation services in the spring of 1985 and the fall of 1987. The contractors will be required to assess the contribution of project activities toward objectives achievement and other objectives as defined in the evaluation scope of work prepared by the USAID staff.

The evaluation plan in the original project paper provides for internal annual evaluations. Internal evaluation, to be handled by the contractor, together with GOM counterparts, will utilize the AID methodology of evaluation design and will monitor progress toward project outputs and purpose. These annual internal evaluations will be monitored by USAID, which will receive copies of the evaluation reports for comment. Based on these, USAID will prepare PES's annually, except for 1985 and 1987, the years of the special evaluation, and final evaluation.

The Mission Evaluation Officer together with the Food and Agriculture Officer and Project Manager will ensure that project monitoring and evaluation tasks are performed in a thorough and timely manner. Evaluation reports will be sent to the Development Information Unit and distributed to AID/W offices.

Additional evaluation instructions are contained in the NEAC Reporting Cable, State 243746 (see the copy in the front of this document).

ANNEX FOR
DRYLAND AGRICULTURE
APPLIED RESEARCH
PROJECT 608-0136

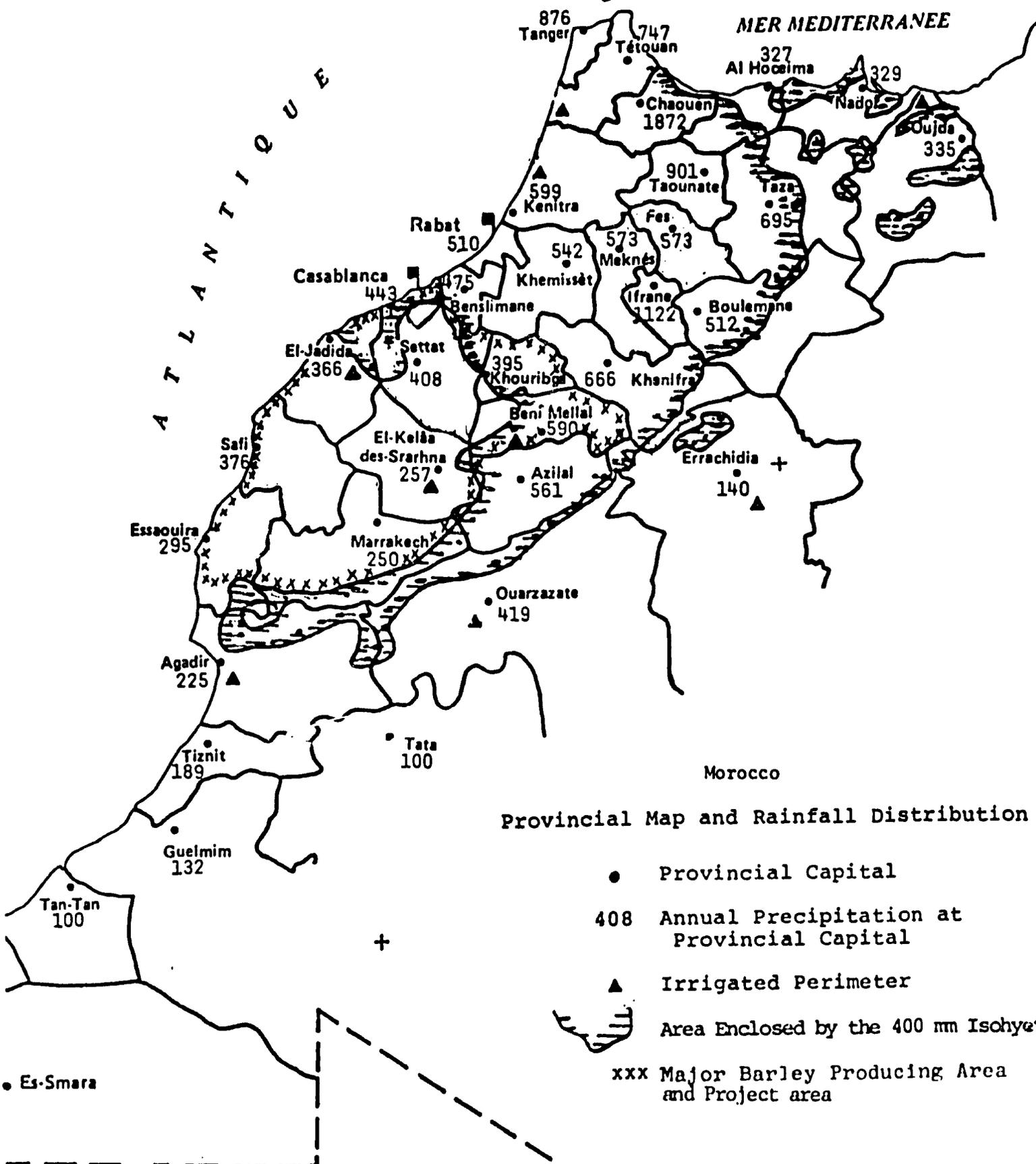


Division de la Cartographie - Rabat - 1979

ESPAGNE

MER MEDITERRANEE

ATLANTIQUE



Provincial Map and Rainfall Distribution

- Provincial Capital
- 408 Annual Precipitation at Provincial Capital
- ▲ Irrigated Perimeter
- Area Enclosed by the 400 mm Isohyet
- xxx Major Barley Producing Area and Project area

ESTIMATED EXPENDITURE SCHEDULE **ANNEX 2**
DETLAND AGRICULTURE APPLIED RESEARCH PROJECT 608-0136 **PROJECT PAPER AMENDMENT No. 3** **BUDGET SUMMARY**

\$1 : 6.S. DE 000's - \$/EQ	FY78 - FY83			FY84			FY85			FY86			FY87			FY88			TOTAL LOP					
	AID \$	AID \$/EQ	COM \$/EQ	AID \$	AID \$/EQ	COM \$/EQ	AID \$	AID \$/EQ	COM \$/EQ	AID \$	AID \$/EQ	COM \$/EQ	AID \$	AID \$/EQ	COM \$/EQ	AID \$	AID \$/EQ	COM \$/EQ	AID \$	AID \$/EQ	COM \$/EQ	AID	COM	
1. U.S. Tech.Asst																								
Team Leader	200	15	-	125	12	-	125	12	-	125	12	-	125	12	-	125	12	-	825	75	-	900		
Cereals Agronomy	200	15	-	125	12	-	125	12	-	125	12	-	125	12	-	125	12	-	825	75	-	900		
Forage Agronomy	200	15	-	125	12	-	125	12	-	125	12	-	125	12	-	125	12	-	825	75	-	900		
Soils/Plant Lab.	-	-	-	125	12	-	125	12	-	-	-	-	-	-	-	-	-	-	250	24	-	274		
Var. Selection	150	13	-	125	12	-	125	12	-	125	12	-	125	12	-	125	12	-	775	73	-	848		
Tillage Research	-	-	-	125	12	-	125	12	-	125	12	-	125	12	-	125	12	-	625	60	-	685		
Equip. Maint.	150	13	-	125	12	-	125	12	-	125	12	-	125	12	-	125	12	-	775	73	-	848		
Prod. Economics	-	-	-	-	-	-	125	12	-	125	12	-	125	12	-	125	12	-	500	48	-	548		
Rural Sociology	-	-	-	125	12	-	125	12	-	125	12	-	125	12	-	-	-	-	500	48	-	548		
Plant Protection	-	-	-	125	12	-	125	12	-	125	12	-	125	12	-	-	-	-	500	48	-	548		
Soil/Water Fert.	-	-	-	125	12	-	125	12	-	125	12	-	125	12	-	125	12	-	625	60	-	685		
Sen. Car. Breeder	-	-	-	125	12	-	125	12	-	125	12	-	125	12	-	125	12	-	625	60	-	685		
Backstop-Office	412	-	-	130	-	-	131	-	-	131	-	-	130	-	-	130	-	-	1064	-	-	1064		
S.T. Consultants	305	52	-	218	36	-	208	36	-	199	136	-	194	136	-	185	136	-	1309	532	-	1841		
Subtotal 1	1617	123	-	1723	168	-	1839	180	-	1705	268	-	1699	268	-	1440	244	-	10023	1251	-	11272		
2. Training																								
U.S. Short Term	37	198	5	40	110	8	40	79	9	40	65	9	40	64	9	18	58	7	215	576	47	789	47	
U.S. Long-Term	430	-	332	378	6	231	406	6	289	278	-	332	106	16	320	32	32	920	1630	67	-	1690	1814	
Subtotal 2	467	198	337	418	116	239	446	85	288	318	65	341	146	80	329	50	90	527	1845	624	1861	2479	1861	
3. COM Salaries																								
Professional			178			200			250			360			450			523			2060		2060	
Staff			60			100			150			60			60			60			491		491	
Subtotal 3			238			300			400			420			510			583			2551		2551	

ESTIMATED EXPENDITURE SCHEDULE
 DAYLAND AGRICULTURE APPLIED RESEARCH PROJECT 608-0136 PROJECT PAPER AMENDMENT NO. 3 BUDGET SUMMARY

ANNEX 2

\$1 = 6.5 Dh 000's - \$/SEQ	FY78 - FY83			FY 84			FY 85			FY 86			FY 87			FY 88			TOTAL LOF				
	AID \$	AID \$EQ	COM \$EQ	AID \$	AID \$EQ	COM \$EQ	AID \$	AID \$EQ	COM \$EQ	AID \$	AID \$EQ	COM \$EQ	AID \$	AID \$EQ	COM \$EQ	AID \$	AID \$EQ	COM \$EQ	AID \$	AID \$EQ	COM \$EQ	AID	COM
Commodities			-																				
Vehicles	70	54	31	-	171	51	-	-	70	-	-	70	-	-	-	-	-	-	70	225	222	295	222
Household Effects	72	-	--	-	180	-	-	-	-	-	-	-	-	-	-	-	-	-	72	180	-	252	
Field Equipment	240	68.7	14	400	60	16	-	80	18	-	-	210	-	-	214	-	-	30	640	128.7	122	768.7	122
Ag. Ext. Materials	2.5	2.5	-	10	10	-	-	-	-	-	-	-	-	-	-	-	-	-	12.5	12.5	-	25	
Socio-Economic	-	17.2	-	-	30	-	-	10	-	-	10	-	-	10	-	-	-	-	-	77.2	-	77.2	
Soil Laboratory	61.9	7	-	31	4	-	-	-	-	-	-	-	-	-	-	-	-	-	92.9	11	-	103.9	
Cere. Laboratory	35.9	5	-	135	15	-	-	-	-	-	-	-	-	-	-	-	-	-	170.9	20	-	190.9	
Forage Laboratory	32.	4.8	-	135	15	-	-	-	-	-	-	-	-	-	-	-	-	-	167.	19.8	-	186.8	
Lab. Chemicals	8.5	8	-	5	5	-	5	5	-	-	-	-	-	-	-	-	-	-	18.5	18	-	36.5	
Administration	11	16.5	5	30	25	10	30	25	15	25	25	5	-	23	3	-	-	-	96	114.5	38	210.5	38
Part. Support	19	6	-	10	5	-	20	7	-	30	8	-	15	5	-	-	-	-	94	31	-	125.0	
Met. Station	2	-	2	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	4	-	4	4	4
Machinery Dev.	63	21.7	-	40	15	-	40.8	-	-	30	-	-	15	-	-	-	-	-	188.8	36.7	-	225.5	
Lab Modification	-	-	-	-	25	-	-	25	-	-	-	-	-	-	-	-	-	-	-	50	-	50.	
Greenhouse	-	-	-	180	-	60	-	-	-	-	-	-	-	-	-	-	-	-	180.	-	60	180.	60
Path. Laboratory	-	-	-	235	15	-	-	-	-	-	-	-	-	-	-	-	-	-	235.	15	-	250.	
Ento Laboratory	-	-	-	135	15	-	-	-	-	-	-	-	-	-	-	-	-	-	135.	15.	-	150.	
Weed Sci. Lab	-	-	-	44	6	-	-	-	-	-	-	-	-	-	-	-	-	-	44.	6.	-	50.	
Resource Library	-	-	-	125	5	-	40	5	-	40	5	-	40	5	-	35	-	-	280	20.	-	300	
Sub-total 4.	617.8	211.4	52	1517	601	139	135.8	77	103	125	48	95	70	43	217	35	-	30	2500.6	980.4	446	3481	446
Construction																							
Sub-total 5.	-	-	1347	-	-	1430	-	-	1440	-	-	-	-	-	-	-	-	-	-	-	4217	-	4217

