PROJECT PAPER

Project 608-0182

PLANNING, ECONOMICS & STATISTICS FOR AGRICULTURE

Morocco

July, 1983

BEST AVAILABLE COPY

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT DATA SHEET

1. TRANSACTION CODE: A = Add, C = Change, D = Delete — Amendment Number

DOCUMENT CODE: 3

COUNTRY/ENTITY: MOROCCO

3. PROJECT NUMBER: 608-0182

BUREAU/OFFICE: NEAR EAST — 03

5. PROJECT TITLE (maximum 40 characters): PLANNING, ECONOMICS & STATISTICS FOR AGRICULTURE

PROJECT ASSISTANCE COMPLETION DATE (PACD): MM 07 DD 30 YY 93

7. ESTIMATED DATE OF OBLIGATION (Under 'B.' below, enter 1, 2, 3, or 4)

A. Initial FY 83 B. Quarter 4 C. Final FY 88

8. COSTS ($000 OR EQUIVALENT $1 =)

A. FUNDING SOURCE	FIRST FY B. FX	C. L/C	D. Total	LIFE OF PROJECT E. FX	F. L/C	G. Total
AID Appropriated Total	800	59	859	11,284	661	11,945
(Grant)	(800)	(59)	(859)	(11,284)	(661)	(11,945)
(Loan)	(-)	(-)	(-)	(-)	(-)	(-)
Other U.S. 1.						
Other U.S. 2.						
Host Country	-	-	-	153	17,398	17,551
Other Donor(s) FAO	-	-	-	-	600	600
TOTALS	800	59	859	11,437	18,659	30,096

9. SCHEDULE OF AID FUNDING ($000)

APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE 1. Grant	2. Loan	D. OBLIGATIONS TO DATE 1. Grant	2. Loan	E. AMOUNT APPROVED THIS ACTION 1. Grant	2. Loan	F. LIFE OF PROJECT 1. Grant	2. Loan
ARDN	184	052		-	-	11,945	-	11,945	-
TOTALS				-	-	11,945	-	11,945	-

SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each): 051, 053

11. SECONDARY PURPOSE CODE: 189

SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)

A. Code: TECH

B. Amount:

PROJECT PURPOSE (maximum 480 characters)

TO IMPROVE THE GOM'S ABILITY TO COLLECT AGRICULTURAL STATISTIC, UNDERTAKE ECONOMIC ANALYSIS AND MONITOR AND EVALUATE AGRICULTURE PROJECTS.

SCHEDULED EVALUATIONS

Interim MM 06 YY 86 — MM 04 YY 88 Final MM YY 92

15. SOURCE/ORIGIN OF GOODS AND SERVICES: ☐ 000 ☐ 941 ☐ Local ☐ Other (Specify) 935

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

BEST AVAILABLE COPY

17. APPROVED BY

Signature: Robert Chase

MISSION DIRECTOR

Title: Robert C Chase

Date Signed: MM 07 DD 06 YY 83

18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION: MM DD YY

AID 1330-4 (8-79)

PROJECT AUTHORIZATION

NAME OF COUNTRY: Kingdom of Morocco

NAME OF PROJECT: Planning, Economics and Statistics for Agriculture

NUMBER OF PROJECT: 608-0182

1. Pursuant to Section 103 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Planning, Economics and Statistics for Agriculture Project for the Kingdom of Morocco ("Cooperating Country") involving planned obligations not to exceed $11,945,000 over a six year period from date of authorization, subject to the availability of funds in accordance with the AID OYB/allotment process, to help finance foreign exchange and local currency costs for the project. The planned life of project is ten years from the date of initial obligation.

2. The Project consists of developing an agricultural statistics service within the Ministry of Agriculture and Agrarian Reform. The project will focus on upgrading the quality and quantity of agricultural statistics, the development of an analytical capability for agricultural economics and improving the ministry's ability to monitor and evaluate agricultural projects.

3. The Project Agreement(s) which may be negotiated and executed by the Officer(s) to which such authority is delegated in accordance with AID regulations and Delegation of authority shall be subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as AID may deem appropriate.

a. Source and Origin of Commodities, Nationality of Services

Commodities financed by AID under the project shall have their source and origin in Morocco or in the United States, except as AID may otherwise agree in writing. Except for ocean shipping, the suppliers of commodities or services shall have Morocco or the United States at their place of nationality, except as AID may otherwise agree to in writing.

Ocean shipping financed by AID under the project shall, except as AID may otherwise agree in writing, be financed on flag vessels of the United States.

b. Conditions Precedent and Covenants

A. Conditions Precedent: The Project Agreement shall contain conditions precedent in substance as follows:

(1) Prior to the first disbursement of funds or the issuance of procurement documents for the computer equipment, objective yield laboratory equipment and photography laboratory equipment, the Cooperating Country will have completed construction, renovation and electrical installation of the physical facilities necessary to house such items procured.

TABLE OF CONTENTS

I. The Project Summary and Recommendations

- A. Grantees
- B. Implementing Agency
- C. Amount
- D. Terms
- E. Total Project Cost
- F. Description of the Project
- G. Recommendations

II. Project Rationale and Description

- A. Background
  - 1. General
  - 2. Agricultural Sector
  - 3. Conformity with Moroccan Programs
    - a. Interim Plan (1978-1980)
    - b. The Current Plan (1981-1985)
    - c. The MARA/FAO Paln
  - 4. Relationship to the CDSS
  - 5. Strategy Problem
    - a. Recent Developments
      - Table 1 - GOM Receipts & Expenses Estimate for 1982
    - b. Adjustments to PID
- B. Detailed Project Description
  - 1. Project Concept & Goal
  - 2. Project Objectives - Purpose
  - 3. Outputs
  - 4. Project Inputs
  - 5. Output/Input Linkages
  - 6. Assumptions

III. Project Analysis

- A. Cost Estimate and Financial Plant
  - Table 2 - Summary Cost
  - Table 3 - U.S. Costing Outputs/Inputs
  - Table 4 - GOM Costing Outputs/Inputs
  - Table 5 - Cost by Fiscal Yr., Source of Funds
  - Table 6 - Cost by Fiscal Yr., Source of Funds - FY 1989-1992
- B. Implementation Plan
- C. Participant Training for DPAE
  - 1. Long-Term Training for DPAE
  - 2. Short-Term Training - U.S.
  - 3. Selection Committee
  - 4. Participant Training Guidelines
    - Table 7 - Scheduled Short-Term Training in U.S.
    - Table 8 - Long-Term Training in the U.S.
- D. Summary of Analysis
  - 1. Technical Analysis
    - a. Background

TABLE OF CONTENTS

(continued)

b. Organization
c. Agricultural Statistics
d. Data Processing
e. Economic Studies
f. Service Des Projets (Monitoring and Evaluation)
g. Training of Enumerators

2. Financial Analysis
3. Economic Analysis
4. Social Analysis
5. Administrative Analysis
   a. Administrative Structure of MARA
   b. MARA Organization
   c. DPAE Organization
   d. Investment Funds - DPAE
6. Condition Precedent and Covenants

iv. Evaluation Plan

MOROCCO

PLANNING, ECONOMICS AND STATISTICS FOR AGRICULTURE

I. THE PROJECT SUMMARY AND RECOMMENDATIONS

A. Grantee: Government of Morocco

B. Implementation Agency: Division of Planning and Economic Affairs (DPAE), Ministry of Agriculture and Agrarian Reform (MARA)

C. Amount: US $11,945,000 of which $859,000 is requested for Authorization in FY 1983.

D. Terms: This activity is to be grant funded from Development Assistance Funds.

E. Total Project Cost: The total project cost to AID is $11,945,000 of which $859,000 will be obligated in FY 83. The GOM contribution is estimated at $ 17,550,000 and other donor cost at $.6 million. The GOM contribution is estimated to be 59% of total project cost.

F. Description of the Project: The Planning Economics and Statistics for Agriculture Project involves the development of the Ministry of Agriculture and Agrarian Reform's capacity to gather and analyze statistics on the agriculture sector, undertake economic analysis of factors affecting agriculture and to monitor and evaluate agricultural development projects. The activity involves the transfer of technology that has been developed in the U.S. by the USDA and other institutions to Morocco. This technology will give MARA more accurate and timely data on the agricultural sector. It will provide the analytical capacity to help policy makers to understand the economic relationships on such major questions as subsidies and price supports and market structures. Finally, it will enhance the MARA's capacity to identify and manage agriculture investment projects.

The USAID proposed project with the DPAE will concentrate on technology transfer primarily through the use of U.S. technicians and training of Moroccans. The long-term agriculture sector goal, to which this project will contribute, is to reduce Morocco's dependence on imported food. Proper planning and management of investments to achieve this goal require high quality data and data analysis. Therefore, USAID considers it essential to create a corps of professionals who can provide this support to the sector goal.

The primary beneficiaries of this project are the Moroccan farmers who will benefit from better policy decisions generated by better knowledge about the agricultural sector. Directly, the project will help to train almost 600 people who work for the DPAE.

AID will finance in-country and U.S. training for DPAE staff. 18 Moroccans will be trained to the PhD level and 4 to the MS level in the U.S. This group of professionals will direct approximately 600 DPAE staff, most of whom will receive short-term training in Morocco. In addition, 16 DPAE staff will benefit from short-term training in the U.S. AID will finance 9 person years of long-term technical assistance and 4.6 person years of short-term technical assistance over the 10 year life of the project.

Although the PID approval cable* raised several issues concerning the Rainfed Agriculture Project (608-0170) most of these are not issues for this project. This is due to the fact that USAID has decided to separate the DPAE activities from other Rainfed Agriculture activities in PP design. This was done for the following reasons:

(1) The DPAE activity is designed as a ten year continuous project, whereas other activities in Rainfed Agriculture are to be incrementally phased.

(2) The DPAE activity covers the entire agriculture sector whereas the other activities will be limited to the rainfed zone. This is because production and use of all agricultural projects are important to the understanding of separate products or areas, i.e. the production of cereals in irrigated farming areas impacts on prices equally with cereals produced in dryland areas.

(3) The administration and management of assistance to the DPAE will be easier and clearer as a separately funded project.

(4) Contracting arrangements for T.A. should be easier when dealing with only one agency of the MARA.

(5) The DPAE has benefitted from a pilot project funded under an earlier centrally-funded activity. Therefore, this longer term effort is soundly based upon earlier experience. The other activities of the Rainfed Agriculture Project will require pilot phases and slower implementation.

For these reasons the Mission concluded that it did not make sense to include this project with the other rainfed agriculture activities.

USAID will implement this project through the Directorate of Planning and Economic Affairs (DPAE) of the Ministry of Agriculture and Agrarian Reform. Other implementation decisions are:

(1) USAID recommends contracting with the USDA for technical assistance.

(2) In-country training will be handled by U.S. Technical Assistance personnel and the DPAE, with backstopping from the USAID training office.

(3) USAID will utilize the services of ST/IT for participant training in the U.S.

(4) USAID will rely on technical assistance personnel for writing specifications

---

*Annex 1

for, reviewing bids for, and procurement of complex hardware and software, remote sensing equipment, aerial photography lab equipment and objective yield lab equipment.

(5) USAID will utilize the Services of the Regional Legal Advisor and Contracting Officer, located in Rabat for T.A. contracts and other procurement.

The inputs, which will be provided by AID, subject to the availability of funds, for carrying out the project, are summarized as follows:

(1) Technical Assistance (TA): 3 Economists are to be provided to the DPAE. Each individual will have a 3 year tour of duty. In addition, a total of 4.6 person years of short-term technical assistance will be provided to SSD, SP and SE. The estimated cost of this TA is $2,209,000.

(2) Training: The project will finance an estimated 68 person years of long-term academic training in the U.S. (18 Ph.Ds and 4 MS's). Short-term training in the U.S. is expected to total 96 person weeks for 16 DPAE staff. English language training and in-country training will also be provided to DPAE staff in Morocco. The estimated cost of training is estimated to be $1.87 million.

(3) Commodities totalling $5.158 million of which $.865 million is estimated for computers and software, $3.475 million for aerial photography and photo lab equipment, and $.510 million for satellite imagery. Additional commodities are estimated to cost $.308 million.

(4) Other costs total $2.554 million of which $1.576 million is for inflation, $427,000 is for special contingencies, $211,000 for evaluations and $340,000 for local currency operating costs.

(5) Of total AID financed input costs,$10.469 million are proposed for disbursement in the first five years of the project and $1.327 million in the last five years.

G. Recommendations: USAID has reviewed the Planning, Economics and Statistics for Agriculture Project Paper and recommends that this $11.945 million activity be approved.

II. PROJECT RATIONALE AND DESCRIPTION

A. Background

1. General: Recent economic conditions which have resulted from both conditions within Morocco and the international economic situation have led to major reconsiderations by the GOM of its agricultural policy. Morocco's population growth, estimted at 2.6% currently, increased competition for its agricultural exports, especially toward Europe, war and drought, have exacerbated a position of stagnant growth in the agricultural sector. At the same time, the international economic recession has led to a decline in the demand for phosphates, Morocco's main export, and a de facto devaluation of the dirham due to the increased value of the dollar. Thus, Morocco is faced with an increasing need to import food while the value of exports declines and the cost of imports increases. Of particular concern has been the need to import increasing quantities of wheat, which must be paid for with increasingly scarce foreign exchange. Morocco has therefore embarked on a major effort to expand agricultural production, particularly cereals.

2. Ag. Sector:

Moroccan cereal production has grown very slowly in the last two decades. Total grain disappearance (total grain production plus imports less exports) increased at 2.9 percent per year since 1960, a figure close to the 1982 census estimate of 2.6 percent population growth. Total grain production is increasing at only slightly above one percent per year, the deficit being made up by wheat imports. Over the short run (1974-1980), the available data indicates that disappearance increased by 1.5 percent per year, while production of all cereals decreased by 1.2 percent per year.

Non-agricultural growth (particularly mining and industry) has substantially outstripped agriculture, bringing with it increases in average per capita incomes in towns and cities, a rapid rural-urban migration, and shifts in food consumption patterns. Agriculture still dominates the employment scene accounting for 40% or more of the total labor force, but its contribution to GDP has dropped from 22% to 16% since 1970.

Shift in consumption patterns, which often accompany urbanization and per capita income growth, appear to have been accelerated by liberal imports of consumer goods, price and subsidy policies, mainly directed at urban consumers. Under the impetus of urban consumer-oriented policies, consumption of bread wheat, vegetable oil, butter and sugar have grown rapidly as have imports of them, except for locally-produced sugar, which has received massive infusions of public investment. Imports now account for 75 percent or more of the bread wheat, vegetable oil, and butter consumed, and about 50% of the sugar consumed.

With growing imports and increasing difficulty with exports, Morocco has seen its agricultural trade balance decline to the point where agricultural exports now pay only 75% of the agricultural import bill.

There are two important outgrowths of the economic problems briefly discussed above. First, a policy decision has been made to shift emphasis from irrigated agriculture to rainfed agriculture. This has required the development of investment strategies for the rainfed agricultural zones. Second, the increased requirement to import food, especially cereals, has accentuated the need for more reliable data on domestic production of cereals. It has also brought more clearly into focus the anomalies of the import, price and subsidy policies concerning agriculture and consumption of agricultural commodities.

As these investment strategies are being developed the GOM has realized the need to improve its information base on the agriculture sector. Timely and accurate information upon which to make investment and policy decisions on a wide range of issues that affect both production and foreign exchange demands, is only as good as the quality of information upon which they are based. Therefore, the need to improve the information about the agricultural sector, which this project addresses, is crucial to the success of the present rainfed agricultural strategy.

3. Conformity with Moroccan Programs

a. The Interim Plan (1978-1980): The GOM's Interim Plan (1978-1980) provided for about 18% of the public investment to go to the agriculture sector. However, a disproportionate part of that was budgeted for the irrigation sub-sector which accounts for only about 10% of the arable land. The irrigation sub-sector received over 70% of the funds allocated in the agriculture investment budget. In addition, the sub-sector received funds through operational budgets of the Ministry of Agriculture (subsidies on inputs, contributions from research, education, plant protection, and other sources). Also, large amounts of farm credit were allocated for irrigation development and equipment.

During this period, AID began a pilot activity in Morocco to improve the collection and quality of agricultural statistics. The project was a three-year effort to initiate advanced technologies in data collection. Hopeful of the success of this project, increased investment was targeted in the following plan period.

b. The Current 5 Year Plan (1981-1985): In the 1981-1985 Plan, there has been a shift in resource allocations from the irrigated sub-sector to a focus on small and medium-sized farms in the rainfed areas of Morocco. Thus, for the current plan period, the GOM has taken a deliberate step to emphasize cereals production and forage and livestock production in the non-irrigated areas of the country.

In addition to a shift in focus, the total budget for agriculture was to be increased from DH .9 billion per year spent in 1978-1980, to DH 2.11 billion per year under the current plan. While the share to irrigated areas still remained high at about 40 percent, the amount going for projects and support to the rainfed sub-sector was to increase to about 52 percent of the total annual agricultural sector budget. Beyond 1985, the GOM Plan called for even greater relative emphasis on rainfed agriculture as irrigation projects presently under construction were completed.

Recognizing the need for improved information to successfully carry out the Rainfed Agricultural Strategy, the 5-Year Plan targeted a major effort in this area. 120 million dirhams (over $19 million) were earmarked for investment in agricultural statistics, economic studies and project monitoring and evaluation. This effort was to be channelled through the Ministry of Agriculture and Agrarian Reform's Directorate of Planning and Economic Affairs (DPAE).

c. The MARA/FAO Plan: An important step in implementing these changed policies was a request to FAO in November, 1981 by the Ministry of Agriculture and Agrarian Reform (MARA) for a team of agricultural development specialists to work with its Department of Plant Production (DPV) to assist in diagnosing constraints to increased cereal production and defining a plan of action. The resulting plan (known as the MARA/FAO Plan) calls for a well-coordinated effort and maximum support to a common set of measures with the goal of increasing cereal production from the current average of 4.0 - 4.3 million MT annually to 7.2 million MT by 2000. Such an increase would stabilize yearly imports at the current 1.5 - 1.9 million MT level. The plan notes that because of cereal-forage-livestock interrelationships on cereal-growing farms, the program must be carried out in the context of farming systems which duly consider forage and livestock along with cereals.

Concommitantly with the development of this overall strategy of Rainfed Agriculture, the FAO also undertook a review of the DPAE. This resulted in a proposal for considerably strengthening the DPAE as the major agricultural information and project planning and management arm of the MARA. FAO undertook to provide support to the Planning Division of the DPAE, a complementary activity of this Project.

4. Relationship to the CDSS

In 1982, USAID prepared an agriculture strategy paper as part of the 1984 CDSS exercise. The strategy sets forth priorities and programs designed to address key constraints to increased cereal production in the rainfed crop area. The strategy recommended that activities be directed primarily to the neglected, medium and small farms located outside World Bank supported integrated rural development project areas and outside the irrigation perimeters. It noted the close interrelationship between crops, forage and livestock especially on small and medium-sized farms and recommended that research, and the provision of technical advice to farmers, be directed toward programs that would increase cereal production.

Specific activities proposed in the strategy included:

-- Expansion of rainfed agricultural research from areas having less than 400 mm of rainfall (under the Mission's current 0136 Project) into areas having over 400 mm of rainfall.

-- Economic and social studies to provide guidance for program design; data collection and analysis needed for more general planning and policy formulation.

-- Extension/outreach, including development of closer farmer-extension-research linkages.

-- Improved supply and distribution of inputs.

-- Support to credit and cooperatives.

The CDSS targeted $83 million of Development Assistance funds for the 6 year period of 1983-1988 and $118 million of PL 480 and ESF funds, for implementation of the rainfed agricultural strategy. Based on the GOM's Five-Year Development Plan targets and the USAID's FY 1985 CDSS strategy, the PID for project 608-0170 was developed in February, 1983. That project, "Rainfed Agriculture", called for approximately $170 million of investment over a ten-year period.

5. Strategy Problem

a. Recent Developments: Although the overall strategy of the CDSS and the PID documents continues in this project paper, several factors have required that the scope and size of the effort be considerably changed. The most salient points are:

(1) Morocco is experiencing a serious budgetary crisis which has required a drastic readjustment of planned investment targets. The general picture can be seen in Table 1 for 1982.

TABLE 1. GOM Receipts and Expenditures, Estimate for 1982

	Loi de Finances (12 months)	Actual (6 months) (MDH)	Estimate (12 months)	Change (Loi: Estimate)
Receipts	33,045	12,569	25,138	-24%
Expenditures	39,360	14,257	28,514	-27%
Operations	(18,104)	(8,341)	(16,682)	- 8%
Debt	(4,450)	(2,138)	(4,276)	- 4%
Investment	(16,806)	(3,778)	(7,556)	-55%
Balance	-6,315	-1,688	-3,376	-46%
MARA Investment	1,900	338	676	-64%
Subsidies	2,505	790	1,580	37%

Source: USAID Estimates

Investment expenditures for 1983 have been even further reduced. The budget shortfalls have grown out of four major problems:

i) The 1976-83 war;
ii) The 1980-83 drought;
iii) The decline in phosphate exports due to the world economy; and
iv) A de facto devaluation caused by the strength of the U.S. dollar.

The result of this budget reduction has been:

i) A general freeze on hiring of personnel;
ii) A determination not to start new projects;
iii) A determination to reduce imports; and
iv) Delay in adoption of the MARA/FAO National Cereal Plan.

(2) The scheduled master plans for research and extension which were to have been undertaken with funding from the World Bank have not been completed, although those funds are still available.

b. Project Identification Document: Although these factors are considered only temporary, the USAID deems it prudent to scale down the scope of the Rainfed Agriculture project. When the economic situation improves, and the plans of action are more fully developed, USAID's on-going activities will be expanded and new activities added in pursuit of the long-term stated goal. To make sure that appropriate investments can be made later, pilot efforts will be undertaken in extension and input delivery. To make sure that policy decisions and investments affecting agriculture are made for maximum benefit, a significant effort will be made to improve the Ministry's agricultural statistics, economic analysis and project identification, monitoring and evaluation systems.

The proposed DPAE activity has been designed as a separate project within the Rainfed Agriculture sector. It is a support system that is needed for the attainment of the long-term agriculture goals. Because the GOM considers this an "old" project due to the pilot effort undertaken in central-funded project and its inclusion in the Five-Year Plan, it will receive GOM support for the remainder of the Plan Period.

B. Detailed Project Description

1. Project Concept - Goal

The long term strategy discussed above for increasing food production in Morocco calls for a well coordinated effort in planning, implementing and monitoring of a wide range of development projects. In addition to the several government entities that will be involved, the strategy also envisions mobilizing the private sector in the pursuit of its objectives. The goal of this project is to make available current information and sound analysis that will enable GOM officials to make policy decisions that will lead to increased agricultural production.

One of the serious constraints to overcome if this goal is to be met is the lack of a comprehensive program to provide accurate and timely data collection and analysis required for improved policy decisions and sound agricultural planning. Successful economic planning requires detailed basic information on a country's resources. Due to the dynamic nature of agriculture, timely and accurate information is perhaps even more critical if development is to be successful in this sector. Information required includes not only the basic data on agriculture, the accuracy and timeliness of which is extremely important and needs to be improved for Morocco, but also includes the economic analysis of this data given the extent to which the agricultural sector impacts on the economy and in view of the inherent interdependence among all sectors of the economy.

Because of this need the GOM created the Directorate of Planning and Economic Affairs (DPAE) in 1980 as part of the 1978-80 tri-annual plan. The responsibilities of DPAE cover the gathering and analysis of agricultural statistics as well as the preparation of economic studies and agricultural development plans.

The DPAE has been given a large mandate under the present Five-Year Plan. In addition to annual data collection on crop production, DPAE is charged with conducting over 20 other surveys on selected crops, markets and prices, agricultural employment and production techniques and costs. As well it is mandated to institutionalize a system of monitoring and evaluation of agricultural projects.

In order to aid the MARA in the achievement of its goals for the agricultural sector, the DPAE will need to carry out its mandate in a professional and timely manner. However, due to the present shortage of both financial resources and technical capacity, the DPAE cannot fulfill its mandate. Because of the critical importance of DPAE's goals, USAID will assist DPAE to meet its objectives.