ESTIMATED EXPENDITURE SCHEDULE
 DRYLAND AGRICULTURE APPLIED RESEARCH PROJECT 608-0136
 PROJECT PAPER AMENDMENT NO. 3

BUDGET SUMMARY
 ANNEX 2

	FY78 - FY83			FY 84			FY 85			FY 86			FY 87			FY 88			TOTAL LOP				
	AID \$	AID \$EQ	GOM \$EQ	AID \$	AID \$EQ	GOM \$EQ	AID \$	AID \$EQ	GOM \$EQ	AID \$	AID \$EQ	GOM \$EQ	AID \$	AID \$EQ	GOM \$EQ	AID \$	AID \$EQ	GOM \$EQ	AID \$	AID \$EQ	GOM \$EQ	AID	GOM
6. Other Costs																							
Local Hire Cost	-	110	-	-	60	-	-	60	-	-	60	-	-	60	-	-	60	-	-	410	-	410	-
Invitational Tvl	21			15			15			15			15			15			96	-	-	96	-
Seminar Series		5	6		5	8		5	8		5	10		5	12		5	12	-	30	56	30	56
Operating Expenses																							
Lincoln	292			28			28			28			28			28			432	-	-	432	-
Morocco		157	138		200	90		203	100		155.7	216		95	240		80	280	-	890.7	1064	890.7	1064
Project Quarters		135			12			12			12			12			12			195		195	
Overhead	455.8			560			644			560			560			550			3329.8			3329.8	
Eng. Training				147			54			69			100			5			375			375	
Valuation	20						25	5					35	7					80	12		92	
Socioeconomic Prog		70	25		185	35		128	40		126.4	30		128.5	30		40		637.9	200	637.9	200	
Subtotal 6	789.8	477	169	750	462	133	766	413	48	672	358.1	256	738	300.5	282	598	157	332	2175.6	1320	6488.4	1320	
																			4312.8				

ANNEX III

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 78 to FY 88
Total U.S. Funding 26,323,400
Date Prepared: 6/27/83

Project Title & Number:

DRYLAND AGRICULTURE APPLIED RESEARCH 608-136 Project Paper Amendment No. 3

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>PROJECT GOAL: To increase basic food production in order to meet the needs of Morocco's fast-growing population; and improve income of traditional small dryland farmers.</p>	<p>MEASURE OF GOAL ACHIEVEMENT: Technologies introduced which under farmer field trials increase yields by at least 30% and are economically viable and socially acceptable.</p>	<p>GOM data, project evaluations, other AID project reports/records, project annual reports, on-site inspection tours, and other donor reports.</p>	<p>Production inputs which are identified to be critical to increasing yields will be available on a timely and reasonable basis.</p> <p>Market incentives will be favorable for the production of subject crops given increased cost of production associated with adoption of improved inputs.</p>
<p>PROJECT PURPOSE: To establish an applied agronomic research program which will a) adapt existing technology to local conditions in order to increase the productivity of the dryland farmers; b) train adequate Moroccan staff to operate the program and transmit the results to farmers; and c) develop a program whereby suitable farming equipment can be made accessible to small farmers; and 2) to establish a collaborative socioeconomic research program with INRA-INAV that will give a better understanding of the behavior of the dryland farmers and thus provide a basis for effective extension programs.</p>	<p>Conditions that will indicate purpose has been achieved: End of project status.</p> <ul style="list-style-type: none"> - A unit in MARA with adequate staff facilities, and budget is conducting production-oriented research. - Production technology that is economically applicable is being developed. - Improved technology is being made available to farmers. 	<p>GOM annual reports, project evaluations, other AID project reports, on-site inspection tours, and other donor reports.</p>	<p>GOM agricultural service agencies such as the extension service, parastatals, seed multiplication/distribution authority, credit banks, and cooperatives make improved production inputs known and available to farmers throughout the semi-arid region.</p>

**PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK**

Annex 3

Life of Project:
From FY 78 to FY 88
Total U.S. Funding 26,323,600
Date Prepared: 6/22/83

Project Title & Number: **DRYLAND AGRICULTURE APPLIED RESEARCH 608-0136** Project Paper Amendment No. 3

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS																																																												
<p>PROJECT OUTPUTS:</p> <ol style="list-style-type: none"> Adapted agronomic technologies and cultural practices appropriate to Moroccan dryland farming; Adapted farming equipment suitable for small and medium-scale farmers; Socioeconomic data collected and analysed allowing a better understanding of the socio-cultural and economic environment in which dryland farmers operate, yielding baseline information needed for establishing farming systems research/extension programs and for project evaluation; A functioning Agricultural Information Resource Center providing timely information to project staff, GOM personnel in the DPA's and CT's in the project area, and to farmers; INRA staff development and management systems designed for an effective applied research program; ISAV-M2 and INRA staff development and research systems designed for an effective socioeconomic applied research program; A functioning National Aridoculture Center; Functioning satellite research stations for the National Aridoculture Center. 	<p>MAGNITUDE OF OUTPUTS:</p> <ol style="list-style-type: none"> Fully equipped and functioning National Aridoculture Research Center with linkage to satellite research stations. 15 MSc and 17 Ph.D participants to form the research scientist cadre at the National Aridoculture Center. 128 INRA support staff trained in improved technical and administrative skills A trained cadre of 3 social scientists to provide support at INAV for INRA applied research. Improved agronomic technology and agricultural equipment developed in collaboration with INRA and provided to farmers through GOM extension facilities. 30 socioeconomic research study reports plus numerous monthly agricultural information reports. 2 reports on appropriate agricultural mechanization for low rainfall crop production. 	<p>GOM reports, Project records, evaluations and on-site inspection tours.</p>	<p>Diverse research programs can be closely integrated.</p> <p>GOM will continue current increase in strategic emphasis on rainfed agricultural production.</p> <p>GOM agricultural researchers will adopt improved research and research assessment methods</p> <p>GOM will maintain salary levels competitive with private enterprise.</p>																																																												
<p>INPUTS:</p> <p>A.I.D.</p> <ol style="list-style-type: none"> Research Technical Assistance Team Consultants Commodities Training Other Costs <p>GOM</p> <p>Land, buildings, equipment and machinery, agricultural and social scientists and technicians, laborers and administrative personnel.</p> <p>Operating Budget.</p>	<p>IMPLEMENTATION TARGET:</p> <table border="1" data-bbox="513 999 982 1369"> <thead> <tr> <th></th> <th>PY</th> <th>US \$000</th> <th>GOM \$000</th> </tr> </thead> <tbody> <tr> <td>Personnel</td> <td>99.85</td> <td>11,274.0</td> <td></td> </tr> <tr> <td>LT Tech.</td> <td>86.50</td> <td>9,433.0</td> <td></td> </tr> <tr> <td>ST Consult.</td> <td>13.35</td> <td>1,841.0</td> <td></td> </tr> <tr> <td>Commodities</td> <td></td> <td>3,481.0</td> <td>446.0</td> </tr> <tr> <td>Training</td> <td></td> <td>2,479.0</td> <td>1,861.0</td> </tr> <tr> <td>32 LT Part.</td> <td></td> <td>1,690.0</td> <td>1,814.0</td> </tr> <tr> <td>ST Part.</td> <td></td> <td>789.0</td> <td>47.0</td> </tr> <tr> <td>Other Costs</td> <td></td> <td>6,488.4</td> <td>1,320.0</td> </tr> <tr> <td>Construction</td> <td></td> <td></td> <td>4,405.0</td> </tr> <tr> <td>GOM Salaries</td> <td></td> <td></td> <td>2,551.0</td> </tr> <tr> <td>Subtotal A</td> <td></td> <td>23,722.4</td> <td>12,583.0</td> </tr> <tr> <td>Inflation</td> <td></td> <td>2,601.0</td> <td>1,353.4</td> </tr> <tr> <td>Subtotal B</td> <td></td> <td>26,323.4</td> <td>13,936.4</td> </tr> <tr> <td>Total Project</td> <td></td> <td>38,259.8</td> <td></td> </tr> </tbody> </table>		PY	US \$000	GOM \$000	Personnel	99.85	11,274.0		LT Tech.	86.50	9,433.0		ST Consult.	13.35	1,841.0		Commodities		3,481.0	446.0	Training		2,479.0	1,861.0	32 LT Part.		1,690.0	1,814.0	ST Part.		789.0	47.0	Other Costs		6,488.4	1,320.0	Construction			4,405.0	GOM Salaries			2,551.0	Subtotal A		23,722.4	12,583.0	Inflation		2,601.0	1,353.4	Subtotal B		26,323.4	13,936.4	Total Project		38,259.8		<p>GOM approved annual budgets and expenditure reports, Project records and evaluations, on-site inspection tours.</p>	<p>GOM willing to increase available budget funds for salaries and operating costs of Aridoculture Project in a timely basis.</p> <p>All Project trained participants return to work on Project.</p> <p>U.S. TA Contractor completes work plans, commodity procurement and reports on timely basis plus provides appropriate TA staff on a timely basis.</p>
	PY	US \$000	GOM \$000																																																												
Personnel	99.85	11,274.0																																																													
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	PM FY 78-83		PM FY 84		PM FY 85		PM FY 86		PM FY 87		PM FY 88		PM Total	
	GA	TA	GA	TA	GA	TA	GA	TA	GA	TA	GA	TA	GA	TA
Cereals	1	1	1	1	1	1	1	1	-	1	-	-	4	5
Cereal breeding	-	1	1	1	1	1	1	1	1	1	-	-	4	5
Legumes	1	1	1	1	1	1	-	1	-	-	-	-	3	4
Forages	1	1	1	1	1	1	-	1	-	-	-	-	3	4
Soil Fertility	1	1	1	1	1	1	-	1	-	-	-	-	3	4
Soil Chemistry	-	1	-	1	1	1	1	1	-	-	-	-	2	4
Soil Management	1	-	1	1	1	1	1	1	1	1	-	-	5	4
Plant Pathology	-	1	1	1	1	1	1	1	-	-	-	-	3	4
Ag. Economics	-	-	-	1	-	1	1	1	2	1	1	-	4	4
Statistics	-	1	-	1	-	1	1	1	1	1	1	-	3	5
Weed Science	-	2	-	1	1	1	1	1	1	-	-	-	3	5
Entomology	-	1	-	1	1	1	1	1	1	1	-	-	3	5
Pest Control	-	-	-	1	-	1	-	1	1	1	1	-	2	4
Ag. Research Equipment	-	2	-	1	-	1	-	1	-	1	-	-	-	6
Research Design Management	-	4	-	2	-	2	-	1	-	1	-	-	-	10
Water Management	-	2	-	1	-	1	-	1	-	1	-	-	-	6
Total	5	19	7	17	10	17	9	16	8	8	3	-	42	92
	24		24		27		25		16		3		134	

Short-Term Training Summary

Short-term participant training is funded to provide on-the-job training and experience in specific skills and subject matter required to enable the smooth implementation of Project activities. Funding is provided for a total of 218 people for short-term technical and practical skills training, and 76 people scheduled for English language training. The following Table presents an estimated annual level of effort by type of training program.

SUMMARY: SHORT-TERM TRAINING BY PERSON MONTHS AND COST (\$000)

TYPE OF TRAINING	FY 78-83			FY 84			FY 85			FY 86			FY 87			FY 88			TOTALS		
	Staff/ PM	FX	\$EQ	Staff/ PM	FX	\$EQ															
<u>English Long-Term</u>	26/ 168		157	5/ 30		30	1/ 6		6										32/ 204		193
<u>Short-Term</u>	4/ 24		24	9/ 54		32	9/ 54		21	8/ 48		16	8/ 48		16	6/ 36		15	44/ 264		124
<u>U.S. Training</u>	4/ 18	33	8	4/ 20	36	8	2/ 8	14	4	22/ 106	191	44									
<u>3rd Country Training</u>	1/ 3	4	6	5/ 20	4	36	26/ 103	24	186												
<u>In-Country Technical Training</u>	20/ 10		3	25/ 20		4	40/ 34		10	45/ 17		5	20/ 15		4	20/ 10		3	170/ 106		29
TOTAL Staff/ TRN	55/ 211	37	198	48/ 130	40	110	59/ 92	40	79	62/ 69	40	65	37/ 67	40	64	33/ 50	18	58	294/ 783	215	574

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LONG - TERM PARTICIPANT TRAINING PROGRAM

The following list represents the proposed areas of study and the numbers of persons to be trained to a specific degree level in the U.S., including additions under this Amendment.

1. Crop Production
 - 2 Ph.D - cereal production
 - 4 Ph.D - cereal breeders (small grains)
 - 2 MSc - agronomy (cereals orientation)
 - 2 Ph.D - legume/forage breeders
 - 2 Ph.D - legume/forage production
 - 1 MSc - legume/forage production

2. Soil Science
 - 1 Ph.D - soil chemistry
 - 1 Ph.D - soil fertility
 - 2 Ph.D - soil management
 - 2 MSc - soil fertility
 - 2 MSc - soil management

3. Weed Science
 - 1 MSc

4. Entomology
 - 2 MSc

5. Plant Pathology
 - 2 Ph.D
 - 1 MSc

6. Vertebrate Pest Control
 - 1 MSc

7. Agricultural Economics
 - 1 Ph.D - farm management

8. Agricultural Mechanization
 - 2 MSc

9. Experimental Design/Analysis
 - 1 MSc (statistics)

The implementation schedule on the following page details planning dates for departure and return. The assumption is made that academic coursework at the U.S. university will require 1 1/2 - 2 years for the MS and 2 1/2 - 3 years for the Ph.D. There is an agreement between the GOM and USAID that all coursework will be completed in the U.S., however, thesis/dissertation field work should take place in Morocco. Contractor TA team members will lend guidance to the returning participants during the preparation and conduct of the research work, in collaboration with his/her advisor from either INAV Hassan II and/or the U.S. university. Due to the close guidance each student will receive from a U.S. university professor acting as graduate major professor during the U.S. period of training it is proposed that the U.S. campus advisor visit Morocco for 2 weeks to assist in the structuring of the thesis work at the beginning of the period of fieldwork for the MS participants and 2 visits of 2 weeks each at the beginning and middle of the field work for the Ph.D participants. All thesis/dissertation fieldwork conducted by returning participants will be research focused on agricultural problems in the semi-arid areas of the project zone, and will be expected to advance the achievement of Project purpose and objectives.