2. Project Objectives - Purpose

The purpose of the Planning, Economics and Statistics for Agriculture Project is to improve the Government's ability to collect agricultural statistics, undertake economic analysis and monitor and evaluate agricultural projects. The achievement of this purpose will be accomplished when the DPAE has the capacity to fulfill its present mandate from the MARA without additional assistance. At the same time its activities will be integrated into the MARA through its contribution of information on the agricultural sector. This objective should be reached in 7 to 10 yea

The project, as designed, should begin to produce measurable results in improve data collection within three years. As well, improvements in the economic analysis division should be achieved at that time with the addition of data processing capacity However, the major impact in all three areas being supported under this project will begin in the fourth year of the project when long-term trainees begin to return from the U.S. The phasing is designed so that data processing facilities will be in place to get maximum benefits from personnel returning from high level training. Thus the

major share of computer equipment, both hardware and software, will be operational in FY 88. All professional training should be completed by FY 92 and a complete integration of all operations attained within the DPAE. The major impediment under this project for achieving the purpose would be a shortage of, or delay in, providing trainees for long-term training. However, the time frame proposed should be flexible enough to allow for some setback.

3. Outputs

The major outputs of the DPAE project are :

(1). An area sampling frame (ASF) for agricultural surveys. The ASF is a system which incorporates probability sampling into data gathering. The use of probability sampling permits accurate data to be gathered in a low cost and efficient manner.

(2) A program of current, regularly scheduled agricultural statistics based on the use of the ASF. The primary use of the ASF will be for the regularly scheduled national crop and livestock surveys. The annual survey which provides the basic crop area estimates will serve as a base for future sub-samples which can be used for objective yield surveys, agricultural inputs or farm labor surveys. Also the annual survey will serve as a "ground truth" base which is necessary for computer classification of satellite remote sensing.

(3) Expanded data processing capability in DPAE. Starting from a base of two Northstar microcomputers, the DPAE will have computer capacity that will allow them to process the data for all national agricultural surveys, handle the requirements for major economic studies and maintain project monitoring and management information.

(4) Aerial photography and photography laboratory. Aerial photography is urgently needed if the ASF technology is to be expanded throughout the country. The development of facilities to handle the photographs, once taken, is a major element in the ASF technology.

(5) Implementation of crop yield modelling . Objective yield surveys provide crop yield information for estimates (at harvest) or forecasts (prior to crop maturity) based directly on counts, measurements, and weights of the crop made from small randomly selected plots in a probability selection of random fields. The system to be developed under this project will vastly increase the reliability of yield estimates for major crops. It will also permit earlier estimates and forecasts of production.

(6) Crop yield models for major crops. The development of crop yield models will permit the DPAE to incorporate agromet and remote sensing data into crop forecasting thus improving yield estimates and making them more timely.

(7) The employment of digital processing of satellite data for improving crop area and land-use estimates and for ASF maintenance. The project will utilize satellite technology to reduce costs in keeping crop and land use data current.

(8) Agricultural data bank. A capacity will be developed to computerize all data for the MARA. This system will be integrated into the other MARA systems to allow ready access to current agricultural data.

(9) Models for analyzing agricultural data. Under the Economic Studies Division of the DPAE several models will be developed to analyze specific agricultural phenomenon or problems. These will be drawn from the studies mandated under the Five-Year Plan or from others as required by the government. In most cases these models will be developed to permit regular (annual, semi-annual) situation reports to be produced. Starting in FY 88 the DPAE should be rapidly developing their capacity to respond to requests for data and economic analysis on all macro-elements of the agricultural sector. Their capacity to undertake or coordinate studies of a micro nature should be expanding as well. Although they probably will not be able to undertake all of the studies and analysis, or produce all the data requested of them by 1988, they should be able to have a major input into analytical design.

(10) Adapted project monitoring and evaluation systems employed on development projects. The systems designed should permit the MARA to have current status reports on the implementation status of development projects in the agricultural sector. Impact evaluation systems should also be developed. From DPAE's modest effort now in monitoring and evaluating agricultural development projects, they should have increased 2 or 3 fold their capacity by 1988. If the plans for expansion of this division are carried out, there is no reason why DPAE cannot be capable of monitoring and evaluating the majority of agricultural projects presently envisioned, by 1992.

(11) Capability to carry out project design. The project should develop the capacity in DPAE's Service des Projets to have a major input into project design and analysis. They should be able to offer analysis and advice to project managers and investment agencies.

(12) Documentation Center. For research and reference purposed an improved center for current documents in project management and evaluation, economic analysis and crop statistics methodologies will be developed.

By 1992, the DPAE should be in a position to supply necessary data, economic analysis, and analytical backstopping for all demands from MARA agencies. At that point they should be able to contribute significantly to the efforts of the MARA in reaching its 20 year objective.

4. Project Inputs

The inputs required to produce the twelve outputs described above are estimated to cost $30.096 million over the LOP. Of this it is anticipated that USAID will furnish 39% the GOM 59% and other donors 2%. These inputs are summarized below.

Personnel: Under a PASA agreement with the USDA the project will finance 9 person years of long-term technical assistance. Beginning in July 1984, two economists will be assigned to the DPAE for a period of 3 years each. One technician (Senior Survey Statistician) will be assigned to Statistics and Documentation Service (SSD) and one technician (Agriculture Economist) will be assigned to the Economic Studies Service (SE). In July 1985 a third technician (Agriculture Economist) will be assigned to the SSD. Detailed job descriptions are contained in Annex X-7.

In addition, the project will finance under the PASA a total of 237 person weeks of short-term technical assistance (a detailed schedule of TA requirement is contained in Annex X-10). These technicians are programmed throughout the LOP and scheduled to coincide with the phased development of the various technical aspects of the project. Short-term technicians will aid the statistical service as they progress from the Area Sampling Frame, now under development, to sophisticated remote sensing and yield modeling efforts. The estimated 100 person weeks will undertake the training of Moroccan staff in sampling techniques, data processing, computer maintenance, objective yield surveys, remote sensing, development of a databank and yield modeling efforts.

96 person weeks of short term technical assistance is programmed throughout LOP to provide the Economic Studies Service training and design in mathematical and statistical models for economic analysis. These technicians will work with the service staff to develop models to undertake specific analysis of such things as agricultural import policy or producer and consumer price subisidies.

41 person weeks of short-term technical assistance is programmed to assist the Projects Service in the improvement of its project management responsibilites. These specialists will train Moroccans in project evaluation techniques, project management, computer systems, financial and economic analysis and personnel management.

In addition to the 904 staff presently employed by the DPAE, it is estimated that 34 additional professional staff will be required to carry out the project objectives. These would be scheduled to be employed according to the estimates of Annex X-11 and the training program discussed below.

FAO plans to provide 2 people over a two year period for the Planning Division which includes the Project Service.

Training: A major part of the technology transfer designed into this project will be the long-term academic training of Moroccans. 18 persons will receive training to the PhD level and 4 to the MS level in the U.S. It is also anticipated that the GOM will provide MS level training for 8 Moroccans locally who will be assigned to the DPAE. The long-term training in the U.S. involves skills in the areas of statistics and agricultural economics related to crop and livestock production forecasting, monitoring and analysis. In addition, people will be trained in fields necessary for project monitoring and management.

Short-term training in the U.S. is limited to providing experience to Moroccan staff in working with U.S. scientists in areas such as crop forecasting or remote sensing. Some short-term training will also be provided at scheduled short courses by the USDA or World Bank.

The majority of short-term training in Morocco will be on-the-job training with brief seminars or workshops provided by short-term T.A. Local costs will be primarily borne by the GOM.

Construction: Construction in this project is limited to providing laboratory space and preparing space for computer facilities. These costs ($80,000) will be provided by the GOM.

Commodities: It is anticipated that the U.S. will provide $ 5.158 million in FX costs of commodities for this project. The major cost items are for

computer equipment, both hardware and software for a total of $865,000, aerial photography lab equipment of $475,000, remote sensing equipment of $100,000, aerial photography of $3.0 million and $510,000 of satellite imagery.

The GOM is expected to supply a total of $3.46 million in commodities over the ten year LOP, of which the largest items are vehicles ($2.5 million)

Other inputs: The other inputs are primarily limited to operations and special contingencies of which AID will furnish the FX amount of $638,000 and LC cost of $340,000. It is anticipated that GOM will furnish $2.9 million of operations costs of which $2.5 million is for vehicle operations for LOP. Due to the long-term LOP, inflation is anticipated to require $7.397 million in dollar equivalents, representing 25.5% of total budget requirements.

5. Output/Input Linkages

All but three of the outputs in the project are so closely interrelated that it is difficult to separate them functionally. Many of the outputs have a dependency relationship such that achieving progress in one output is required for the implementation of the other. Hence, the design is phased in the delivery of inputs but does not have clear phase breaks that would permit separate design (i.e. two five year projects).

The beginning of the project rests with the completion of the construction of the Area Sampling Frame which was begun under the earlier pilot effort with USDA. This is a prerequisite to the collection of data in output #2. The ADP is essential to the handling of this data and will evolve as the core of the project which will support all other aspects of the DPAE. The efforts in yield modeling and economic analysis will require the sophisticated data processing which will be developed. The digital processing of satellite data will require the data processing capacity envisioned. Remote sensing in turn is a necessary input into yield modeling efforts and to maintain the ASF.

The monitoring and evaluation efforts, though seemingly more separate from other project efforts, and could perhaps be developed separately, would be severely weakened by separation. The improved data, and sophisticated analysis built into the other services will contribute immeasurably to the monitoring and evaluation efforts. More importantly, as the Project Service becomes more involved in the project identification and design phases, the real benefits to it of the other efforts will be felt.

The project with the DPAE will create a major support system to MARA programs. The successful conclusion of this project will aid all MARA efforts, and be especially critical to the long-range objectives in the rainfed agricultural sector. Thus it has linkages with other major AID efforts in agriculture such as Dryland Applied Research (#608-0136), Range Management (#608-0145) and Agronomic Institute (#608-0160). This project will also be a major support for planned efforts in other aspects of rainfed agriculture now being designed (#608-0170). Finally, given its national scope, the DPAE project will contribute to all other donor and GOM efforts in agriculture.

The success of this project will contribute to the long-term sector goal of re-

ducing Morocco's dependance on imported food in several significant ways:

1) It will provide more reliable and timely data and analysis to key policy makers who will then, hopefully, make better decisions on investments in agriculture;
2) It will offer donors more reliable information for their determinations of foreign assistance;
3) It will allow savings in foreign exchange to Morocco through better information on domestic production and import needs and permit the GOM to make more timely buying decisions on international markets;
4) It will more accurately identify functional relationships in the production system and indicate the most important production constraints;
5) It will improve the monitoring of on-going projects, thus improving their efficiency and chances for success; and finally
6) It will be able to provide the neccessary information to improve the coordination of development efforts and remove contradictions in investment efforts and policies

6. Assumptions: Three major assumptions are made in the project design that will determine the level of success of the project in sum or in part. These are:

1) That the GOM will continue to support the DPAE with adequate funds for operation of the agency. The GOM, in the present Five-Year Development Plan, committed almost 100 million dirham ($15 million) for investment in data collection, analysis and project monitoring. Understandably, the present economic situation has scaled down this effort, but improvement in the world economy should correct the present problem in the next plan phase, to begin in 1986. This is important, particularly in the requirement for vehicles and vehicle operations for ground-level data collection. Movement of personnel at critical points of the crop season is essential to improving data collection.

2) That suitable candidates will be provided for long-term training. The project design requires that high-level professionals be trained to operate the system by the end of project. If the training phase is respected, further external assistance should not be neccessary after 1992. The substitution of foreign technical assistance in the long term is not considered a viable option. It would be far too costly and would fail to "Moroccanize" the technology being provided.

3) Finally it is important that the GOM provide the additional staff planned at the professional levels. This is crucial for the Services of Economic Studies Projects.

III. PROJECT ANALYSIS

A. Cost Estimates and Financial Plan

AID's major inputs into this project are the provision of long and short-term technical assistance, long and short-term training and commodities and other supplies which are largely high technology inputs such as computers, remote sensing equipment, satellite imagery, aerial photography and photographic lab equipment. U.S. local costs are a total of $ 661,000, which is mainly for support of U.S. professionals in Morocco including housing, transportation and some office supplies. AID will also furnish $230,000 for surveys during the first year of change-over (FY 84-85) from the tradition agricultural surveys, to the surveys based on ASF technology. In the first year a double cost is involved as both surveys are done. After the first year the GOM will bear the cost of data collection.

The GOM contributions to this project are estimated at 59% and are estimated on the "with" and "without" project rule. That is, the operations costs of DPAE which include approximately 900 personnel, offices, vehicles, etc. are not included, even though they will obviously contribute to project objectives. GOM's total estimated cost of $17,550,000 in local currency costs and $.153 million in foreign exchange costs are largely for required additional personnel ($4,568 million LOP), salaries of long-term trainees ($.614 million), vehicles and vehicle operations ($5 million) and general operations cost associated with expanding the staff and activities of DPAE.

Details of cost calculations are presented in Annexes X-1 - X-8, and summarized in Tables 2, 3, 4, 5 and 6. Contingency factors are included for possible special problems as noted in annex X-1 of $427,000. Inflation factors are based on NEAC guidelines for contingency calculations (STATE Cable 015265, 19 Jan 83) and are shown in Annex X-2.

TABLE 2 SUMMARY COST ESTIMATE & FINANCIAL PLAN ($000 U.S.)

Category	AID		GOM		OTHER	TOTAL	
	FX	LC	FX	LC	LC	FX	LC
T.A.	2029	180	-	-	600	2029	780
GOM Salaries	-	-	-	4568	-	-	4568
Training	1828	47		926	-	1828	973
Construction	-	-	-	80	-	-	80
Commodities	5,158		100	3,360	-	5,258	3,360
Other	211	340	-	2900	-	211	3240
Spec. Cont.	427	-	-	-	-	427	-
Inflation	1631	94	53	5564	-	1684	5658
TOTAL	11,284	661	153	17,398	600	11,437	18,659

TABLE 5

COST BY FISCAL YEAR/SOURCE OF FUNDS
(000$U.S.)

FISCAL YEAR / INPUTS	1983				1984				1985				1986				1987				1988			
FUNDING RESPONSIBILITY	AID		GOM		AID		GOM		AID		GOM		AID		GOM		AID		GOM		AID		GOM	
CURRENCY SOURCE / INPUT CATEGORY	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC
Personnel: L.T. U.S.					66	10			299	45			399	60			331	50			99	15		
S.T. U.S.	29				151				156				162				78				59			
US TOTAL PERSONNEL	(29)				(217)	(10)			(455)	(45)			(561)	(60)			(409)	(50)			(158)	(15)		
COM Prof. Replacement								110				330				458				550				624
Training: L.T. U.S					125	5		47	350	29		149	475	11		169	425	2		156	225			90
S.T. U.S.					20			4	38			10	38			10	26			6	6			2
L.T. Mor												12				24				24				24
S.T. Mor								20				20				20				20				20
TOTAL TRAINING					(145)	(5)		(171)	(338)	(29)		(191)	(513)	(11)		(223)	(451)	(2)		(206)	(231)			(136)
Construction: O.Y. Lab								10																
Computers/Supplies								50																
Aerial Photo Lab								20																
TOTAL CONSTRUCTION								(80)																
Commodities: O.Y. Lab					30			10				20				20				20				20
Computers/Supplies	31				219			20	470			20	95			20	50			40				50
Aerial Photo Lab.					300				25				25			25	25			25	25			25
Remote Sensing									100															
Office Equip					28											20				20				
Vehicles					60			500				500				200								
Aerial Photos					1500							1500												
Satellite Imagery					10				25				40				60				75			
Docum. Center					10			10	10			10	10			10	10			10	10			10
TOTAL COMMODITIES	(31)				(2157)			(540)	(630)			(2050)	(170)			(295)	(145)			(115)	(110)			(105)
Other: Data Col						70				160														
Vehicle Operations						5		200		10		200		15		300		15		300				300
Evaluations													44								55			
General Operations						5		20		20		40		20		40		20		50				50
Special Contingencies	13				40				38				93				118				74			
Base Totals	(73)				(2559)	(95)		(1021)	(1511)	(264)		(2811)	(1381)	(106)		(1316)	(1123)	(87)		(1221)	(628)	(15)		(1215)
Inflation	-0-				102	5		51	182	34		368	255	22		287	287	27		386	207	6		504
TOTAL	(73)				(2661)	(100)		(1072)	(1693)	(298)		(3179)	(1636)	(128)		(1603)	(1410)	(114)		(1607)	(835)	(21)		(1719)

BEST AVAILABLE COPY

TABLE 6

COST BY FISCAL YEAR/SOURCE OF FUNDS
(000 $U.S.)

FISCAL YEAR / INPUTS	1989				1990				1991				1992				TOTAL				COMPREHENSIVE TOTAL			
	AID		GOM		AID		GOM		AID		GOM		AID		GOM		AID		GOM		AID		GOM	
CURRENCY SOURCE / INPUT CATEGORY	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC
Personnel: L.T. U.S.																	1194	180						
S.T. U.S.	78				83				39								835							
TOTAL U.S. PERSONNEL	(78)				(83)				(39)								(2029)	(180)						
GOM Prof. Replacement				624				624				624				624				4568				(624)
Training: L.T. U.S	75			34	25			12				1					1700	47		658				
S.T. U.S																	128			32				
L.T. Mor				12																96				
S.T. Mor				10				10				10				10				140				
TOTAL TRAINING	(75)			(56)	(25)			(22)				(11)				(10)	(1828)			(968)				
Construction: O.Y.Lab																				10				
Computer Room																				50				
Aerial Photo Lab																				20				
TOTAL CONSTRUCTION	-0-			-0-	-0-			-0-	-0-			-0-	-0-			-0-	-0-			(80)				
Commodities: O.Y. Lab				20				20				20				20	30			170				
Computers/Supplies			25	50			25	50			25	50			25	50	865		100	350			(25)	(50)
Aerial Photo Lab.	25			25	25			25	25			25				20	475			170			(25)	(25)
Remote Sensing																	100							
Office Equip				20				20									28			80				(10)
Vehicles				500								500				300	60			2500				(300)
Aerial Photos																	1500							
Satellite Imagery	75				75				75				75				510						(75)	
Docum. Center	10			10	10			10	10			10	10			10	90			90			(10)	(10)
TOTAL COMMODITIES	(110)		(25)	(625)	(110)		(25)	(125)	(110)		(25)	(605)	(85)		(25)	(900)	(3658)		(100)	(4460)				
Other: Data Col.																		230						
Vehcile Operation				300				300				300				300		45		2500				(300)
Evaluations					62								50				211							
General Operations				50				50				50				50		65		400				(50)
Spec. Contingencies	30				10				11								427							
Base Totals	(293)		(25)	1655	(290)		(25)	(1121)	(160)		(25)	(1590)	(135)		(25)	(1354)	(8153)	(567)	(100)	13334			(135)	(1359)
Inflation	120		10	886	144		12	737	93		14	1257	92		17	1292	1482	94	53	5768				
TOTAL	(413)		(35)	(2541)	(434)		(37)	(1858)	(253)		(39)	(2847)	(227)		(42)	(2676)	(9635)	(661)	(153)	19102				

BEST AVAILABLE COPY

U.S. COSTING OF PROJECT - OUTPUTS/INPUTS ($000)

	#1 ASF	#2 Ag. Stat.	#3 A.D.P.	#4 Acr. Photo	#5 Obj. Yield	#6 Yield Model	#7 Data Proc. Satellite Remote Sens.	#8 Data Bank	#9 S.E.	#10 P.M. & A.	#11 Project Design	#12 Doc. Center	TOTAL
Personnel													
L.T.	150	150	150		150	150	150	19[illegible]	458				1374
S.T.	30	4	134	16	94	30	73	—	314	[illegible]	35		835
Training													
L.T. U.S.		75	75			325	175		525	[illegible]	[illegible]		1760
S.T. U.S.							32		32	32	13		128
S.T. For	1	2	2		2	10	3	1	13	1	5		47
Commodities													
Comp. & Sup.			694				100	15	30	26			865
Ob.Yield Lab					30								30
A.Photo Lab				475									475
A. Photos	3000												3000
Rem. Sensing							120						120
Sat. Imagery							510						510
Vehicles	6	6	6		6	6	6	[illegible]	20				156
Off. Equip.									14	7	7		[illegible]
Doc. Center												60	60
Other													
Data Col.Sup.		230											
Evaluation	18	18	18	18	18	18	18	18	18	18	18	18	180
Spec. Cont.		141	94			40	6	16	61	9			[illegible]
Wks. Oper.	5	5	5		1	3	2		15				
Commodities	5	5	5		5	15	20	2	10				
A. Base Tot.	3215	636	1143	509	310	594	1232	94	1514	463	367	103	10220
B. Other	459	115	215	91	57	107	722	16	274	84	66	19	1725
C. Total	3674	751	1398	600	367	701	1454	110	1788	547	433	122	11945

BEST AVAILABLE COPY

GOM Costing of Project Outputs/Inputs
(in 000)

GOM	#1 A.S.F.	#2 Ag. Stat.	#3 A.D.P.	#4 Aer. Photo	#5 Obj. Yield	#6 Yield Models	#7 Dig.Proc.Sys Remote Sen	#8 Data Bank	#9 S.L.	#10 P.M.	#11 Prog. Dev.	#12 Doc. Center	Total
Prof. Staff		571	571			571	571		1142	[illegible]	[illegible]		1568
Training													
.T. U.S. (Tvl)		2	2			12	4		12	6	6		44
.T. U.S. (Sal)		28	28			168	54		168	54	54		614
.T. U.S. (Tvl)	50		15	10			8		8	3	3		32
.T. Mor.							25		10	20	10		140
.T. Mor.										48	48		96
ommodities													
ommodities													
omp.Supplies		100	150			20	50	30	50	25	25		450
bj.Yield Lab					170								170
er.Photo Lab				170									170
ffice Equip.	10		20				10	20	10	5	5		80
ehicles		1900			200				200	100	100		2500
er. Photos													
perations													
ehicles		1900			200				200	100	100		2500
en-Office	40	40	40	5	20	15	40	40	80	40	40		400
oc Center												90	90
onstruction													
omputer Room			50										50
bj.Yield Lab					10								10
er.Photo Lab				20									20
OM Base Total	100	4541	876	205	600	786	762	90	1880	[illegible]	[illegible]	[illegible]	11934
nflation	39	2066	428	87	262	388	332	41	915	551	481	41	5617
OM Total	139	6607	1304	292	862	1174	1094	131	2795	1544	1478	131	19551
ther Donors										300	300		600

BEST AVAILABLE COPY

B. Implementation Plan

This project will be implemented by the Division of Planning and Economic Affairs of the Ministry of Agriculture and Agrarian Reform in the government of Morocco. The Minister of Agriculture will designate a project manager who will be responsible for the implementation of the project in DPAE. The responsibilities of the project manager will be:

(1) To co-ordinate the project activities within the DPAE; this includes co-ordination between Services and co-ordination of technical assistance.

(2) To co-ordinate in-country training programs including timing, training sites, trainee selection and travel. It will also include co-ordination of supplies, materials and Moroccan personnel required for training programs.

(3) To coordinate project activities between DPAE, other sections of MARA, parastatals, other GOM Ministries and local government entities.

(4) To furnish reports on progress of implementation of project activities to USAID. Progress reports shall include training, technical assistance, selection of long and short-term participants and adherence to implementation schedules.

(5) To furnish to USAID reports on the committment of GOM resources to the project objectives.

(6) To furnish to USAID annual implementation plans including any amended plans prior to the start of the fiscal year or at such times as agreed to between DPAE and USAID.

It is proposed that the technical assistance for this project be furnished through a participating agency service agreement(PASA) (See Annex X-12). The USDA's responsibilities include the following:

(1) To furnish qualified long and short-term technical assistance to the DPAE as described in the project documents, including appropriate amendments or as revised through agreement with DPAE and USAID. This includes 9 person years of long-term technical assistance and approximately 237 person weeks of short-term technical assistance.

(2) To provide all necessary logistical support for long and short-term technical assistance personnel furnished under the project.

(3) To develop the specifications for all computer equipment, both hardware and software required to meet the goals of the project.

(4) To procure all computers, both hardware and software through normal procurement procedures of the USDA except that:

a. Procurement must also conform to USAID regulations when different from USDA regulations;

b. Prior to procurement of any data processing, USDA is required to obtain clearance from the USAID Office of Information Resources Management (IRM).

c. Any commodities or services provided under this project must be of U.S. or Moroccan source and origin as defined in AID Handbooks 18, 14 & 15 unless specific wavers are obtained from AID Administrator or his designee.

(5) To develop all specifications for equipment required for the aerial photography lab, objective yield lab and remote sensing activities.

(6) To procure all equipment for the aerial photo lab, objective yield lab and remote sensing as per #4 above when applicable.

(7) To procure, from time to time, and as determined necessary by USDA, supplied technical assistance personnel, satellite imagery and computer compatible tapes. However, budget projects for this project must not be exceeded without prior approval of the USAID contracting officer.

(8) To ship any and all commodities to Morocco and see to their installation.

(9) To coordinate the short-term training in the U.S., including determining appropriate training institutions, or venues, and supplying logistical support.