As the participants return from their U.S. academic training they will be expected to assume their roles as scientists with INRA, assigned to the Aridoculture Center. They will work cooperatively with the INRA and contractor TA research team in the process of building the INRA capacity to address practical agricultural problems.

It is considered highly desirable to have graduate students undertake their research in Morocco under this project so that the research reflects Moroccan conditions and so that Morocco can receive more of the benefits that result from the research. Therefore, consideration has been given to encourage agricultural MSc and Ph.D graduate degrees to be given by the INAV whenever possible after research has been completed in Morocco.

In some cases however, it is not feasible to have candidates channeled through the INAV. It is also not always possible to have applied INRA field research being supervised by INAV professors. Therefore, some participants will receive degrees from U.S. universities and not receive a degree from INAV-Hassan II. In such cases, it still is desirable to have graduate research conducted in Morocco. This is true on both substantive grounds and administrative grounds. That is, given the relatively few INRA staff available for training, and the fact that they are already INRA personnel, it is to the advantage of INRA that they return to Morocco as soon as possible, and that they carry out their research in the context of the Aridoculture Project with joint supervision from appropriate contract team members, INRA staff, and INAV faculty.

While this approach is more expensive the cost/benefit ratio, when considered in these terms, is essentially positive. In addition, the use of U.S. professors as degree research advisors under this approach yields a multiplier effect insofar as they are made available to give seminars, short-courses, and informal supervision to other students in their respective fields of expertise during their TDY's in Morocco.

DRYLAND AGRICULTURE APPLIED RESEARCH PROJECT 608-0136 PROJECT PAPER AMENDMENT NO. 3

ILLUSTRATIVE LONG TERM PARTICIPANT
TRAINING SUMMARY

SPECIALTY	DEGREE	DEPARTURE DATE	RETURN FOR THESIS
1. Soil Management	Ph.D	10/81	6/83
2. Soil Fertility	Ph.D	12/80	5/83
3. Forages	Ph.D	8/80	6/83
4. Cereals	MSc	12/80	84
5. Legumes	Ph.D	9/82	84
6. Forages	Ph.D	8/82	84
7. Soil Fertility	MSc	12/82	85
8. Soil Fertility	MSc	12/82	85
9. Cereals	Ph.D	12/82	85
10. Forages	Ph.D	12/82	85
11. Cereal Breeding	Ph.D	12/82	85
12. Pathology	Ph.D	12/82	85
13. Pathology	Ph.D	12/83	86
14. Cereals	MSc	12/83	85
15. Pathology	MSc	12/83	85
16. Weed Science	MSc	12/83	85
17. Entomology	MSc	12/83	85
18. Entomology	MSc	12/83	85
19. Cereal Breeding	Ph.D	12/83	86
20. Cereal Breeding	Ph.D	12/83	86
21. Legumes	MSc	12/83	85
22. Soils Management	Ph.D	12/83	86
23. Soils Management	MSc	8/84	86
24. Soil Chemistry	Ph.D	8/84	87
25. Cereals	Ph.D	8/84	87
26. Ag. Economist	Ph.D	2/85	88
27. Tillage	MSc	8/85	87
28. Tillage	MSc	8/85	87
29. Statistics	MSc	8/85	87
30. Corn-Sorghum Breeder	Ph.D	10/84	87
31. Soils Management	MSc	8/85	87
32. Vertebrate Pest Control	MSc	9/85	88

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Project Paper No. 3

ANNEX 7.

STATEMENT OF WORK FOR U.S. RESIDENT
TECHNICAL ASSISTANCE TEAM MEMBERS

GENERAL

The additional members of the U.S. technical assistance team funded under this amendment will work under the direction of the team leader. They will provide assistance as needed to the program. The following statements of work are intended to be illustrative of major duties rather than comprehensive. It is mandatory that all U.S. resident technicians have a working level proficiency in the French language.

Soils and Water Management Specialist

The soil and water management specialist will be responsible for evaluating the field water balance under various crop rotations, tillage treatments and soil management systems. These will be related to crop response at different levels of fertility laboratory analysis to develop soil moisture/fertility response curves by soil types and depth. The ultimate goal of the work will be to ascertain which systems of planting, tillage and crop management provide the maximum water use efficiency under the semi-arid conditions of the project area and how they can be related to soil tests to determine yield potential.

Activities will include the determination of actual crop water use and water losses under various cropping systems, evaluation of root system efficiency in water extraction for various genotypes of cereal crops; development of water balance models calibrated to regional conditions and from these activities the development of information that will help to maximize the efficient use of rainfall that occurs. The work will include the definition of practices for the range of soil depths and textures that are predominate within the project region, and relate them to soil analysis.

The soil and water management specialist must work closely with other project scientists since much of his/her field work will be done in connection with the on-going plot work of other individuals.

The development of the soil physics aspects of the soil laboratory will be another aspect of the soil and water management specialist's work. This will provide the essential laboratory backup for the field program in this area.

It is automatically assumed that the specialist will be closely involved in advising returning graduate students and in cooperative efforts with INRA staff.

Agricultural Machinery Specialist

The availability and improper use of farm machinery is a limiting factor to crop production throughout the project region. The widespread use of the offset tandem disc (cover-crop) by both large and small-scale farmers has had a serious

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negative impact on crop yields. The misuse of the tillage implements cause increased moisture loss during tillage and seed incorporation. It results in inefficient use of broadcast phosphate and necessitates a very high seeding rate for cereal grains.

Another aspect of this problem is the inavailability of properly adapted seeding and fertilizer application equipment. A few drills are available for rent from extension service work centers (CT's) but few if any are properly selected for local conditions. There is no useful seeding equipment to be found in the market place that is designed for farmers employing animal traction.

The farm machinery specialist will be involved in a range of activities that will be directed toward improving the tillage, planting and fertilizer application practices in the project region. S/he must take steps that will help make improved machinery available to farmers who use either tractor or animal traction. This will include efforts to strengthen the ability of the private sector to respond to farmer needs. A range of activities is envisioned that will include:

1. Comparative research trials of traditional and improved planting and tillage equipment, both on research stations and on farms. Such work may also include adaptive research with equipment for chemical weed control.
2. Development or adaptation of improved seeding and fertilization equipment for animal traction. This will likely include adaptive trials of equipment previously developed in other countries.
3. Work with Moroccan manufacturers and wholesale machinery distributors to assure the availability of improved equipment to farmers. Manufacturers will be encouraged to adapt newly developed machines.
4. Involvement with CT's and other information outlets to increase awareness of the availability and benefits of use of proper equipment and practices.

Cereals Breeder/Advisor

The cereal breeder will be stationed in Rabat to advise and assist the INRA staff on the development and implementation of national cereal breeding programs to address the principle problems in cereal production. S/he will assist in identification of appropriate genetic parent material to serve as the basis for hybridization and selection for improved varieties and collaborate with the cereal variety cataloging and seed multiplication programs to expedite release, production, and distribution of improved varieties. The Senior Cereal Breeder will also advise graduate students who return to do thesis work.

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Forage Agronomist

The forage agronomist will work with INRA and other MIAC team members to determine priority needs in forage production. Two main objectives are (1) to provide adequate high-quality feed for the livestock important to both small and large farmers, and (2) to study soil improvement and response to residual nitrogen from the forage crop. It is a challenging task to evaluate the biological, economic and cultural factors which determine the balance of cropping and livestock activities on the farm, and to cover alternative forage production systems which are viable economically and acceptable culturally.

Agronomic and other aspects of the work include screening of local and introduced forages, dates of seeding and densities, land preparation and seeding methods, crop culture, weed control and pest control, harvesting and forage preservation, and nutritional evaluation of forages. Interseeding with cereals, forage establishment, fertilization practices, and rotations with cereals are additional concerns. Statistical and economic analysis of alternative systems is essential. Complementarity of cereal and forage production is to be explored.

Close collaboration with INRA scientists, with the cereals agronomist and soils specialist, and others in the team will make the field work more efficient and relevant. Supervision of thesis work in the field by INRA participants is critical to their orientation and training.

Agricultural Production Economist

The production economist will be responsible for the design of a dynamic program of research which is closely integrated with the research of the other MIAC and INRA project members. The purpose of "collaborative" research design is to enable the economist to fully understand the technical parameters, constraints and objectives of various agronomic experiments so s/he will be able to conduct comparative cost of production analysis. Other major concerns associated with the introduction of new production technologies in this semi-arid region will be studied including labor allocation and productivity, availability of inputs (including credit), the extant farming system in relation to the ecosystem and the marketplace, and the impact of risk assessment on adoption of technological change. The economist will be responsible for conducting and/or supervising in-depth analysis of these and other economic issues which impact on production and productivity. The economist will be closely involved with advising returning graduate students in the preparation and conduct of field research and in providing guidance and assistance to the staff of INAV working under the socioeconomic research program.

Rural Sociologist

The rural sociologist will be primarily located at INAV to enable close collaboration with the GOM Director for the socio-economic research effort. The sociologist will be responsible for assisting the Director in the conduct of the Chaouia 50 farm study and market surveys and other research activities. The sociologist will assist in methodology development, including upgrading data collection activities and analytical model design-emphasizing the introduction of a more quantitatively rigorous approach to analysis.

The rural sociologist will interact closely with all team members in the planning and analysis of agronomic and economic research, and will be the key

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element in providing a direct link between the agronomic, economic and sociological research activities to form the base of a Farming Systems Research/Extension effort in conjunction with extension activities funded under Project 0170.

Pest Management/Crop Loss Appraisal Specialist

The level of actual plant disease and weed damage in the form of yield reduction or loss of quality of the crops grown in the farming system is hard to determine without carefully designed research. These losses vary between locality, years and varieties. In order to determine the frequency, distribution requires a carefully designed sampling system that is related to actual measurements in loss that can be related to the evaluation systems utilized for sampling. This specialist will develop a system of this type with special attention to linking this system for future use as part of the SPAE studies of losses. These are parts of the Project 0170 yield modeling and sample survey and forecast modeling. These efforts are an expansion of the initial efforts under the supervision of USDA.

The crop loss appraisal developed by this specialist will become an important part of the long range research protocols dealing with cereal and legume breeding, plant pathology, entomology and weed control. There are so many pest, disease and weed problems that any progress will need to come from concentrated effort on those of the most economic importance.

Beneficiary AnalysisBeneficiaries:

The beneficiaries of this project may be divided into two categories-- institutional and individual. There are also direct beneficiaries and indirect beneficiaries.

In most cases, the institutional beneficiaries--and the individuals belonging to those institutions--are the direct beneficiaries of project activities. These include the professional and technical staffs of INRA, and of INAV Hassan II. These two institutions, which are the main host-country counterpart organizations under the project, have participated closely with the USAID and the current contract team--as well as with the special evaluation team--in assessing past activities under the project, and in the design of activities to be carried out under the proposed amendment.

In the case of the agronomic research component, the professional cadres of INRA who will receive long term participant training in the U.S. are the first direct beneficiaries. Other professional and technical cadres who will receive short-term in-country and/or U.S. or third-country training, are also direct beneficiaries under this component. Under the socioeconomic research component of the project, direct beneficiaries are those senior researchers, graduate students, contract-hire researchers, and undergraduate students who will be involved in research and study design, implementation and analysis. This project component allows for the funding of particular cross-sectional studies which are required for effective project performance and for subsequent project evaluation. At the same time, however, it has an institution-building function, and allows the INAV Hassan II Development Directorate to finance research which would otherwise be impossible given current GOM budgetary constraints.

To the extent that GOM officials of other institutions, such as the Settat DPA, and its dependent CTs, are involved under the project, they, too, are direct and/or indirect beneficiaries who receive the benefits of improved research methodologies, and applied research results which allow them to carry out their duties more effectively with project-area farmers.

The indirect beneficiaries under both project components are the small and medium-scale farmers in the seven provinces of the project area. By virtue of improvements in physical inputs and cultural practices to be introduced into the local farming systems, these farmers are likely to experience substantial increases in income, some savings of manual labor, and increased hedges against risks associated with the high variability of climatic factors in the region. In addition, they are likely to benefit from a better informed and more accessible set of GOM officials who will have more and better information to extend to them. As these benefits begin to flow under the project, it is probable that relationships between the GOM administration and the farming population in the project area will substantially improve. The creation of the

Agricultural Information Resource Center, for example, is one of the project components which is most likely to facilitate this kind of improvement.

Participation:

Under this project, through the socioeconomic research component, and through on-farm trials under the agronomic component, there has been a substantial amount of participation by anticipated project beneficiaries in project activities. The farmer feedback which is ensured by these two components is unusual in projects of this kind, and, indeed, is particularly unusual in the context of Moroccan agriculture. This participatory mode will be enhanced under the proposed amendment, and will be further supplemented by activities under the companion FSR Extension/Production project.