(10) To advise USAID's bureau ST/IT on placement of long-term trainees when required.

(11) To nominate one of the long term technicians in Morocco as team leader or coordinator. This person shall assure that:

(a) An annual implementation plan for contractor activities in Morocco is submitted to AID/Rabat.

(b) Such reports as deemed necessary by USAID/Rabat are prepared by appropriate contractor personnel in Morocco. These, however, should not exceed one report per short term consultant trip, one technician report per month, one composite annual report, and one composite final report.

(c) Activities of the contractor are coordinated with USAID and DPAE. In addition this person shall;

(d) Assist in the scheduling of short-term technical assistance provided by the contractor and in-country training programs.

USAID shall nominate a project officer who will be based in Morocco and who shall have the following responsibilities:

(1) To monitor the project implementation schedule(s) to assure that progress

BEST AVAILABLE COPY

toward objectives is being made as planned.

(2) To recommend changes in implementation scheduling to the contractor and the DPAE when scheduling seems inappropriate to reasonable progress or when problems develo

(3) To review all reports from the DPAE and the contractor and make quarterly summary reports for the Mission Director including recommendations for changes.

(4) To coordinate with the Regional Legal Advisor and Contracts Officer concerning issues of procurement and contracting.

(5) To write Project Implementation Orders for project execution, except for long-term training and contractor procurement.

(6) To coordinate the selection of candidates for long-term training with USAID and MARA, and to assure that processing of candidates by USAID's training officer is completed including meeting academic and English language requirements, and that AID Handbook 10 requirements are met.

(7) To forward appropriate reports and documents to the contractor responsible for evaluation.

Following the obligation of FY 1983 funds the USAID and GOM project officers will prepare PIO/T's for technical assistance services. AID/W will be requested to negotiate a PASA agreement(s) with the USDA to provide both long and short-term personnel who will provide in-country technical assistance and commodity procurement services related to SP, ES and SSD activities. USAID will also issue a separate PIO/T requesting AID/W either to negotiate a contract with a U.S. firm to conduct project evaluations or to issue a task order against an existing IQC that has already been negotiated to provide these services. PIO/P's for participant training will also be prepared by the project officer in coordination with his GOM counterpart. All PIO/P's for U.S. training will be processed through ST/IT.

Implementation Schedule

The implementation schedule relating to major inputs is given in Annex VII. This schedule will be reviewed by DPAE, USAID and contractor(s) at least once a year. Based on this global implementation schedule, more detailed annual schedules will be prepared by the review members. Amendments to the schedule will be made to assure that objectives will be met in the time planned.

C. Participant Training for DPAE

1. Long-Term Training for the DPAE

It is proposed that long-term training in the U.S of 22 DPAE staff be provided under this project. The first group would consist of 4 MS students who would be trained for work with the SSD of the DPAE. The MS students would be prepared specifically for the yield modeling and forecasting effort of the DPAE. They could be chosen from such disciplines as: Statistics; Climatology; Computer Science; Plant Science; or, Plant Physiology. In fact, it would be preferable if the candidates came from different disciplines. It is intended that these candidates be sent for 1-2 years to U.S. Universities that have strong programs in yield modeling, crop forecasting, or remote sensing. Recommended schools (in order of preference) are: University of Missouri; Kansas State University; Texas A & M.

For these students, research for thesis preparation could be conducted in the DPAE on the yield modeling effort proposed under this project. If this is done, supervision will be required from the University of study.

For six PhD candidates who will work in the statistics services of the DPAE, the primary field of study will be statistics with secondary fields in computer science, remote sensing, survey sampling, etc. The schools suggested, by order of priority are:

School	Major Strength
Iowa State University	Statistics
Oregon State University	Statistics
N.C. State University	Statistics
Purdue University	Statistics/Remote Sensing
Michigan State University	Statistics/Remote Sensing
University of Missouri	Statistics/Yield Modeling
Kansas State University	Statistics/Yield Modeling
Texas A & M	Yield Modeling

In the Service Des Etudes (SE) and Service Des Projets (SP) the major field of study is agricultural economics, with minor fields in business, financial analysis, project management and design, or social sciences. Candidates could be drawn from the field and it may be beneficial if one or two had some background in civil and mechanical engineering, and one or two were trained in a social science such as rural sociology or development anthropology. Because of the stress on quantitative analysis, candidates should be strong in mathematics or statistics.

Although the fields of study are not absolute, the following breakdown would be the most useful: Ag. Econ/Engineering; Ag. Econ/Rural Sociology; Ag. Econ/Busine: Admin; Ag. Econ/Agro Business; Ag. Econ/Statistics; Ag. Econ/Public Policy.

Service Des Etudes

1 - Ag. Econ/Macro Economics
1 - Ag. Econ/Price Policy
2 - Ag. Econ/Econometrics
1 - Ag. Econ/Public Policy Economics
1 - Statistics/Computer Science
6

U.S. based training for MS and PhD candidates under USAID funded projects 608-0160 (Agronomic Institute) and 608-0136 (Dryland Ag. Applied Research) usually do their research in Morocco and receive their degrees from INAV Hassan II in Rabat.

In support to the INAV Hassan II, candidates are selected from INAV staff and sent to the U.S. as non-degree students to complete course work in U.S. Universities. After completing course work in the U.S., students return to Morocco where they do their research under guidance from professors of INAV and their U.S. University of study. After completing the thesis, students are awarded degrees from INAV. However, to also receive a degree from the U.S. University, students must return to the U.S. to defend their thesis.

Under the Dryland Agriculture Applied Research Project (0136), candidates are selected from the MARA's National Research Institute. They are then either required to pass an exam at the INAV, after which they can be sent to the U.S. and receive degrees in the same way as INAV students, or they are selected, and upon acceptance from a U.S. University, go to the U.S. and complete their degrees in the U.S.

It is considered highly desireable to have graduate students undertake their research in Morocco so that the research reflects the condition of Morocco and so that Morocco can receive the benefits of the results of that research. Because of this, consideration has been given by MARA to requiring all agricultural graduate degrees to be given by the INAV after research has been completed in Morocco.

In some cases, however, it is not feasible to have candidates chosen and channelled through the INAV. It is not always possible, as well, to have research supervised by INAV professors. However, it still seems desirable to have graduate research conducted in Morocco. This is true on substantive grounds, but is also true on administrative grounds. That is, given the relatively few cadres available for training, and the fact that they are usually already GOM officials with duties to carry out, it is to the advantage of their respective services that they return to Morocco as soon as possible, and that they carry out their research in the context of their on-going and expanded duties and responsibilities.

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 supervisors 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.

However, two factors operate very much against this approach; cost and time. Costs per degree especially at the PhD level are very high. This is due to the fact that thesis advisors must come to Morocco from the U.S. University to help supervise research. One must budget at least three trips, one at the development of the resear proposal, one mid-term to assess progress and review thesis preparation and one at th end to participate in the committee for thesis defense. In addition, it is difficult particularly at the PhD level, to get cooperative supervision from U.S. based professors unless a student receives his degree from the U.S. University. Thus the studen

must return to the U.S. and prepare a thesis defense (and usually publish his thesis).

It also appears that the time needed to receive a degree is longer. This is often due to delays experienced in approvals for research (waiting for advisor or other committee members) or thesis approval. However, it can also be due to work demands placed on the student in Morocco.

Several other problems have been experienced such as the status of the student while doing research in Morocco, payment of travel and per diem while doing research and delegation of research supervision by thesis advisors.

In most cases it would be considered advantageous if these candidates could do their research in Morocco while working for the DPAE. This is because the PhD level research could be conducted on one of the areas of study that is mandated to the DPAE. Thus the research would satisfy a very definite need of the DPAE. However, the decision on research venues should be left to the University Advisor, the student and the DPAE, with concurrence from USAID. It should be the responsibility of the student to get written approval which details how the research is to be conducted, who would do the supervision, what the student's status would be at DPAE and a detailed cost estimate. USAID could then make a determination. As all computer hardware and software, aerial photography, satellite imagery and other equipment has already been budgeted under this project there should be only a limited need for additional items for student research if done in Morocco. Also, as students would be expected to be employed by the DPAE while they are conducting their research, costs of data collection, travel, or other operations would be expected to be borne by DPAE.

It is expected that most students would complete their degrees in the U.S. Requests for unusual research expenses either in the U.S. or in Morocco would have to be submitted to USAID at least 6 months in advance.

2. Short-Term Training in the U.S.

For the most part, short-term training requirements of DPAE personnel will be met by in-country training. Training in the U.S., is, for the most part, long-term academic training leading to degrees. However, there is a need for some training in specific technical areas that may best be carried out in the U.S. This includes approximately 9 participants from the Service des Projects (monitoring and evaluation) and 4 each from the Service des Statistiques et Documentation (statistics) and Service des Etudes (economic analysis).

For monitoring and evaluation, the training would be more formal and would utilize, for the most part, scheduled training programs of the World Bank, USDA or other institutions. Because the programming of these training sessions is usually done only a few months in advance, or at best prior to the year in which they are held, we cannot schedule them precisely. It is also not certain what the length of the courses will be. Therefore, we have programmed 2 months per session based upon the average rate of the USDA's training programs (per week) for similar training.

For the SSD, the main concern for U.S. training is in Digital Processing of Satellite Remote Sensing data. The design team consultants hope that this effort can be accomplished through long-term training and short-term T.A. in Morocco. However, it is instructive to quote them on this issue:

The review and systems design under this phase should be carried out by selected host country staff, in cooperation with U.S. counterparts, to analyze and define Moroccan objectives as well as the operational framework anticipated. An essential part of this process would be to assess other current capabilities in digital processing of remote sensing data in addition to the aforementioned MIDAS system. This assessment should include visits to U.S. remote sensing institutions such as EROS, ERIM, LARS and the Space Sciences Laboratory at the University of California at Berkely, as well as the ARC and USDA user agencies such as SRS and the Foreign Agricultural Service (FAS).

Basic Training Phase. This phase should focus on the training of host country staff in the fundamentals of remote sensing and data capture from space-born sensors. Training should include visual as well as digital classification techniques. Training in digital processing of remote sensing data could be accomplished by assignment of Moroccan staff to work with USDA user agencies for on-the-job training for 2-3 weeks with participation, before the OJT assignment, in a basic remote sensing short course such as those offered by LARS. Perhaps this training could be made an integral part of the design and review phase depending on needs of the selected participants. For the longer term, to assure the technology transfer is successful, at least one Moroccan scientist should be selected for academic training in remote sensing leading to an advanced degree in this discipline.

In addition to the above training, an in-country Fundamentals of Remote Sensing Short Course of 1-2 weeks should be designed and conducted for DPAE staff. Expertise for conducting this workshop could be provided by many of the remote sensing institutions in the U.S. including many universities and private firms or it could easily come from other countries, e.g. France, Switzerland or others involved in this technology.

The determination of the need for U.S. training for the short courses should be left to the technical assistance contractor. Consideration would have to be given to the advantages of U.S. training to in-country training, including cost and English language abilities. However, 4 participants will be budgeted for 4 weeks each so that both visitations to U.S. facilities and short-term course work can be accomadated.

In the Economic Analysis (SE) service, short-term training is considered only as a cooperative on-job orientation with U.S. counterparts in the USDA. USDA has undertaken similar efforts for other countries (such as Egypt). The S.E. would send a technician to the USDA to observe how the analytical section operates. Again, the determination for such visitations should be made by the T.A. contractor as was noted above for remote sensing.

3. Selection

Participant training candidates will be selected by the DPAE Director and his staff.

4. Participant Training Guidelines

All participant training will be geared to identified needs within DPAE. Specific training will be structured to facilitate the transfer of techonolgy.

a. Categories of U.S. Training: Participant training under this project is divided into two categories: academic and technical. Academic training is a program in an accredited institution of higher eduction leading to a degree. The majority of academic training will be for PhD degrees. A limited number of participants (estimated: 4), will receive MS level training. For degree training, a participant will be limited to earning only one degree while in the U.S. except when approved for special circumstances by the JSC, and will be required to return to Morocco upon completion of his/her degree program. This project will not finance undergraduate degree studies. All participant training will be fully forward funded in accordance with Near East Bureau guidelines.

All non-academic training in the U.S. will be classified as technical. This will include observation visits, short-term, non degree training, and special seminars and conferences.

b. Selection Criteria: Although the new project will allow for some flexibility, USAID will make every effort to screen participants' programs to ascertain their relevance to the DPAE portfolio guidelines. Each proposed participant will be considered without discrimination according to the following criteria:

(1) Is a citizen of Morocco, mature and able to adjust to new and varied conditions and cultures.