Impact and Replicability:

One of the key dimensions of this project is its potential replicability. The mode of operation of the project, which is one of slow but sure progress in the development and adaptation of improved cultural practices and physical inputs for the varied farming systems in the area is sensitive to the needs of replicability. Rather than assuming that all small dryland farmers in the project area behave in the same way, and suffer from the same constraints--social, economic and agronomic--the project proceeds to define and understand these constraints, and then uses this information to define ways in which these constraints can be relaxed. As project activities expand to cover the large and varied project area, replicability will increase. Further, as the institution-building effort under the project is achieved, this kind of approach will be replicated by the two cooperating institutions in other suitable areas of the country. Some of the methodological approaches, and the attitudes toward agronomic and socioeconomic research which are developed under the project, will be replicable in irrigated areas as well as in other dryland areas, although the same may not be true for some physical inputs and cultural practices which are, properly, designed for dryland areas.

The project, together with the companion Extension/Production project, is likely to have a high level of impact on the institutions involved, and on the individuals who comprise the farming population of the project zone. The provision of adapted technologies for improved productivity which are then likely to be adopted by a significant proportion of beneficiary farmers is likely to have a spread effect which will be significant. In general, even without sophisticated and viable extension systems, profitable agricultural innovations which are not too costly, tend to be widely adopted. The income and security benefits which derive from these improved innovations are likely to be spread fairly equitably among the beneficiary population, since the innovations are geared toward the small and medium-scale farm household. The farming systems research approach which is being increasingly built into the project takes into account the whole farm, and the farm household, rather than simply one or two crops, and a single household head as decision-maker.

Socio-Cultural Feasibility and Issues:

This approach, however, is a significant departure from the current approach to agricultural research and extension in Morocco. In the socio-cultural context of Morocco, it implies a kind of egalitarian approach to the small and medium-scale farming population that is very different from the "top-down" approach which is most characteristic. Similarly, by including the whole farm and the farm household as the unit of analysis, it per force includes attention to women as contributors to agricultural production and to some agriculture-related decision-making. This, too, is a significant departure in Morocco. While it is clear from data obtained under the socio-economic research component of the project that women engage in agriculture production activities--and may have some decision-making authority in the spheres in which they participate--in general, it is a single, old, male head of household who is the primary decision-maker about all things affecting the household. This is essentially true whether or not younger male household members remain in the rural area working on the family farm.

However, with the continuing rural exodus, these intra-household relations are probably changing. Data now available indicate that young married and unmarried women are now migrating to town to work, as are young married and unmarried men. It is possible that the traditional dependence of all young married women on their husbands and their mothers-in-law may be somewhat mitigated by urban migration patterns. On the other hand, there is also evidence to indicate that increasingly, as land becomes more and more fragmented through inheritance, there is a tendency for male family members to try to ensure that women do not inherit their share of agricultural land on the death of the male household head. Similarly, where family members migrate to town, it is unlikely that women will receive their share of the crop which comes to the family of the proprietor under sharecropping arrangements.

Another, related issue is the high level of insecure tenure in the project area. As much as 30 per cent of land farmed is sharecropped and/or rented on a year-by-year basis. Whereas in the past, sharecropping was a means for a number of small, sub-subsistence farmers to group together to share their individually insufficient means of production, this pattern is changing. Larger landlords are now the main providers of land for sharecropping and/or rental. Whereas in the past, Muslim tradition dictated that the proprietor should contribute half of the inputs required for production on land that was sharecropped, and sharecropping arrangements might last for more than one year, the present pattern is quite different. In most instances, the proprietor no longer provides any of the inputs except the land itself. Sharecropping and rental arrangements are usually now only for one year, and there is a serious inflation in terms of rents and shares required as pressure on land increases despite the rural exodus.

These and other issues will be addressed under the project amendment through a series of particular studies to be carried out under the socioeconomic research component. The socio-cultural and political sensitivity which has already been demonstrated by the Moroccan researchers from INAV Hassan II is likely to ensure that answers to these questions which derive from the project studies will be accurate and reliable. The rapport between the small farmers who have been involved in prior studies under the project and the INAV researchers is very good, and care should be taken not to destroy it if some of these farmers are later involved in on-farm demonstrations of improved practices under the agronomic research component and/or under the companion Extension/Production project.

DRYLAND AGRICULTURE APPLIED RESEARCH PROJECT
608-0136
PROJECT PAPER AMENDMENT No.3

Commodity Procurement Plan Summary

This commodity procurement plan has been developed in collaboration with the GOM project implementing agencies, INRA and INAV-Hassan II. This procurement plan supports the project goal, purpose and objectives, while subsequently complementing the GOM procurement capability to support applied agricultural research and socio-economic analysis. This revised procurement plan takes into consideration A) the potential inputs to be provided under Project 609-0170, B) addresses the need to strengthen linkages with ongoing projects presently in the USAID agricultural portfolio, and C) meets the procurement priorities proposed for the Project 608-0136 project paper amendment. This revised procurement plan also addresses the needs of return participants scheduled to conduct Ph.D dissertation research in-country under this project. Of the dollar amount indicated, the Mission anticipates that 26 percent will be purchased in Morocco with local currency.

Considerable effort during contract negotiations will be devoted to questions of commodity procurement. The Mission intends that the Contractor will be responsible for developing commodity specifications, procuring under a competitive procurement program, arranging commodity shipment and insurance, clearing commodities and processing documentation through Moroccan customs, and, after arrival of the commodities in Morocco, establishing and maintaining a system to control, protect, preserve and maintain them.

The contractor shall be obligated to prepare a yearly procurement plan as part of the collaborative INRA-Contractor Annual Work Plan. This procurement plan will present an itemized procurement budget, describe previous procurements together with their cost, and will propose actions to resolve present or anticipated procurement problems. At the present time, the Mission believes that waivers may be necessary for vehicles. However, as we do not presently have details on the mix of vehicles that will be required nor do we have any firm idea on the potential need for shelf item or other possible waivers, we intend to concentrate on this question as part of the Mission's review and approval of the contractor's procurement plan.

DRYLAND AGRICULTURE APPLIED RESEARCH PROJECT 608-0136
 PROJECT PAPER AMENDMENT NO. 3 COMMODITY PROCUREMENT PLAN

Currency Source	Project Paper Amendment No. 2 AID Funding			Additional AID Funding			Project Paper Amendment No. 3 AID Funding			TOTAL
	#	\$ FX	\$ EQ	#	\$ FX	\$ EQ	#	\$ FX	\$ EQ	
Vehicles	20	70	54	14		171.0	34	70.0	225.0	\$ 295.0
Household Effects	4 sets	72		9 sets		180.0	13	72	180.0	252.0
Field Equipment		240.0	68.7		480.0	60.0		640.0	128.7	768.7
Ag. Extension Material		2.5	2.5		10.0	10.0		12.5	12.5	25.0
Socio-Economic			17.2			60.0			77.2	77.2
Soil Laboratory		61.9	7.0		31.0	4.0		92.9	11.0	103.9
Cereal Laboratory		35.9	5.0		135.0	15.0		170.9	20.0	190.9
Forage Laboratory		32.0	4.8		135.0	15.0		167.0	19.8	186.8
Laboratory Chemicals		8.5	8.0		10.0	10.0		18.5	18.0	36.5
Administration		11.0	16.5		85.0	98.0		96.0	114.5	210.5
Participant Support		19.0	6.0		75.0	25.0		94.0	31.0	125.0
Meteorological Station		2.0			2.0			4.0		4.0
Machinery Development		63.0	21.7		125.8	15.0		188.8	36.7	225.5
Laboratory Modification						50.0			50.0	50.0
Greenhouse					180.0			180.0		180.0
Pathology Laboratory					235.0	15.0		235.0	15.0	250.0
Entomology Laboratory					135.0	15.0		135.0	15.0	150.0
Weed Science Laboratory					44.0	6.0		44.0	6.0	50.0
Resource Library					280.0	20.0		280.0	20.0	300.0
Subtotal		617.8	211.4		1882.8	769.0		2500.6	980.4	
TOTAL			829.2			2651.8			3481.0	\$3,481.0

Project Paper Amendment No. 3

ANNEX 10

**Project Chaouia Summary
Socioeconomic Studies Program and Budget Breakout**

Three separate sub-component descriptions and budgets have been developed from a proposal submitted by the Hassan II National Agronomic and Veterinary Institute. The project paper amendment authorizes INAV-H2 to implement an Agricultural Information Resource Center program, a Haute Chaouia Socioeconomic research program, and a Haute Chaouia field research program carried out by INAV-H2 Bachelor of Science students and their advisors.

The study of agroeconomic behavior of 50 Farms in Haute Chaouia has some flexibility that allows the replication of these studies in an associated agroecological zone in the latter years of LOP. In order to provide necessary initial baseline data, in the event that this approach is chosen after the project evaluation in 1985, provision is made for student field studies to be carried out in the Abda Plain (Safi) and Ben Ahmed regions during years one and two. Both these regions adjoin the Haute Chaouia region, and are in the project zone.

Salaries will only be paid under the AID contribution if they are for contract researchers. If they are salaries for GOM employees, they will fall under the GOM contribution.

The vehicles that will be used in the socioeconomic program will be procured by USAID for INAV-H2. Appropriate source/origin waivers will be authorized by USAID. A micro-computer will also be procured for the Agricultural Information Resource Center that will standardize with the micro-computer procurement within the INRA institutional development program. This will facilitate exchange of research and socioeconomic data at the Aridoculture Center, Settat, during the formulation of INRA applied research programs.

The overseas trips which are budgeted under the first sub-component for the Agriculture Information Resource Center staff are for visits to various U.S. experiment stations and other U.S. organizations/institutions which provide up-to-date agricultural information to U.S. farmers.

I. Agriculture Information Resource Center

Objectives

Dissemination of information about specific events, activities and problems concerning the functioning of agricultural enterprises in the semi-arid zone.

The Center will gather precise, quantifiable, and qualitative information about a small number of parameters (this number will eventually be

increased over time), on price variations for inputs and outputs, changes in climatic, crop, and soil conditions, on specific state-run programs in the Ag sector and private sector activities; on production activities of farmers given these events and occurrences, and will attempt to comment constructively on the operation of the agricultural campaign during its annual development.

In the medium term, the Center should be able to produce a monthly Ag information bulletin including information on:

- a) the climatic situation and the development of various plant species;
- b) the technical and economic behavior of a sample of 50 representative farms;
- c) evaluative comments on concrete situations and trends affecting local agriculture;
- d) prices of key commodities at local markets.

Operations:

The staff of the new AIRC will be made up of three contract-hire Moroccan researchers:

- a) an agricultural economist;
- b) an agronomist specializing in cereal production;
- c) an ingenieur specializing in applied mathematics (statistics), who will develop a local data bank.

Needs over the life of the project in terms of office space, vehicles, materials, and clerical staff for center operations will be met under project funding, but without causing over-bureaucratization and inflationary orientations.

Development:

A period of 8-10 months will be necessary to design and establish the information system. At first, the bulletins will be published monthly and will be distributed for critical review only to INRA staff, the TA team, and INAV staff involved in the project. In the second phase, they will be distributed for review to the staff of Sottat DPA and its CTs, and, once reviewed, will lead to the preparation of bi-monthly bulletins. In the third phase, these bulletins will be available to local farmers and other concerned individuals and groups.

ANNEX 10

II. Cross-Sectional Study of 50 Farms, Study of Key Commodity Prices at Six Souks and Student Stages:

Objectives:

A continuation of the study carried out under Project Chaouia is envisaged. The ultimate objective is to have this study carried out by the staff of the AIRC with the assistance of DPA and CT staff. Results should assist the Administration, farmers and the agricultural profession to respond better to the risks faced by farmers. The study of key commodity prices at local markets will also be continued. These studies will be continued in Haute Chaouia for 2 more years, and may then be replicated in a different part of the project zone.

Start up:

The first year will combine refinement of the methodological approach and the start-up of the studies, together with necessary interviewers training.

During the first year, 3rd and 4th year INAV undergraduate students will pursue their stages (field studies) in the project area, probably in Safi and/or Ben Ahmed.

Analysis of results of the 50 farm and Souk studies should be carried out at the end of each study year.

III. Specific Studies in the Project Zone

These studies will be carried out by a) 3rd Cycle MS students and b) INAV researchers, either faculty or contractors. The mix should be carefully defined in terms of criteria of timeliness and sophistication of methodologies warranted by each topic.

Each year, results of studies carried out during that year will be analyzed before the next year's study plan is developed.

Illustrative study topics will be:

1. Consumption and standard of living of representative households;
2. Division of labor and age and sex roles in agricultural production;
3. Input distribution system and input prices to farmers;
4. System of production and marketing of agricultural goods;

ANNEX 10

5. Role of livestock on the farm;
6. Role of non-agricultural activities in farm operation;
7. Farm records development for family farms;
8. Modeling of different farm types;
9. Varieties of land tenure and access to land;
10. Means of reducing indirect and insecure tenure;
11. Development of minimum degree of self-sufficiency for small farmers;
12. Agricultural and consumption credit and other credit sources in the project area;
13. Time budget study of crop production.

	FY 78-83		FY 84		FY 85		FY 86		FY 87		FY 88		TOTAL	
	AID \$EQ	COM \$EQ	AID \$EQ	COM \$EQ	AID \$EQ	COM \$EQ	AID \$EQ	COM \$EQ	AID \$EQ	COM \$EQ	AID \$EQ	COM \$EQ	AID \$EQ	COM \$EQ
I. Agriculture Info Resource Center Program														
1. Research Staff	-	-	41.1	4	41.1	4	41.1	4	41.1	5	-	33	88.8	57
2. Program Support	-	-	14.9	8	13.6	9	12.0	9	9.8	10	-	7	50.3	36
Subtotal	-	-	56.0	12	54.7	13	53.1	13	50.9	15	-	40	214.7	93
II. Special Study Program														
1. Research Staff	-	-	23.1	3	23.1	3	23.1	2	23.1	2	-	-	92.4	10
2. Program Support	-	-	2.8	1	2.9	2	2.9	1	4.3	1	-	-	12.7	5
Subtotal	-	-	25.9	4	26.0	5	26.0	3	27.4	3	-	-	105.3	15
III. Chaloua Program														
1. Research Staff	47.9	15.0	86.3	10	38.6	12	38.6	8	38.6	7	-	-	365.3	53
2. Program Support	22.1	10.0	17.6	9	8.7	10	8.7	6	11.6	5	-	-	68.7	40
Subtotal	70.0	25.0	103.9	19	47.3	22	47.3	14	50.2	12	-	-	318.7	93
SUMMARY PROGRAM TOTAL	70.0	25.0	185.8	35	128.0	40	126.4	30	128.5	30	-	40	638.7	200

PROJECT STATUTORY CHECKLIST
SUMMARY

A. GENERAL CRITERIA FOR PROJECT

1. Appropriations Act Sec. 521, FAA Sec. 634;
Sec. 655 (b).
 - (a) Describe how authorizing and appropriations committees of Senate and House have been or will be notified concerning the project; (b) Is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than \$1 million over that amount)?
 - a. CONGRESSIONAL NOTIFICATION
 - b. YES

2. FAA Sec. 611 (a)(1). Prior to obligation in excess of \$100,000, will there be (a) engineering, financial other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance.
 - a. YES
 - b. YES

3. FAA Sec. 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 purpose of the assistance?

BASED ON RECENT DISCUSSION INRA AUTONOMOUS STATUTE WILL BE APPROVED SOON BY GOM LEGISLATIVE UPPER ECHELON.

4. FAA Sec. 611 (b); Appropriations Act. Sec. 501. If for water or water-related land resource construction, has project met the standards and criteria as set forth in the Principles and Standards for Planning Water and Related Land Resources, dated October 25, 1973?

NOT APPLICABLE

5. FAA Sec. 611 (e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed \$1 million, has Mission Director certified and also taken into consideration the country's effective capability to maintain and utilize the project.

YES

6. FAA Sec. 209. Is the project susceptible to execution as part of a regional or multilateral project? If so why is project not so executed? Information and conclusion whether assistance will encourage regional development programs.

NO

7. FAA Sec. 601 (a). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; and (c) encourage development and use of cooperatives, and credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of agriculture, industry, and commerce; and (f) strengthen free labor unions.
- PROJECT WILL IMPROVE THE EFFICIENCY OF LOCAL AGRICULTURE AND IMPROVE TECHNICAL EFFICIENCY OF AGRICULTURE, INDUSTRY, AND COMMERCE.
8. FAA Sec. 601 (b). Information and conclusion on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channel and the services of U.S. private enterprise).
- U.S. ACADEMIC TRAINING WILL BE PROVIDED BY U.S. INSTITUTIONS, PROJECT COMMODITIES PROCUREMENT WILL BE LARGELY FROM U.S. SOURCES.
9. FAA Sec. 612 (b), 636 (h); Appropriation Act Sec. 507. Describe steps taken to assure that, to the maximum extent possible, Morocco is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized in lieu of dollars.
- GOM WILL CONTRIBUTE AT LEAST 25% OF THE COST OF THE PROJECT.
10. FAA Sec. 612 (d). Does the U.S. own excess foreign currency of Morocco and, if so, what arrangements have been made for its release?
- NO
11. FAA Sec. 601 (e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise?
- YES
12. Appropriation Act Sec. 519. If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity?
- NOT APPLICABLE

B. FUNDING CRITERIA FOR PROJECT**1. Development Assistance Project Criteria**

a. FAA Sec. 102 (b), 111, 113, 281 (a).
Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, spreading investment out from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained basis, using the appropriate U.S. institutions: (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic, private, and local governmental institutions; (c) support the self-help efforts of developing countries, (d) promote the participation of women in the national economies of developing countries and the improvement of women's status; and (e) utilize and encourage regional cooperation by developing countries.

PROJECT SHOULD ASSIST IN A POSITIVE MANNER WITH FULFILLING ITEMS (A), (B), (C), (D), AND (E).

b. FAA Sec. 103, 103A, 104, 105, 106, 107.
Is assistance being made available:

(1) (103) for agriculture, rural development or nutrition; if so (a) extent to which activity is specifically designed to increase productivity and income of rural poor; (103A) if for agricultural research, full account shall be taken of the needs of small farmers, and extensive use of field testing to adapt basic research to local conditions shall be made; (b) extent to which assistance is used in coordination with programs carried out under Sec. 104 to help improve nutrition of the people of developing countries through encouragement of increased production of crops with greater nutritional value, improvement of planning, research, and education with respect to nutrition, particularly with reference to improvement and expanded use of indigenously produced foodstuff; and the undertaking of pilot or demonstration of programs explicitly addressing the problem of malnutrition of poor and vulnerable people; and (c) extent to which activity increases national food security by improving food policies and management and by strengthening national food

THE PROJECT IS AN APPLIED AGRICULTURAL RESEARCH PROGRAM DESIGN TO IMPROVE CULTIVATION PRACTICES AND DEVELOP IMPROVED AGRICULTURAL SYSTEMS WHICH WILL LEAD TO INCREASED AGRICULTURAL PRODUCTION. SOCIO-ECONOMIC STUDIES WILL BE CONDUCTED TO INSURE AGRICULTURE SYSTEMS THAT ARE EITHER IMPROVED OR DEVELOPED ARE COMPATIBLE WITH LOCAL CUSTOMS AND DESIRES. THE PROJECT IS DESIGNED TO MAKE POSITIVE IMPACT ON NUTRITIONAL LEVELS VIA INCREASED PRODUCTION OF CROPS IN RURAL LOW RAINFALL AREAS WHERE HOUSEHOLDS CONSUME SIGNIFICANT LOCAL PRODUCE.

reserves, with particular concern for the needs of the poor, through measures encouraging domestic production, building national food reserves, expanding available storage facilities, reducing post harvest food losses, and improving food distribution.

(2) (105) for education, public administration or human resources development; if so, extent to which activity strengthens non-formal education, makes formal education more relevant, especially for rural families and urban poor, or strengthens management capability of institutions enabling the poor to participate in development.

THE PROJECT IS DESIGNED TO TO DECENTRALIZE APPLIED AGRICULTURAL RESEARCH MANAGEMENT TO PERMIT PRODUCER PARTICIPATION IN ON-FARM PRODUCTION RESEARCH.

c. FAA Sec. 110 (a). Will Morocco provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or has the latter cost-sharing requirement been waived for a "relatively least developed" country)?

YES

d. FAA Sec. 110 (b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing, or is the recipient country "relatively least developed"?

NO

e. FAA Sec. 281 (b). Describe extent to which program recognizes the particular needs, desires and capacities of the people of Morocco; utilizes the country's intellectual resources to encourage institutional development; and supports civil education and training in skills required for effective participation in governmental processes essential to self-government.

THE PROJECT EMPHASIZES IMPROVEMENT IN ANALYTICAL, MANAGERIAL AND TECHNOLOGICAL EXPERTISE AND UTILIZES THE INDIVIDUALS INVOLVED WITH DEVELOPING BOTH PUBLIC & PRIVATE INSTITUTIONS BY PROVIDING TRAINING TO THOSE RESPONSIBLE MOROCCANS.

f. FAA Sec. 122 (b). Does the activity give reasonable promise of contributing to the development of economic resources, or to the increase of productive capacities and self-sustaining economic growth?

YES

7. International Air Transport. Fair Competitive Practices Act, 1974. If air transportation of persons or property is financed on grant basis, will provision be made that U.S. carriers will be utilized to the extent such service is available? YES
8. Appropriations Act Sec. 504. If the U.S. Government is a party to a contract for procurement, does the contract contain a provision authorizing termination of such contract for the convenience of the United States? YES

B. OTHER RESTRICTION

1. FAA Sec. 122 (b). If development loan, is interest rate at least 2% per annum during grace period and at least 3% per annum thereafter? NOT APPLICABLE
2. FAA Sec. 301 (d). If fund is established solely by U.S. contributions and administered by an international organization, does Comptroller General have audit rights? NOT APPLICABLE
3. FAA Sec. 620 (h). Do arrangements exist to insure that United States Foreign aid is not used in a manner which is neither contrary to the best interest of the United States nor promotes or assists the foreign aid projects or activities of the Communist-block countries? YES
4. Will arrangements preclude use of financing:
- a. FAA Sec 104 (f). To pay for performance of abortions as a method of family planning or to motivate or coerce persons to practice abortions; to pay for performance of involuntary sterilization as a method of family planning, or to coerce or provide financial incentive to any person to undergo sterilization? YES
- b. FAA Sec. 620 (g). To compensate owners for expropriated nationalized property? YES

- c. FAA Sec. 660. To provide training or advice or provide any financial support for police, prisons, or other law enforcement forces, except for narcotics programs? YES
- d. FAA Sec. 662. For CIA activities? YES
- e. FAA Sec. 636 (i). For purchase, sale, long term lease, exchange or guaranty of the sale of motor vehicles manufactured outside U.S., unless a waiver is obtained. YES
- f. Appropriations Act Sec. 503. To pay pensions, annuities, retirement pay, or adjusted service compensation for military personnel? YES
- g. Appropriations Act Sec. 505. To pay U.N. assessments, arrearages or dues. YES
- h. Appropriations Act Sec. 506. To carry out provisions of FAA section 209 (d) (Transfer of FAA funds to multilateral organizations for lending.) YES
- i. Appropriations Act Sec. 508. To finance the export of nuclear equipment fuel, or technology or to train foreign nationals in nuclear fields? YES
5. Appropriations Act Sec. 509. Will assistance be provided for the purpose of aiding the efforts of the government of Morocco to repress the legitimate rights of the population of Morocco contrary to the Universal Declaration of Human Rights? NO
6. Appropriation Act Sec. 513. Will arrangements preclude use of financing for publicity or propaganda purposes within U.S. not authorized by Congress? YES

STANDARD ITEM CHECKLIST

A. PROCUREMENT

1. FAA Sec. 602. Are there arrangements to permit U.S. small business to participate equitably in the furnishing of commodities and services financed? YES

2. FAA Sec. 604 (a). Will all procurement be from the U.S. except as otherwise determined by the President or under delegation from him? YES

3. FAA Sec. 604 (d). If Morocco discriminates against U.S. marine insurance companies, will commodities be insured in the United States against marine risk with a company or companies authorized to do a marine insurance business in the U.S.? MOROCCO DOES NOT DISCRIMINATE AGAINST U.S. MARINE INSURANCE COMPANIES.

4. FAA Sec. 604 (e); ISDCA of 1980 Sec. 705 (a). 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? (Exception where commodity financed could not reasonably be procured in U.S.) NONE

5. FAA Sec. 603. Is the shipping excluded from compliance with requirement in section 901 (b) of the Merchant Marine Act of 1936, as amended, that at least 50 per cent of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on privately owned U.S. - flag commercial vessels to the extent that such vessels are available at fair and reasonable rates? NO

6. FAA Sec. 621. If technical assistance is financed, to the fullest extent practicable will such assistance, goods and professional and other services be furnished from private enterprise on a contract basis? If the facilities of other Federal agencies will be utilized, are they particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs? YES. NO USE OF OTHER FEDERAL AGENCIES IS PLANNED.

ANNEX 12

Economic and Financial Analysis

Tables:

- A. Cost of Production, 26 ha.
- B. Economic Analysis, 26 ha.
- C. Cost of Production, 7 ha.
- D. Economic Analysis, 7 ha.

Assumptions for Farm Financial Analysis

Farm Profile, 26 Hectare Farm

Analysis looks at returns to labor and management. Family labor costs are not included.

1. Yields are average for medium size farm, Settat Province.
2. Producer prices are 4-month average of free market prices, 1982, in Settat area. Cereal sales since 1957 illustrate that from June-September, over 80% of total grain is commercialized. (Grain Storage, Handling and Distribution, KSU, Morocco 1969.)
3. Revenue is calculated at 100% for land owned and 1/2 of production from land share-cropped. Although several arrangements are practiced, this appears to be the most common.
4. Cost of production of legumes is estimated in Laraichi, et. al Propriete des moyens de production et possibilites d'emploi, Chaouia et Beni Meskine. 1977-78, INAV.
5. Cost of production per hectare of maize is calculated at 23 man/days in Laraichi, et. al.
6. Wage rate is estimated at 15 dirham/man day. Wage is average paid to agricultural labor in Haute Chaouia area. INAV estimation verified by calculating opportunity cost of labor.
7. Straw averages 1 MT/hectare.
8. Bovine yields 400 litres/year of milk x 1.2 dh/litre.
9. Sale price of cross-breed cow is 4,000 dh.
10. An average sheep will give up about 2 kg of wool x 10 dh.
11. Feed calculations are the following:
 - sheep: 2 kh/day x 120 days (July-October) 2.4 QT x 50 dh/QT 120 dh.
 - donkey, work ration: 300 days x 3 kg/day 9 QT x 5 dh/QT 45 dh.
 - cows: 7 kg/day x 120 days 10.8 QT x 50 dh/QT 54 dh.