(2) Is in good physical and mental health as indicated by medical examinations.

(3) Displays an adequate understanding and utilization of English or third country language in order to be judged capable of

BEST AVAILABLE COPY

participating effectively in the arranged training program.

(4) Has served at least one year beyond his/her civil service requirement, i.e. three years, in the Moroccan Government unless agreed to in writing by the GOM and USAID.

(5) Is willing to serve in the DPAE for the period of his/her obligation to the GOM.

c. Additional Criteria for Long-Term Academic Participants (U.S.):

(1) Fields of training under this project are public administration, management, public policy, finance, economics, statistics, computer science, remote sensing and crop forecasting.

(2) Degrees offered are MA/MS and PhD.

(3) Each participant's file must include the following:

- A signed letter of nomination from MARA.
- A curriculum vitae (resume).
- A detailed description of the desired training.
- An agreement (engagement) signed by the candidate that he/she will serve in DPAE when he/she returns home, for a certain period of time in accordance with GOM regulations.
- A certificate stating he/she has sufficient English language proficiency to enable him/her to follow an extensive academic program conducted in English in the U.S.
- Academic credentials and 7 photographs.
- Three letters of recommendation.
- A medical certificate.

(4) Academic nominations must be received by the GOM/USAID Joint Selection Committee 180 days prior to the registration date of the concerned U.S. University. The nominee's complete file is due at that time.

d. Additional Criteria for Short-Term Technical Participants (U.S.):

(1) Fields of training are evaluation, agricultural statistics, remote sensing, crop forecasting, administration, management, economics, financial management, agriculture, and other training in related fields.

(2) Duration of training will be 1-6 months.

(3) Participant's file must include the following:

- A signed letter of nomination from DPAE.
- A detailed description of the desired training.
- A curriculum vitae (resume) and 7 photographs.

- Three letters of recommendation with a medical certificate.
- A certificate stating that the candidate's English language proficiency is sufficient for short-term training.
- A recommendation from contractor's resident technical assistant.

(4) Nominations must be received by the GOM/USAID Joint Selection Committee 120 days before the planned training program. Nominees complete files are due at that time.

e. Additional Criteria for the Short-Term In-Country Training:

(1) Proposals from DPAE must be submitted to USAID through proper channels.

(2) DPAE proposals will be submitted in a formal request signed by a responsible official of the DPAE.

f. English Language Training: Participants proposed for training in the United States must demonstrate language proficiency adequate to meet program requirements. To determine a proposed candidate's level of proficiency, the project will provide for the American Language Center, Rabat, to administer the American Language Institute of Georgetown University (ALIGU) Test. Participants will be required to meet the following ALIGU qualifying scores prior to their departure for training:

TEST	ACADEMIC	NON-ACADEMIC
Usage	90% (50%)1/	70% (30%)2/
Vocubulary and Reading	90% (35%)1/	65% (25%)2/
Comprehension (Listening)	75% (50%)1/	79% (30%)2/

In general, participants whose English language proficiency is below qualifying ALIGU scores will be allowed to take English classes at one of the American Language Centers, currently located in Rabat, Casablanca, Marrakesh, Tangiers and Fes.

Normally, the project will finance in-country, group English classes for up to six months. If warranted, under exceptional circumstances, the six-month period may be extended for an additional six months, maximum. The project will not finance English classes for any participant in excess of twelve months.

Furthermore, prior to placement at a U.S. university, most participants will be required to take the Test of English as a Foreign Language (TOEFL). If a U.S. University requires a TOEFL score, a participant will not be permitted to proceed to the U.S., even though he/she has already achieved satisfactory scores on the ALIGU Test, without a satisfactory TOEFL score. Normally, universities that do require TOEFL

1/ Minimum scores for nomination shown in parentheses.

2/ Minimum scores for nomination shown in parentheses.

scores insist on levels in the 500-550 range. This is equivalent to a total ALIGU score in the 240-280 range.

An informal USAID survey of several AID-funded projects with a participant training element has indicated that inadequate English language proficiency was a common factor among many of those candidates who were not able to complete their U.S. training programs. This project, therefore, will adopt the 608-0178 guidelines by applying stricter language proficiency criteria than those of previous USAID projects, will seek to diminish the likelihood of early termination of U.S. training programs.

TABLE 7

SCHEDULED SHORT-TERM U.S. TRAINING

FOR DPAE

YEAR	S.P.	S.E.	S.S.D.	PERSONS/WEEKS	COST
1984	2			2/16	$20,000
1985	2	2	1	5/28	38,000
1986	2	1	2	5/28	38,000
1987	2		1	3/20	26,000
1988		1		1/4	6,000
	8	4	4	16/96	128,000

TABLE 8

Long term training schedule

	SSD	M & E	SE	out	in	level	Perso Year
English in Morocco)	1	2	2	Jan. 1984	Aug. 1984		
	3	2	2	Jan. 1985	Aug. 1985		
	8	6	6	Sept. 1985	Feb. 1986	---non acad. reading	
	5	2	2	Jan. 1986	Aug. 1986		
	2			Jan. 1987	Aug. 1987		
	2*			Jan. 1984	Aug. 1985		
	2*			Jan. 1986	Aug. 1986		
Total English	23	12	12	Total	47 persons		
Academic in U.S.)	1			Sept. 1984	July 1986	Ph.D	2
		1	1	Sept. 1984	July 1987	Ph.D	6
		1	1	Sept. 1984	July 1988	Ph.D	8
		1	1	Sept. 1985	July 1988	Ph.D	6
	2			Sept. 1985	July 1988	Ph.D	6
	1	1	1	Sept. 1985	July 1989	Ph.D	12
		1	1	Sept. 1986	July 1989	Ph.D	6
		1	1	Sept. 1986	July 1990	Ph.D	8
	1			Sept. 1987	July 1991	Ph.D	4
	1			Sept. 1987	July 1989	Ph.D	2
	2*			Sept. 1985	Sept 1987	MS	4
	2*			Sept. 1986	Sept 1988	MS	4
ub-Totals	10	6	6	18 Ph.D's	4 MSc's		68
Academic in Morocco)		8	2	Sept. 1985	July 1987	MS	
			2	Sept. 1986	July 1988	MS	
			2	Sept. 1987	July 1989	MS	
			2	Sept. 1988	July 1990	MS	

* Yield modeling training

D. Summary of Analysis

1. Technical Analysis

a. Background: Detailed planning for agricultural development requires detailed information on the resources required for agricultural production. In addition to the physical resources, it is essential to understand the functional relationships that cause resources to be mobilized for production. Once this information is gathered and analysed, it is imperative that resources are properly managed if productivity gains are to be maximised. Because of this need, the GOM created the Directorate of Planning and Economic Affairs.

b. Organization: The Directorate of Planning and Economic Affairs (DPAE) is organized into two technical divisions and one administrative service. The technical divisions are the Division of Planning and the Division of Economic Affairs.

The Division of Planning is subdivided into three services; Planning, Technical Cooperation and Projects. The Services of Planning and Technical Cooperation are largely responsible for the identification and planning of agricultural development projects. The Service of Projects is responsible for the evaluation of agricultural development projects, the installation of analytical methodology for the planning and programming of agricultural development and for the preparation of agricultural development plans. It is also responsible for the monitoring of project performance and the evaluation of project impact.

The second technical division, the Division of Economic Affairs (DAE), is comprised of two services. The first Service, Economic Studies and Market and Prices (SEEMP)*, is responsbile for agroeconomic studies and analysis. The Statistics and Documentation Service (SSD) is responsible for gathering and analysing agricultural statistics. The DPAE has 165 fulltime staff at its national offices in Rabat. These are assigned to the various Services as noted below.

SERVICE	
Administration	29
Statistics	62
Economic Studies	19
Projects	18
Cooperation	14
Plan	15
Division Offices	8
	165

Of this staff, 18 are trained to the MS level or above, and 17 to the BS level. In addition the DPAE employs about 60 temporary workers in the national office. At the Provincial level, DPAE has staff in 26 Provinces. 390 of these are permanent employees, with 5 MS level. and 21 BS level. In addition 302 part time employees are used, particularly for survey enumeration.

Although figures could not be obtained, it is estimated that the personnel costs of DPAE are in excess of $5,000,000 per year. Depending on non costed benefits and numbers and duration of occassional employees, the figure could easily be double that.

* Often referred to only as SE, Service d'Etudes

c. Agricultural Statistics: Agricultural data is a prerequisite to intelligent investment and management decisions in agriculture. Data must be reliable and be compiled and summarized quickly. Given the nature of agriculture production with rapid turnover, highly diverse products and non-homogenous units, this is always a difficult task. Because of the vast numbers of farms involved in production, transport, processing, exporting and retailing, census type of data becomes so volumneous that it cannot be handled efficiently. Therefore, a simpler, more cost efficient approach is required that can still assure a high degree of accuracy.

For several years the United States Department of Agriculture, through its Statistical Reporting Service (SRS) has sought to improve the timeliness, and accuracy of data collection in the U.S. without increasing the costs of data handling. Fortunately, with the advances in statistical methodologies and data processing capacities, vast improvements have been made. The major development has been in the techniques of probability sampling. In its simplest terms this means gathering data from a very small number of the population and estimating from this sample what the whole population is like.

The first requirement for probability sampling is an adequate sampling frame. That is a list of names, firms, farms, etc., from which to draw the probability sample. Over the past 30 years, the SRS has developed a method of constructing a sampling frame for estimating agricultural production known as the Area Sampling Frame (ASF). The basic concept is to divide the country into major units by the characteristics under study. These are then subdivided further until a number of sampling units are determined. The sampling units are then enumerated and the information is expanded to arrive at national statistics. The advantage to this system is that a relatively small number of units, farms for example, need to be enumerated. In the U.S., for example, about .5% of farms are sampled annually. Obviously, the cost of data collection on the ground is reduced considerably, the quality of data gathered is improved, control of enumerators enhanced, and volume of data to be processed is reduced.

The area sampling frame method of gathering current agricultural statistics was first introduced in Morocco in 1979 under the Remote Sensing for Agriculture Project (No. AG/DSB 931-1224). This project was financed by the USAID Bureau for Science and Technology and was implemented by the USDA's Statistical Reporting Service (SRS). The project was worldwide, covering 11 countries, of which Morocco was one.

The original project consisted of four phases:

(1) Development of an area sampling frame (ASF);

(2) Data collection of primary agricultural data;

(3) Digital processing of remotely sensed data for estimating crop areas; and

(4) Objective yield forecasting using agrometeorological yield models.

Phases 3 and 4 were not done in any of the countries, partially because of problems with Lansats 3 and 4, but primarily because of insufficient project funds. The latter occured because more countries entered the program than was originally estimated.

In Morocco, Phase I, (construction of the ASF) began in one province, Kenitra, under a memorandum of understanding (MOU) between USDA and DPAE signed in mid-1979. That MOU provided for the construction of the ASF in one province, conducting a pilot survey using a ramdon sample selected from that ASF, and eventually the construction of an ASF for all of Morocco.

By 1982, the Service de Statistique et Documentation, (SSD) which conducts the surveys for DPAE, had conducted the agricultural survey in 7 provinces based on the ASF, and these surveys had replaced the traditional surveys. Similar surveys were tried in 8 other provinces based on the ASF, but due primarily to lack of aerial photographs for these areas, difficulties were encountered. Yield surveys have also been initiated in provinces where the agricultural surveys based on the ASF have been proven.

The initial pilot study in Morocco and the ensuing expansion were considered very successful by both the SRS and the SSD. These surveys were easier to conduct, easier to monitor, took less time and allowed a greater scope of information to be collected than was the case with the traditional surveys.

In June of 1981, a Northstar Horizon microcomputer was introduced for automated summarization of ASF survey results. A second Northstar, on loan from USDA, expanded this capacity in 1982. Even with this computer capacity the volume of data to tabulate presents serious problems. This problem will continue as demand for other surveys increases the data handled by the DPAE.

The developments made by the DPAE in the use of current technology for statistics in agriculture must be further advanced if the needs of policy makers and other end users are to be met. These include:

a. Improvements in the quality of basic agricultural data through implementation of ASF technology for all of Morocco's agricultural production zone and through introduction of digital processing of satellite remote sensing data for ASF maintenance and improved crop and land-use estimates;

b. Improvements in yield forecasts and estimates through objective yield surveys for major crops and the implementation of a crop yield modeling effort for selected crops; and

c. Enhancement of the present data processing capability in DPAE to enable more timely processing and publication of survey results, to provide for implementing an agricultural data base for economic and policy analysis, and to permit the introduction of remote sensing and yield modeling technologies.