TABLE A : COST OF PRODUCTION
26 Hectare Farm

<u>DURUM WHEAT</u>	<u>PRESENT</u>	<u>YEAR 1</u>
Land Preparation (2 cover crops X 50 DH)	100	100
Seeding Labour	3	3
Seeds	84	168
Fertilizer	95	95
Labor (3 hrs)	4	7
Manual Weeding	150	--
Herbicides	--	50
Labor	--	8
Harvest (mechanical)	200	200
Crop Transport (to home, mechanical)	100	100
Labor	15	20
Threshing (labor - 6 days)	90	120
Transport to Market (2 days)	30	30
Grain Sacks (12 sacks @ 8.5 DH/2 yrs)	51	68
	<hr/>	<hr/>
	922	969

5%

Note: figures are in dirham per hectare

(Table A Continued)

COST OF PRODUCTION

26 Hectare Farm

<u>BREAD WHEAT</u>	<u>PRESENT</u>	<u>YEAR 1</u>	
Land Preparation (2 cover crops X 50 DH)	100	100	
Seeding Labour	3	3	
Seeds	80	163	
Fertilizer	95	95	
Labor	4	7	
Herbicides	--	50	
Labor (5 days)	--	8	
Harvest	200	200	
Bundling	100	100	
Transport (mechanical)	100	100	
Labor	15	20	
Transport to Market (labour - 3 days)	45	45	
Threshing labor	90	105	
Grain Sacks (12 sacks @ 8.5 DH/2 yrs)	51	68	
	<hr/>	<hr/>	
	883	1,064	20%

Note: figures are in dirham per hectare

(Table A, Continued)

COST OF PRODUCTION

26 Hectare Farm

<u>BARLEY</u>	<u>PRESENT</u>	<u>YEAR 1</u>	
Land Preparation (2 cover crops X 50 DH)	100	100	
Seeding Labour	3	3	
Seeds	60	120	
Fertilizer	--	95	
Labour	--	7	
Weeding-Chemical	--	50	
Labour (6 days)	90	8	
Harvest: Combine	200	200	
Bundling	100	100	
Transport (mechanical)	100	100	
to grain storage (labour)	15	20	
to market (labour)	15	30	
Threshing	90	120	
Labor (6 days)			
Grain Sacks (12 sacks @ 8.5 DH/2 yrs)	51	68	
	<hr/>	<hr/>	
	824	1,021	20%

Table B :

Economic Analysis

Changes in Major Crop production and costs as a result of improved practices and valued at economic prices, 26 hectare farm, Haute Chaouia N-N/W.

<u>Item</u>	<u>Change (DH)</u>	<u>Ratio: Economic Prices to Market Prices</u>	<u>Economic Value Of Change (DH)</u>
<u>Production</u>			
Durum	2,907	.77	2,238.4
Bread Wheat	1,288	.74	953.4
Barley	<u>1,418</u>	1.02	<u>1,446.4</u>
Total Change	5,613		4,648.2
<u>Costs*</u>			
Durum	909.2		
Bread Wheat	692		
Barley	1,147		

Total Change in Cost: 2,748.2
 Net Change in Production: 1,900
 Benefit-Cost Ratio: 1.7:1

*Shadow prices factored; includes labor, seed, herbicide, fertilizer, etc. (See Work Tables, Annex ____.)

Assumptions for Farm Financial Analysis
Farm Profile, 7 Hectare Farm

Analysis includes all labor costs, including family labor, although children's and women's labor in livestock activities is not included.

Assumptions of labor costs, producer prices, share-cropping arrangement straw yields, milk yields and feed calculations are the same as for the 26 hectare farm.

Additionally,

1. Maize requires 36 man/dahys to cultivate using a tractor for land preparation and animal traction for harrowing, weeding; maize is manually harvested.
2. Legume labor requirements are 60 man/days per hectare. (from Laraichi, et. al. Propriete des moyens de production et possibilites d' emploi, 1977-78, INAV.)
3. Yields are average for small farms in Haute Chaouia, Settat Province.

Table C:

COST OF PRODUCTION

7.1 Hectare Farm

<u>DURUM WHEAT</u>	<u>PRESENT</u>	<u>YEAR 1</u>	
Land Preparation (1 cover crop)	50	50	
Harvesting	200	200	
Labour: 30 Man/days	450	345	
Inputs:			
seeds	84	168	
fertilizer	--	95	
herbicides	--	50	
grain sacks	<u>51</u>	<u>68</u>	
	835	976	16%

Note: figures are in dirham per hectare

(Table C Continued)

COST OF PRODUCTION

7.1 Hectare Farm

<u>BREAD WHEAT</u>	<u>PRESENT</u>	<u>YEAR 1</u>	
Land Preparation (1 cover crop)	50	50	
Harvesting	200	200	
Labour: 20 Man/days	300	165	
Inputs:			
seeds	80	113	
fertilizer	--	95	
herbicides	--	50	
sacks	<u>51</u>	<u>68</u>	
	681	791	16%

Note: figures are in dirham per hectare

(Table C Continued)

COST OF PRODUCTION

7.1 Hectare Farm

<u>BARLEY</u>	<u>PRESENT</u>	<u>YEAR 1</u>	
Labour: 38 Man/Days	570	480	
Inputs:			
seed	60	120	
fertilizer	--	95	
herbicides	--	50	
sacks	<u>51</u>	<u>68</u>	
	681	813	19%

Note: figures are in dirham per hectare

Table D:
(Revised)

ECONOMIC ANALYSIS

Changes in revenues and costs of major crops as a result of introducing improved practices: 7 Hectare farm, Haute Chaouia, N-N/W.

<u>Item</u>	<u>Change (DH)</u>	<u>Ratio Economic Prices to Market Prices</u>	<u>Economic Value of Change</u>
<u>Revenue</u>			
Durum (.46 ha)	190	.77	146.3
Bread Wheat (.64 ha)	191	.74	141.3
Barley (2.49 ha)	<u>869</u>	1.02	<u>886.4</u>
TOTAL CHANGE	1,250		1,174.0
<u>Costs*</u>			
Durum (.46 ha)			66
Bread Wheat (.6 ha)			68
Barley (2.49 ha)			<u>328</u>
TOTAL CHANGE			462

★ ★ ★ ★ ★ ★ ★ ★ ★

Net Change in benefits: 1,250
 Net Change in cost : 462
 Benefit-Cost ratio : 2.7:1

*Shadow prices factored; includes labor, seed, herbicides, fertilizer, etc.

Costs and Revenues:¹
Work Table for Economic Analysis

			(dh)
Durum	459,000		969 per ha cost
Barley	707,000		920 per ha cost
Bread Wheat	164,000		960 per ha cost

	<u>HA</u>	<u>COSTS</u>	<u>REVENUES</u>
2% Durum	9180	8,895,420	2,864,160
Barley	14140	13,008,800	3,088,176
Bread Wheat	3280	3,148,800	921,024
		<u>25,053,020 (dh.)</u>	<u>\$6,873,360</u>
Total		\$ 3,854,310	
10% Durum	45900	44,477,100	14,320,800
Barley	70700	65,044,000	15,440,880
Bread Wheat	16400	15,744,000	4,605,120
		<u>109,521,100 (dh.)</u>	<u>\$29,766,405</u>
Total		\$ 16,849,400	
20% Durum	91800	88,954,200	28,641,600
Barley	141400	130,088,000	30,881,760
Bread Wheat	32800	31,488,000	9,210,240
		<u>250,530,200 (dh.)</u>	<u>\$68,733,600</u>
Total		\$ 38,543,107	
30% Durum	137700	133,431,300	42,962,400
Barley	212100	195,132,000	46,322,640
Bread Wheat	49200	47,232,000	13,815,360
		<u>375,795,300 (dh.)</u>	<u>\$103,100,400</u>
Total		\$ 57,814,661	

¹ Yields = 30% increase per cereal

Barley \$12; Bread Wheat \$18; Durum \$24 per quintal.

ANNEX 13

Administrative Analysis

Background:

Since the preparation of the original design for this project in 1977-78, a major institutional reorganization has taken place. The Ministry of Agriculture and Agrarian Reform (MARA) originally had straight-line authority over all agricultural research functions, as well as related extension functions. This form of organization tended toward acute centralization of decision-making, and encumbered the research system. It was found that the performance of the Agronomic Research Directorate (DRA) was seriously hampered by this form of organization, and as a result, national responsibility for agronomic research was vested in a new Institute, the National Agronomic Research Institute (INRA) in 1980. The Director of INRA is directly responsible to the Minister of Agriculture, and the INRA annual budget is presented directly to, and received from, the Ministry of Finance through the MARA.

In 1983, the process whereby INRA becomes an autonomous institution under the supervision of the Minister, has nearly been completed (see Chart 1). The administration has approved the new INRA statute, and final approval is expected from the King at any moment.

A new statute for INRA will allow the Institute to address a number of problems which have direct bearing on the effective performance of activities under this project. For example, as an autonomous institution, INRA can raise salaries of professional as well as of support staff, to make them commensurate with those paid to equivalent personnel in higher education (such as the professional staff of INAV Hassan II), and of the ORMVAs respectively. This should make assumptions about retention of returned participant trainees much more realistic than they may have been in the past, when INRA was paying equivalent professionals significantly less than was available to INAV staff. This, in turn, also makes it more likely that when the National Aridoculture Center is completed and made an attractive place to work and to live, return participants and other INRA professionals and support staff will be willing to work there over the long term.

The new statute also permits INRA to establish specialized criteria for entry to professional researcher positions and to

promote researchers on the basis of performance (rather than strictly on that of tenure). If these authorizing measures will, in fact, be implemented, on the basis of sound professional standards, it will not only do much to raise the quality of the institution, but will make it a unique pilot experiment in non-personalized management of a GOM institution.

INRA Staffing Pattern and Organization Chart:

Chart 2 reflects the original INRA organization chart. Chart 3 indicates changes which are proposed. The final organization chart has not yet been officially determined. Chart 2 reflects an INRA structured like the old DRA, but without the original plant protection and seed multiplication cells. Chart 3 reflects a streamlined central directorate and some changes in the regional centers and satellite centers. On none of these charts is a "National" Aridoculture Center in Settati clearly indicated as a separate entity.

AID's recent evaluation of the project had recommended the establishment of such a Center reporting directly to the INRA Director. Private talks with the Director in early July have suggested that this is not feasible, and may not be necessary or desirable, at least in the short-run. He is concerned lest such a change establish a precedent for other special interest activities in the field; he is eager to delegate increasing responsibilities to the field level (a development which we have encouraged) and is afraid that a special reporting relationship to headquarters might contradict this tendency; and lastly, he confirms that he is prepared to reconsider this matter at such time as he has staffed-up Settati with returned participants (see below), and the Center has begun to generate meaningful results.

A related matter is the status of the Director of the Center at Settati. At present, the acting Director is also the Director of Research for the Region. More importantly, the incumbent does not have a Ph.D. and cannot command the professional respect or provide technical leadership, to the Moroccan cadres. The INRA Director has acknowledged this problem and has agreed to appoint a new Director as soon as an appropriate individual with a Ph.D. in an agricultural field having strong research administration experience has been identified. In the meantime, he notes (properly), that most of the tasks involve administrative and logistical issues.

Another issue which was raised in the context of the recent special project evaluation concerns the integration of socioeconomic and agronomic research within INRA. The structure for INRA proposed under the draft Master Plan includes a Directorate for Information and Social Sciences. This Directorate would include separate services for documentation, editing and dissemination of research results, and studies, as well as separate services for international institutional coordination and for national institutional coordination. It is still unclear when--and if--this Directorate will be

created and staffed, but in the meantime, all parties have agreed to establish new pilot modes of integration in cooperation with INAV-Hassan II as are described in this amended project paper.

Implementation Constraints:

The recent evaluation raised several points relating to implementation constraints of an administrative/managerial nature. On the GOM side, problems of constrained operational budget, poor planning for equipment, vehicular and other needs, the lack of clarity of the status of the Center and its pro tem Director (discussed above), the problem of low salaries, and of unavailability of suitable cadres to be sent for long term participant training, were cited. In the context of the on-going PL 480 Title I negotiations with the GOM, the USAID is attempting to ensure that some of the constraints listed are met through the attribution of local currency generations to the GOM contribution under the proposed amendment to Project 0136.

In this context, the project amendment includes provision for the establishment and maintenance of a variety of management systems which should improve INRA's performance under the project. These include a proposed system for motor pool management, and one for allocation of staff. Further, there are short-term training options included under the amendment which should make it possible for INRA to improve the performance of some of its technical and support staff--as well as members of the professional staff--without the necessity for long term participant training, therefore the numbers of long term trainees have been substantially reduced to conform with more realistic estimates.

While the project itself can do some of the work toward relaxing implementation constraints, and while AID and the GOM--through the PL 480 negotiations--can do some of the rest, a considerable amount remains for the senior management of INRA. Here again, a number of the identified constraints to effective implementation are addressed in the draft Master Plan, and strongly re-inforced by USAID representations to top management of MARA in the context of the PL 480 Self-Help negotiations. A further new development is that the INRA Director is seeking grant funded institutional support from ISNAR, an international research center which is designed to provide such support to national research institutions over the long term.

In the context of developing the project amendment, a number of discussions have taken place between senior management of the USAID and the INRA Director, as well as between the project manager and lower-level INRA staff. In addition, in the context of the special evaluation, a number of discussions were held between the USAID staff and the present contract team leader. These discussions have brought about clarification and remedial steps in a number of points about project implementation. Included among these are more effective management on the part of the USAID. USAID/Rabat has recently become the base for a regional contracting officer and a regional legal advisor. The advent of these two officers will

substantially improve the Mission's ability to monitor this project and related contracts. Similarly, the Agriculture Division is likely to receive additional positions, which will allow more effective project management on a day-to-day basis, particularly of the socioeconomic component of the project. A recent visit from a senior manager from the S&T Bureau has led to inclusion in the design of the project amendment of short-term consulting services from a number of centrally-funded projects which should assist the USAID in providing the contractor and INRA with up-to-date information on a variety of issues involved in the agronomic and socioeconomic research components.

On the contractor's side, the presence in-country of a new team leader, and of an additional scientist, has significantly improved contractor performance. The proposed increase in the TA team from seven to twelve members is likely to ensure that research activities will be better conceived and better implemented. However, this many long-term technical assistants will, in a sense, place an additional burden on INRA counterparts, as well as enabling them to benefit from a broader base of technical expertise. Given the relative poverty of the Aridoculture Center in professional and administrative and support staff, finding effective counterparts for each of these expatriate experts may prove difficult.

Under the amendment, TA is proposed to increase the back-stopping of the contract field team at the home institution, which should, in turn, improve performance in terms of commodity procurement, forwarding of required technical information to the field, and the placement of participants. Greater use of short-term consultants from the contractor's institution as well as from other U.S. universities and research organizations is also likely to improve substantive performance, and will benefit INRA counterparts who will receive updates on the state of the art in particular sub-disciplines. However, it is important to ensure that these professional benefits will in fact accrue to the INRA counterparts, rather than U.S. short-term consultants working primarily with U.S. technical assistants in the field. One way of ensuring this is to program these short-term visits well in advance, in the context of the annual joint planning exercise.

This planning exercise has taken place twice in the last two years, and the system is being perfected. In addition, there was a second Aridoculture Seminar early this year, which assists all parties to the project to share their research results and to plan further research activities and priorities. This process will continue under the amended LOP, and will be supplemented by a series of seminars about particular research areas as well as about more general research matters.

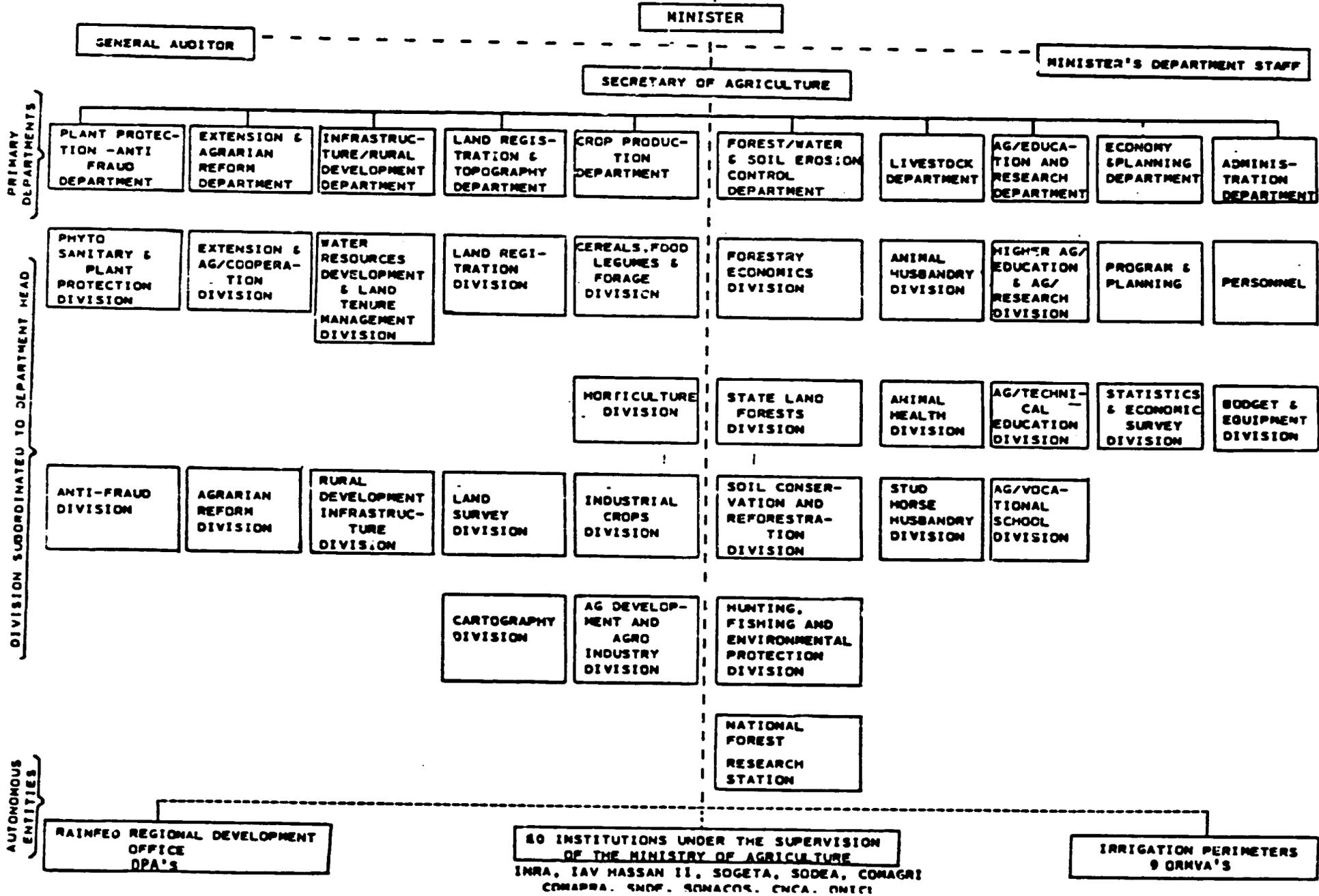
A certain amount of momentum has been achieved in the last year of project operation, and relationship between the contract field team and INRA/Sejjat and Rabat have considerably improved. There is a new air of confidence and cooperation. However, this will be lost if a new contractor is selected; relationships will have to be established all over again, and new systems developed. It is certain that this kind of situation would vastly increase

implementation constraints rather than relaxing them, and if a new contractor is selected, it will be crucial that in project implementation, the issues already raise--and new ones that will arise--be swiftly dealt with by all parties.

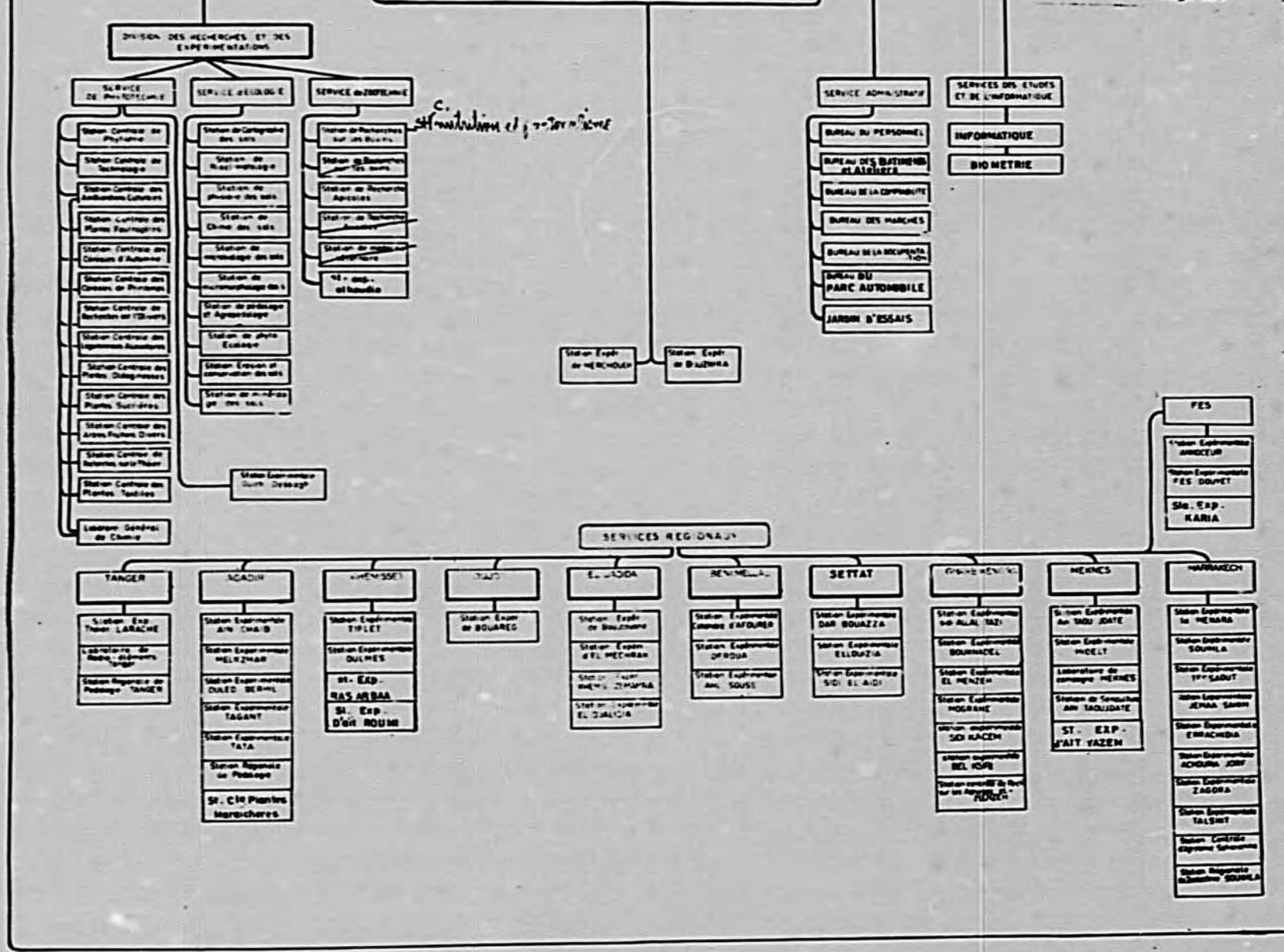
It is also suggested that the two special evaluations which are proposed for FY 85 and FY 87 include a significant proportion of questions about management and administrative relationships in the context of some of the issues that have been raised in this analysis, and in the last special evaluation report. Annual internal evaluations should also address these issues, and other, related, management questions.

Chart 1

MINISTRY OF AGRICULTURE & AGRARIAN REFORM (M.A.R.A.)



INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE



St. Exp. de Herouan et de Bordj

Best Available Document

Dryland Agriculture Applied Research Project 608-0136
Project Paper Amendment No. 3

INITIAL ENVIRONMENTAL EXAMINATION

Project Location: Morocco

Project title: Dryland Agriculture Applied Research (Amended)

Funding: FY 1978 through FY 1988 total project cost is estimated at \$38,259,400, of which \$11,936,400 is to be provided by the Government of Morocco.

Life of Project: Ten years

IEE prepared by: Arlan B. McSwain, Agricultural Development Officer, USAID/Rabat.

Date: June 10, 1983

Action Recommended: Mission recommends a negative determination on the grounds that this project will not have a significant effect on the environment as defined in Regulation 16.

Discussion: This amendment is an extension of Project 608-0136 signed in 1978 and nothing in the project has changed the conclusion of the original IEE. Small amounts of fertilizer and herbicides will be used by project personnel for research purposes only under the conditions set out in Regulation 16, section 216.3 (b)(2)(iii).

Concurrence:

Richard Cline
Mission Director

07/04/83
Date

Dryland Agriculture Applied Research Project 608-0136
Project Paper Amendment No. 3

A N N E X 15
CONTRACTING PLAN

ISSUE: To determine whether the MIAC Contract can be amended non-competitively under the Dryland Agriculture Applied Research Project (608-0136) when the contract extension would be for the continuation of activities designed to meet the same goal originally established in the contract but would increase the contract costs from \$4.5 million to approximately \$25 million.