It is proposed that this be done over a ten year period with a strategy and plan for a phased technology transfer and training program whereby the Moroccan Agricultural Statistics Program will be able by 1990-1993 to be largely independent of the need for further technical assistance. This time period will allow for the gradual transition to a data collection and analysis technology which is based on the most recent advances. This requires introduction, testing and refining technology over a period of years. It also requires training a cadre of professionals and phasing them into an operational system.

The following areas have been identified for which USAID assistance to the DPAE will provide significant improvements for the current agricultural statistics organization and program for the country.

The first requirement for the improvement of Morocco's data base is the completion of the Area Sampling Frame (ASF). Under the Remote Sensing for Agriculture Project SSD staffed and equipped a permanent ASF Unit as an integral part of the organization. This staff has been well trained in frame construction methodology and is completely competent to pursue this activity with little additional technical assistance. Because an ASF never becomes unusable for sampling it becomes a permanent part of the capital of the country. However, periodic updating may be required. The use of satellite imagery for this purpose will be included in this project, along with some technical assistance in non-satellite technology. The most effective approach for technical assistance for the ASF will be for a TDY Mathematical Statistician with ASF experience to conduct a workshop on ASF maintenance procedures for SSD staff. The workshop will include instruction on statistical analysis techniques for determining when it would be beneficial to update the frame for a particular province and how new materials should be used for frame updating. This would include mostly manual procedures and would serve as an interim technology, pending successful implementation of digital processing of satellite remote sensing data. It could be adopted as the long-term solution to frame maintenance if research currently underway in the United States and further work in Morocco shows that the remote sensing techniques are not cost effective. Frame maintenance could then be monitored by the resident statisticians recommended under other parts of this project to determine future assitance requirements.

For completion of the ASF to cover all of Morocco, to assure that maximum use is generated from the ASF and to help in ASF maintenance, the first area for which assistance is needed is in the acquisition of current aerial photography. This is urgently needed if the ASF technology is to be expanded from the current 13 provinces where it is operational to the remainder of the country. The single most important barrier to the adoption of ASF methodology in Morocco is the lack of good quality aerial photography. Success of this project to improve agricultural information systems through area sampling must address this problem. One hope was that satellite imagery would solve the problem and it may eventually; however, the limited (80 meters for MSS; 30 meters for TM) spatial resolution of available satellite imagery is simply not adequate by itself to solve the problem. Unfortunately, flying current aerial photography for Morocco is very expensive. To complete the aerial photography will cost an estimated three million dollars. However, for Morocco this should be viewed in a broader development context. Even though it is mandatory for improving the agricultural statistics program, acquisition of this photography would be a wise capital investment, useful to many other institutions in the country for a wide range of development activities.

Together with the acquisition of current photography, there is the need to enhance the existing photographic laboratory facilities. The possibility of improving an existing laboratory in the Directorate of Land Conservation and Topographic Works was explored. However, the past difficulties of acquiring photography, the time delays and the cost, do not made this a feasible alternative. Therefore, developing a laboratory for the DPAE is proposed.

The primary use of the ASF will be for the regularly scheduled crop and livestock surveys. The annual survey which provides the basic crop area estimates will serve as a base for future sub-samples which can be used for objective yield surveys or

other special surveys such as cost of production surveys, agricultural inputs or farm labor surveys. Also the annual survey will serve as a "ground truth" base which is necessary for computer classification of satellite remote sensing data. The ultimate use of the ASF is largely dependent on the skills and ingenuity of the statisticians in planning and designing surveys. The long-term solution for improving survey design capabilities in the DPAE is for advanced training in statistics, especially in sampling. To meet this need it is recommended that DPAE staff members be selected for long-term training in order to provide, by 1990-1993, at least two statisticians with PhD training, and at least four to be trained at the Masters level. The near term solution would be to provide a resident consultant statistician for two to three years, beginning in 1984. This resident should have experience in survey designing, especially using ASF and experience with either remote sensing technology or yield modeling. For special projects, such as objective yield surveys, the resident statistician would have to be backed-up by TDY consultants with specific expertise in the specialty area.

It is not intended to change the current Moroccan program of surveys, which seems more than adequate in terms of comprehensive coverage. Emphasis should be placed on providing assistance for designing future "ad hoc" surveys and in survey planning and scheduling for the present program. To integrate objective yield forecasts and digital processing of remote sensing data will require a significant improvement in current DPAE planning and survey management.

An evaluation report for the Remote Sensing for Agriculture project in September 1980 recommended Morocco as one of the countries for which "agromet" yield modeling should be implemented. Current investigations support this recommendation, providing adequate computing recources are made available. According to SSD staff, historic yield and weather data are available for up to 20 years at the province level for important cereal crops. This data could be used in regression models as a first step towared more sophisticiated models in future years. Even the simple regression models, if used with caution, could provide an improved forecasting ability for Morocco in a relatively short period of time. In order to develop more advance yield models additional data inputs, not now available in Morocco, will be required. Some of these will come from the Objective Yield survey program and as an evolutionary development as more training and in-country expertise becomes available.

The original concept of using satellite remote sensing data for crop area estimates under the Remote Sensing for Agriculture project was to process the improved (Thematic Mapper) data from Lansat 4 to provide more precise crop area estimates for Morocco. This application was planned based on the same model successfully used by SRS in the United States for improving U.S. crop area estimates. The technical design team reviewed the evaluations of the Remote Sensing for Agriculture Project and supported the evaluation team's conclusion that Morocco should be provided with technical assistance "to develop an in-country capability to classify satellite multispectral data and to derive appropriate in-season information of major crop types, their area distribution and extent."

Research and operational use of satellite data by many institutions over the past decade has clearly demonstrated the utility of this data source for improving crop production estimates and natural resource information. Changes in computer capabilities (both hardware and software) have greatly enhanced the benefit/cost ratio for using satellite data by reducing processing costs and capital investment

required to implement the technology. Also, improvement in sensor capabilities (Thematic Mapper vs. Mulit-Spectral Schanner; SPOT) have, or will, significantly enhance the utility of the data for agricultural purposes. The technical design team recommended that a dedicated computer configuration for digital processing be installed by 1986. Three phases were recommended for establishing this technology in Morocco:

1. A review, evaluation and design phase to begin with project start-up and completed before 1985. This would be carried out by host country staff in conjunction with U.S. Technical Assistance. Moroccan staff visits to U.S. Remote Sensing institutions are proposed under this phase;

2. A training phase focusing upon the fundamentals of remote sensing and data capture from space-born sensors. Most of this training would be done in Morocco, but contingency allowances for short course training at an institute such as LARS would be provided.

3. An institutional support phase by which the GOM support for system maintenance and transfer of operational techniques to new staff would be established.

One of the planned phases in the Remote Sensing for Agriculture Project was to develop and implement crop yield models for selected crops in Morocco. Unfortunately this was premature in terms of the level of technology in DPAE as well as its access to computer capacity.

Current yield forecasts in Morocco are based on largely subjective opinion surveys conducted by SSD and DPV (Directorate of Plant Production), with final end of season estimates based on objective "crop cutting" surveys. Both forecasting and estimating methodologies need improving. This is recognized by SSD staff and they have requested technical assistance to address the problems associated with their yield estimates. To address this area the logical first step is to develop objective yield surveys to provide both forecasts and estimates (starting with the major cereal crops) and to enhance this with a crop modeling program as rapidly as possible.

The objective yield surveys envisioned for Morocco would use a random sample of fields, selected with probabilities proportional to size, from the annual ASF survey. Within each sample field small units would be randomly located and identified for counting and eventual harvest at maturity. Prior to maturity, plant counts and observations correlated with final yield are used to make yield forecsts. Once the crop is mature, sample plots are harvested, weighed and expanded to a biological yield to arrive at a net harvested yield. This net yield mutliplied by harvested hectares provides an estimate of production.

In order to implement a forecast survey, scheduling of data collection for the Area Survey will have to tightened and perhaps the Survey will have to be started earlier. Properly conducted objective yield surveys will generate more reliable data than presently is obtained.

An objective yield survey program as visualized will require the establishment of a laboratory for processing the crop samples. This laboratory will need to be equipped with the necessary instrumentation for handling a large volume of samples within a relatively short time. Equipment required will include micro threshers, seed counter, scales, moisture meters and ovens, as well as the necessary containers and packaging materials necessary to transport samples from the field into the laboratory.

After about three years of these surveys the data from the forecast survey and the harvest survey will be used to develop forecast models for providing objective forecasts of yields earlier in the season as a significant improvement over the subjective procedures now used.

To successfully plan and implement objective yield surveys in Morocco will require technical assistance in the form of both long-term residents and periodic short-term visits. Because of the time required to establish a survey of this kind, this assistance should be provided in time to implement at least a pilot survey for one or two crops in 1984. Also it is assumed that the data entry and computer equipment will be provided.

d. Data Processing: The design team reviewed the data processing situation of the DPAE and made specific recommendations for computer support to the Data Collection and Analysis functions of the DPAE. As has been noted, the SSD has two Northstar Horizon microcomputers. Each of these is connected to two televideo terminals. There are also two impact printers. One computer, two terminals and two printers, along with peripheral equipment, is on loan from the USDA, which also supplied much of the software.

In reviewing the system with the SSD several major problems and constraints were identified. These are:

(1) The length of time it takes to enter each record;

(2) The large number of diskettes required to store data for each Province;

(3) The limited size of the Northstar computer, which forces SSD to do their processing sequentially, rather than simultaneously;

(4) The severe maintenance problems with the Northstar and its peripheral equipment;

(5) The lack of a sufficent number of trained data entry staff;

(6) The inability of the Northstar to support the digital processing of remote sensing data;

(7) The insufficient computer capacity to handle future surveys;

(8) The insufficient capacity on the Northstar for statistical analysis;

(9) The insufficient capacity to build a data bank; and

(10) The lack of a graphics capability of the Northstar.

In order to address these problems, and in view of the 10 year development

program envisioned for the DPAE, the design team reviewed the existing data processing environment in Morocco and made recommendations for the DPAE. In general, the team concluded that additional computer hardware, software, and telecommunications equipment will need to be provided. This was based on the need to improve the data capture function, to support the requirements of digital processing of Landsat data and yield modeling, and to increase the capability within DPAE for statistical analysis, economic analysis, data management, project cost accounting, and preparation of reports. The requirements for all aspects of DPAE's data processing functions were reviewed by the design team and several options were explored. Weighing the advantages and disadvantages of each option the design team chose an option that incorporated aspects of other possible options. The data processing requirements and the recommended system are given in Annex V. With certain modifications in the implementation schedule and the addition of one small micro computer/work processor for the Service des Projets, the data processing component is designed around this option.

Because of the rapidly changing technology in data processing and agricultural statistics (some equipment and programs are under development presently and will be available by July/August 1983) the recommendations could be somewhat modified. Therefore, the design team has programmed a technical systems analysis to be performed as soon as the project is approved. At this time the proposed system should be reviewed, existing technology should be reviewed in the United States, and a feasible, cost effective systems plan should be prepared and presented to AID and DPAE management. The design team stresses that the analysis should recommend improvements in the chosen option, but analysis should be required to justify any significant increase in cost or delay in implementation.

e. Economic Studies: The Economic Studies Service (SE--Service des Etudes Economiques et des Marches et Prix) has the responsibility to conduct studies of an economic nature related to the agricultural sector. The Service presently has only 7 trained professionals of which only three have studied beyond the BS level. The work assigned to this staff ranges from monitoring the international markets for agricultural products relevant to Morocco, particularly cereals, to undertaking studies on the effects of various subsidies on production and consumption. As a relatively new service, the Economics Studies Service has not as yet determined the exact form and scope that these studies and analysis should take.

Although the mandate from the MARA to the SE is very broad, as delineated in the current Five-Year Plan, very little direction or specificity is given for these studies. For example, the 5 Year Plan lists 13 agro-economic studies to be undertaken on such areas as agricultural production, ag. inputs, value added in agriculture, ag. prices, credit, and international trade in agriculture. Exactly what these studies should accomplish is not addressed in the Plan. The SE must therefore begin by specifying the objectives of the studies to be undertaken. After having done this they must determine the form of the study, specify the model to be used and how the data is to be gathered.