SUMMARY:

The MidAmerica International Consortium (MIAC) is currently implementing the Dryland Agriculture Applied Research Project under a Collaborative Assistance style AID Direct Contract. Under this amendment, the technical assistance activities will be broadened to include an expansion of current research in major cereals, forage and grain legumes, mechanization, rural sociology, and agricultural economics. Special design requirements, particularly the need for close coordination between the social, biological and engineering research and the Moroccan institutions with responsibility in these areas, require that the services of a single contractor be utilized to implement the Project. Sound project design appears to dictate that MIAC continue to serve as the contractor for these additional activities for reasons discussed below. The technical requirements of the activities proposed give MIAC a unique capability to provide the services needed, based on both past experience in dryland agriculture crop research (especially in cereal grain-legume rotations) and current activities in Morocco. This meets the criteria listed under Paragraph 7-3.101-50(b)(5) and Paragraph 7-3.101-50(b)(5) of the AID Procurement Regulations. This approval of the non-competitive review board is therefore sought for the non-competitive procurement for implementation of the expanded project activities through amendment of the AID direct contract with MIAC.

FACTS:

This project was originally developed by a feasibility study. The contract for the feasibility study was competed among Title XII institutions with the statement that the institution awarded the contract for the study would also implement the project. (This process was a precursor to the now established Collaborative Assistance procedures). MIAC was awarded the contract for the feasibility study and subsequently became the implementation contractor. The original project paper stated that although the project could take up to ten years it was being designed for five years (Phase I), during which time contractor input was critical. However, although the Project Agreement was signed on August 31, 1978, the contract with MIAC for \$4.5 million was not signed until February, 1980. Because of the late signing of the contract

the initial inability of MIAC to field French-speaking agronomists, slow GOM response to nominate candidates for Ph.D training in the U.S., and a severe drought which yielded invalid field trial data for the first year program, progress was initially very slow. Moreover, the MIAC performance came under substantial criticism in a 1982 audit report. As a result of that Audit Report, changes were made and the MIAC performance has considerably improved. An excellent chief-of-party and changes in the backstopping arrangements in the U.S. have resulted in better relationships with the GOM and well prepared work plans which are being implemented. A recent evaluation of the project has stated that "It is the judgment of the evaluation team that the administrative causes of implementation delay have been ameliorated and that the Project activities are now proceeding with reasonable dispatch. The technological and institutional objectives, as well, remain valid. The evaluation recommendations are to realign the project activities with a new implementation schedule, and to provide additional financial resources to enable full implementation of activities envisioned in the original Project Paper."

The evaluation report also points out that "In general, the failure to implement activities on schedule, compounded by an underdesigned, overly-ambitious, and underfunded project and the impact of inflation has caused the erosion of grant resources available for implementation ... The strategy presented in the original Project Paper for problem resolution and achievement of project technological and institutional objectives is still the most viable and should be pursued more rigorously."

On the basis of this evaluation and the recommendations of the current MIAC staff, the Mission finds that in order to accomplish the project goals, it must increase the technical assistance to provide research specialists in additional fields, increase the training component, and procure additional commodities in an expanded Phase I effort of ten years under this project. These activities are best carried out by a Title XII institution or group of institutions. Under these circumstances there are strong arguments for continuing with MIAC as the contractor.

Policy and Regulations

A. Policy - The AID Policy Paper on Food and Agricultural Development states with respect to programming implications that:

"Technical assistance in the form of training opportunities and technical advisors will comprise a major mode of A.I.D. support for food and agricultural development."

In PD-4, Policy Directive on Title XII, the Administrator urges that Title XII institutions be used in the implementation of food and agriculture projects wherever possible. In so doing, he notes that one of the purposes of the Title XII legislation is "to encourage the

provision of increased and longer term support to the application of science to solving food and nutrition problems of the developing countries." (emphasis supplied). Again, in the Policy Paper, it is stressed that assistance in food and agriculture should be thought of in terms of "long term efforts in a few priority areas that involve joint and collaborative efforts with host country public and/or private institutions at every stage..." This kind of assistance implies institution building. "Institutional development takes time - time to build capacity, time to develop effective working relationships with local populations, time to adapt a priori models of institutional development to on-the-ground circumstances. Thus A.I.D. must be in a position to make longer term commitments to institutions (both public and private) and must be prepared to support a wide range of institutional development requirements. There are two implications. First, projects clearly dependent upon sustained institutional development, will normally be designed and approved for a period of five to ten years, including provision for timely evaluation and redesign." (emphasis supplied) Policy Paper on Institutional Development.

B. Regulations

Under AIDPR Section 7-3. 101-50, Justification for Non-Competitive Negotiations, the following justifications are relevant:

- " (3) Contracts for which one source is considered to have exclusive or predominant capability by reason of experience, specialized facilities or technical competence to perform the work within the time required and at reasonable prices."
- "(5) Amendments to contracts which provide for continuation of activities designed to meet the same goal originally established in the contract (such amendments may not extend the contract beyond the life of the project as established in the Project Paper.)"

Discussion

A. Contract Amendments

Under subparagraph (5) quoted above, A.I.D. may negotiate non-competitive amendments to contracts under certain conditions: (1) the contracts provide for a continuation of activities and (2) the activities are designed to meet the same goal (sic) originally established in the contract. The goal* of the original MIAC contract is to develop an applied agricultural research program leading to increased cereal, legume and forage crop production in the rainfed areas of Morocco. The three major aims of this applied research program are:

- a. Adapt existing technology and subsequently develop appropriate technology to the local conditions in order to increase farmers' productivity.

*In the original MIAC contract, there is no goal statement. Rather, the project purpose is included instead, and this is what is cited in what follows here.

b. Train adequate staff to operate the program and transmit the results to farmers.

c. Develop equipment of appropriate technology adapted to the local soil and climatic conditions. This technology should be appropriate to all farmers of the area with emphasis on the small farmer.

Under the amendment this goal would not change. Moreover, the contractor would be providing the same activities, but in an increased amount: i.e. technical assistance in agricultural research (expanded from 5 to 12 technicians), the training of participants, and the purchase of commodities. The contract amendment would not extend beyond the life of project, as amended in the PP amendment. Thus this criterion alone would appear to support an amendment of the MIAC contract. However, concern has been expressed that this justification may not be sufficient when the contract cost will go from \$4.5 million to \$25 million. Therefore, the additional argument is made that MIAC has predominant capability to perform the contracted project activities.

B. Predominant Capability

Under subparagraph (3) quoted above, A.I.D. may negotiate a non-competitive contract with a source which has predominant capability by reason of experience & technical competence to perform the work within the time required and at reasonable prices. The justification sets out several questions to be answered in determining whether or not a contractor has such predominant capability.

1. What capability does the proposed contractor have which is necessary to the specific effort and makes the contractor clearly more suitable than another in the same general field ?

First, it should be noted that in accordance with the above cited Policy Papers, the contract under this project amendment would have to be implemented by one or a group of Title XII institutions. This factor in itself clearly limits the competition. Next it should be noted that MIAC is a consortium of universities, with particular experience in dryland farming. Thus, several sources would benefit from the contract.

Third, it should be noted that MIAC, and its member institutions, has been involved in the design and the implementation of this project from the outset. This means that MIAC now has effectively six years of involvement with dryland applied agriculture research in Morocco, despite the shorter duration of the present contract.

Finally, the contractor is, through its TA team, already physically present and at work in Morocco, in the project area, and functioning within the project goals and purposes, and is training many of the Moroccans who will come back and do research under the Project Amendment, under the supervision of TA team members.

2. What prior experience of a highly specialized nature and what specialized facilities does the contractor possess which is vital to the proposed effort?

The lead University, Nebraska, has and is developing several specialized facilities which are of particular importance to this project. Especially important is the Scotts Bluff Research Station which does research in dryland farming and has a type of organization that is particularly useful for replication in Morocco. The Director of the National Agronomic Research Institute (INRA), the Moroccan institution being assisted under this project, has visited the Scotts Bluff station and wishes to use the Scotts Bluff station as a model for the regional research center being developed in the project area. In addition, the University of Nebraska is developing a dryland farming center in Lincoln.

The contractor's prior experience in Morocco has given it particular expertise in several areas important to the project. First, it now has a good appreciation of the research problems found in Morocco, and has personnel able to carry out that research. Secondly, MIAC has developed a good working relationship with INRA with the result that the type of long term institutional relationship envisaged by Title XII legislation is beginning to develop. Thirdly, MIAC has developed a mechanism for rapid acceptance and placement of academic participants who will return to Morocco for in-country research and advising by the MIAC team. Most of these academic participants are already placed within MIAC institutions. Finally, MIAC through the University of Nebraska, has developed a tractor and equipment test facility which is recognized as the world standard for agriculture equipment evaluation. Equipment development and testing is a critical component of project activities.

3. Does the contractor have a substantial investment of some kind which would have to be duplicated at Government expense by another source entering the field.

The start-up time cost under a project such as this is considerable. Finding researchers adequately trained in French, making all of the adjustments to living and working in Morocco, and establishing the necessary linkages to making a project such as this function takes one to two years. MIAC has gone through this process. Another contractor would have to do the same thing, at additional expense to the U.S. Government. Because the two contractors would also overlap, there would be additional and unnecessary expenses for overhead, logistic support, equipment, etc.

4. If time schedules are involved, why are they critical and why can the proposed contractor best meet them?

Two time factors are of critical importance: having sufficient people in Morocco for the up-coming growing season starting in October, 1983, and keeping up the flow of participants to allow more to leave for the U.S. in September, 1983. Should the contract be competed,

- 6 -

both activities would be substantially delayed. However, negotiations with MIAC could be concluded more rapidly and would enable the activities to start on-time.

5. Does the proposed contractor have personnel considered predominant experts in the particular field ?

The University of Nebraska, Kansas State, and Oklahoma State, in particular, have personnel considered among the top in the United States for dryland cereal farming techniques.

C. Other Consideration

A.I.D. policy in the Agriculture Sector is to work over a long term with the Host Government in institution building. Such a long term can be 10 years or more. Implementation is usually handled by a Title XII institution or group of institutions, who build up an institutional relationship with the Host Government. Given these policies and the goal of this Project, it makes little sense and goes counter to A.I.D. policy to re-compete a second stage of the first phase of the same activity. The entire process of institution building must start again, often at considerable loss to both the U.S. Government and to the Host Government.

In addition, it does not make good management sense to bring in another contractor at this stage of project implementation. A project such as this must be administered and coordinated by one contractor. Re-competition would, on the contrary, involve two contractors on the ground at least during a part of the implementation period. Coordination between the two could be very difficult, resulting in project implementation delays, personnel dissatisfaction, difficulties for USAID monitoring, and considerable confusion within the GOM. The situation would be different if MIAC had not improved its performance. However now that it has, sound project management dictates completion of Phase I under the same contractor.

RECOMMENDATIONS:

That on the basis of the above arguments the Non-Competitive Review Board in AID/W be asked to approve negotiation with MIAC to amend its current contract to implement this Project Amendment.

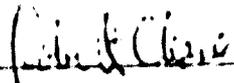
Dryland Agriculture Applied Research Project 608-0136
Project Paper Amendment No. 3

FAA Section 611 (e)

Certification on Capacity to Maintain and Utilize the Project

The Dryland Agriculture Applied Research Project 608-0136 will provide support to the GOM at an estimated AID funding of \$26,323,400 over the ten year period FY 78-88. The Project will provide technical assistance, commodities, and training in support of the institutional development which is designed to upgrade the National Agriculture Research Institute (INRA) capability to implement an applied research program which will adapt existing technology to local conditions in order to increase the productivity of the dryland farmers; train adequate Moroccan staff to operate the program and transmit the results to farmers; and develop a program whereby suitable farming equipment can be made accessible to small farmers; and to upgrade the National Agronomy and Veterinary Institute-Hassan II (INAV-H2) capability to implement a collaborative socioeconomic research program with INRA which will give a better understanding of the behavior of the dryland farmers and thus provide a basis for effective extension programs.

The GOM has given the mission assurance that both Moroccan financial and human resources will be available throughout the life of the project which will enable the GOM to finance the recurring costs. In accordance with the Foreign Assistance Act of 1961, as amended, I certify that section 611 (e) of the Act is fulfilled in that "The Government of Morocco has the capability, both financial and human, to effectively maintain and utilize the project."



Robert Chase
USAID Country Director

Dryland Agriculture Applied Research Project 608-0136 Project Paper No. 3 Annex 17

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8. AID Evaluation Paper No. 13: AID Experience in Agriculture Research: A Review of Project Evaluations, May 1982.
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ROYAUME DU MAROC

AEK/FS

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B. P. 120 Rabat B. P.



27 JUIN 1983

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Le Ministre de l'Agriculture et de la
Réforme Agraire

/s/

Monsieur le Directeur de l'USAID
137, Avenue Allal Ben Abdallah
B.P 120

RABAT

OBJET : Projet Aridoculture 608-0136

Monsieur le Directeur,

Le Projet Aridoculture 608-0136 avec l'USAID et le consortium M.I.A.C. ayant donné satisfaction et permis le démarrage de la Recherche Agronomique et socio-économique en faveur des zones bours non favorables et la formation de jeunes cadres marocains dans des disciplines relatives à l'aridoculture, j'ai l'honneur de vous demander de bien vouloir oeuvrer pour la prolongation et le renforcement de ce projet pour une phase de 5 années. En effet ce Projet revêt une grande importance pour le développement des capacités de l'Institut National de la Recherche Agronomique, la formation de ses chercheurs, et le développement des échanges scientifiques avec les instituts de recherche américains.

Assuré de votre appui et de votre collaboration, je vous prie d'agréer, Monsieur le Directeur, l'expression de ma considération distinguée.

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