It appears that in the first instance the SE will be responsible for several surveys and survey analysis that will occur on a regular (monthly, annual, etc.) basis. Most of these will be on a macro level, i.e. nationwide or relating to the national economy. At present SE is only analyzing the international grain trade.

In order to produce analysis on the agricultural economy the Economic Studies

Service will need to expand, both in terms of quality and quantity of, its technical staff. It is believed that over a ten year period, the assistance proposed under this project will permit this service to acquire the capacity to provide the MARA with its requirements for economic analysis. In order to accomplish this it will be necessary to provide long term training to upgrade the professional staff of the SE. Simultaneous with this training, technical assistance will need to be provided to help specify the studies to be done, and to help SE to determine the methodologies required for these studies.

This is recongnized by the Economic Studies Service and they have requested that at least one long-term technical assistant be provided. Additionally, they have asked that 30 months (three months per year over 10 years) of short-term technical assistance be provided for specific analytical or design problems.

Long term training is proposed for six people to the PhD level. The fields required are:

1 Agricultural economics/macro
1 Agricultrual economics/price policy
2 Econometrics
1 Public Policy economics
1 Statistics/computer science

The candidates will be selected by the Ministry of Agriculture in consultation with USAID (See training plan). They could be either present personnel in the DPAE or within the Ministry who would be assigned to the DPAE upon completion of studies. An alternative would be for the Ministry to nominate candidates from outside the Ministry, for example, from INAV Hassan II or the University.

One long-term technical assistant is proposed for a three year period beginning in 1984-85. This T.A. would assist with on-going studies, or new studies providing help to improve SE's economic analysis. Specifically, the T.A. would help to:

(1) Apply scientific techniques of economic data analysis to agricultural policy questions;

(2) Refine existing methodologies to incorporate features of statistics, econometrics, forecasting, and project modeling for both static and dynamic analysis;

(3) Help to specify the functional relationships within the study areas for mathematical model building; and

(4) Help the SE divison to increase its capacity to produce more time analysis.

Short term technical assistance would be engaged for specific problems related to the agricultural analysis required of the DPAE. The wide range of subjects that the SE needs to address precludes any single person from providing adeqaute training for all service personnel or technical assistance for all activities. Short term technicians therefore, would be brought in to help in the development of special studies in areas such as agro-industrial use of agricultural products, consumer price studies, productivity of agricultural resources or agricultural credit. It is recommended that one short term T.A. be provided each year for a period of 3 months. These specialities would be requested according to the priority needs of DPAE.

The project proposed for DPAE would be linked so that integration of the different divisions will be attained. The data processing; computer hardware and software, as well as the planned data bank, will be utilized by all Services. Initially, it is proposed to supply the SE with one of the existing Northstars for their analysis needs. As DPAE's computer capacity is increased, the SE will be provided with terminals for access to the DPAE system. This is planned so that when long term PhD candidates return starting in 1987-88, both hardware and software will be installed for use by SE allowing them to tie into the data processing system. The computer integration will expand the use of the data collected under the ASF, improving the cost efficiency of that investment. Eventually the shift to a more demand oriented data collection system should occur which should further improve the efficiency of data collection.

f. Service des Projets: The Project Services (SP) of the DPAE is mandated to institutionalize a system of monitoring and evaluation of projects. It has been functioning since 1982, with funds from the IBRD through an Integrated Rural Development Project loan. At present, it is only able to monitor three IRD projects, but it is mandated over time to monitor all significant internationaly and domesticaly funded projects in the agriculture sector, as well as performing formative and summative evaluations. The Service also participates in the identification of projects, and their preparation, but this is largely the responsibility of the chefs des projets of the technical directions in the Ministry.

The Project Service is supposed to monitor project performance across a series of dimensions, including financial and economic, social, and policy, as well as to asess performance in terms of substantive interventions. At present, the cadres in the service are too few, and they are also insufficiently trained to carry out all of these tasks. They have, however, developed an approach to the implementation of their mandate, and are engaged in carrying out as many of their tasks as possible given current manpower and financial support.

Assistance to the project service has as its objectives:

(1) Development of a suitably adapted and complete system for monitoring and evaluating integrated and sub-sectoral projects;

(2) Refinement of existing methodologies for survey design and implementation and related applied research, including improved quantification;

(3) Increased capacity to carry out specific monitoring and evaluati tasks, such as project financial analysis;

(4) Increased coordination between the service and those responsible for designing projects in the technical directorates;

(5) Appropriate training of service staff over the medium term to ensure achievement of the above objectives; including field sta in the provinces; and

(6) Provision of sufficient material support - vehicles, calculato duplication equipment, etc. - so that the service can fulfill mandate. This includes providing access for the service to th integrated computer system proposed for the entire DPAE.

In order to develop the capacity of the Service des Projets (SP) to effectively handle the monitoring and evaluation responsibilities of the Ministry of Agriculture, a staff development plan will have to be implemented. This was recognized as crucial by a 1981 FAO Mission which evaluated DPAE's role in project monitoring and evaluation. Four major points were stressed in that evaluation:

(1) Planning will have to become a continuing task within DPAE. DPAE will have to figure out a methodology for monitoring and evaluating projects undertaken by MARA technical departments;

(2) DPAE will have to coordinate the preparation of the GOM agricultural socio-economic plan, in conjunction with the technical Directorates; DPAE will also have to evaluate the Agricultural projects and use the recommendations to guide the Agricultural policy of the GOM Agricultural socio-economic plan;

(3) The result of project evaluations and DPAE recommendations will have to permit MARA to play the key role in the orientation of agricultural policy; and

(4) The role of DPAE is to coordinate, monitor and develop project evaluation methodology. To undertake this task, DPAE's minimum personnel needs will be 15 Agricultural economists, well trained, motivated, with good experience, reasonably well paid and assisted by a capable technical and administrative staff.

To assist this effort, the FAO proposed to put two technicians into the DPAE's Planning Division to help coordinate their efforts and their training needs. To strengthen this effort, the design team recommended that USAID contribute to the DPAE's SP in three significant ways:

(1) Short term training for SP management personnel, who are responsible monitoring and evaluation techniques and design;

(2) Short term training for DPAE Provincial level people who will be responsible for continuous monitoring of Agricultural projects; and

(3) Long term training to develop the professional skills required for monitoring and evaluation and eventually to be able to provide assistance in project design.

Short-Term TA and Seminars/Workshops: Short-term technical assistance is programmed to meet three needs of the Project Service staff: a) adaptation of the basic monitoring and evaluation system to be used in most future work, including the elaboration of a workplan in the context of preparation of the next Five-Year Development Plan; b) on-the-job training of trainers, who will train their respective field staffs; and c) increased coordination with other MARA directorates leading to a greater awareness, by those directorates of the nature and utility of the project monitoring and evaluation function. The latter need will be met by a combination of short-term TA and seminars/workshops.

In FY 84, five person months of TA will be provided as follows: a) one person for one and 1/2 months to design and implement a short-course to train the ingenieurs

d'application (or their equivalents). These people are employed in the 25 DPAs which currently have field staffs representing the DPAE at the provincial level. This course can be held at the CNERV, at ENA, Meknes; b) one person for two weeks, and three people for three weeks each to assist the Project Service staff to explore a variety of additions or improvements to their current monitoring and evaluation system. This will include assistance in preparing the workplan that will be included in documentation leading to the elaboration of the next (1986-1990) Five-Year Development Plan. These persons, who will be drawn from the U.S. public and private sectors, will conduct workshops for Service staff, which are to be followed by educational seminars to be attended by representatives from other MARA Directorates as well as from other concerned entities, such as the Project management staffs of projects currently under evaluation.

In FY 85, one person month to train the Service headquarter staff in the use of computer hard and software to be made available in FY 84. An additional two people will be provided for one month each to assist the headquarters staff of the Service in improving their skills in project-level financial analysis and in the development of indicators of project success and project impact. One of these persons will also assist in the implementation of the training of field staff by the ingeniers trained the previous year for this purpose.

In FY 86, three people will be provided for one month each to assist the headquarters staff in a) assigning cadres to the various functions determined in the Five-Year Development Plan, including attributing those who will have been on short-course training to the U.S., to the most appropriate functions; b) further refining a variety of dimensions of project-level analysis, and c) developing an ancillary program of applied research to complement the existing monitoring and evaluation system.

Short Courses: The IBRD, AID, USDA and several other institutions based in the U.S. offer a variety of short-course in various aspects of project design, analysis, implementation, and evaluation. Given the broad scope of the mandate of the Project Service under the present Five-Year Development Plan, and the relative lack of some of the skills required to implement it, programming all existing staff to one of these short-courses in the first two-three years of the LOP seems the most expeditious way to proceed. At the same time, individuals will be identified for MS level training in-country (and subsequent placement in the Project Service), and for PhD level training in the U.S. In this way, existing cadres will become more effective in the short-term, while long-term professional development is carried out.

Long-Term Training: It is not anticipated that MS level training for potential Project Service cadres will be carried out in the U.S. Rather it is proposed that eight people receive training in agricultural and social sciences at INAV Hassan II in Morocco. These cadres, when they have finished their coursework and are ready to do their thesis research, can then be placed at the Project Service, where they can carry out thesis research in the context of their new job responsibilities, and then earn their MS degrees locally. It is anticipated that eight persons over the LOP will be trained to the MS level in this manner.

PhD level training will, however, take place in the U.S. This is necessary given the types of fields in which trained personnel are required, and the lack of availability of PhD level courses in these fields in Morocco. It is anticipated that, over

the LOP, 6 Project Service cadres will be sent to the U.S. for participant training at U.S. Universities. They may chose to return to Morocco to do thier dissertation research on-the-job, and receive their degrees from INAV. They can conceiveably also get a U.S. degree providing such arrangements are made with the U.S. university in question (and agreed to by USAID). This will depend on the nature of the field of study, and on the then-effective policy concerning the granting of degrees developed by MARA.

Documentation Center: Access to documents from donor agencies funded projects that are being monitored/evaluated by the Project Service, as well as documents form other similar agencies, from universities and institutes and other relevant institutions is critical for a Service that is in the embryonic stage of developing an approach to project monitoring. Similarly, other documents and professional journals will be essential to the other DPAE services. The same kind of documentation can also be useful for instructional purposes at INAV. Since INAV has a Documentation Center which will be funded by the USAID under Project 0160, and for which a new director has been trained under that project, it seems prudent to place the major responsibility for procurement and storage of documents for the Project Service at INAV, at least in the short-term. This is particularly true given the space problems of the DPAE as a whole. However, copies of relevant documents on project identification, design, monitoring and evaluation that are procured by INAV with funds from Project 0170, should be duplicated as and when necessary, so that Project Service staff can have ready access to them at all times. These can be kept at the existing DPAE documentation center in MARA.

g. Training of Enumerators: Experience gained under the previous "Remote Sensing for Agriculture" Project utilized in-house staff for training of ground level enumerators. This included a three part training system prior to the enumeration of the first province in 1980.

(1) Development of an enumerators manual;

(2) A pre-test survey utilizing the enumerators who would supervise the actual survey enumerators;

(3) A three day enumerators training school for enumerators that were normally employed for the traditional agricultural surveys.

In the technician's report on this effort she notes, "The three days of training included a practice survey during which each enumerator had the opportunity to become familiar with the use of a map and a photograph enlargement to locate a segment in the field. They were also instructed in the delineation of the fields on the photographs, the use of a transparent grid to estimate field area and the correct methods for completing the questionnaire. The DPAE decided that the practice survey, the classroom discussions and the enumerators manual provided sufficient training for the enumerators. Consequently, the field enumeration began the following week." *

It is instructive to note her comments more fully relating to the data collection effort under this pilot project.

> "Data collection was begun on February 13, 1980 and was not completed until late April. Delays were largely due to the personnel and transportation problems discussed below.

---

*Melissa J.A. Cable, Area Frame Construction Specialist, USDA, Remote Sensing for Agriculture Project, AG/DSB, 1224-6178, Rabat, Oct. 17, 1980

The organization of the field work was extremely difficult because the personnel and cars used for the pilot survey were also required for the MA's annual agriculture survey being held at the same time. Usually the field work was conducted by three to four teams. Each team consisted of a supervisory enumerator and three or more enumerators.

It was necessary to obtain permission to conduct the survey from the provincial offices, the regional offices, the caid (mayor) of an area and in some cases the headman in the douar (hamlet). This problem was further complicated if a segment fell in more than one douar. Once all the necessary letters of permission had been obtained, appointments were scheduled with the douars that comprised a segment and a team was designated to conduct the enumeration.

On the day of the appointment, the enumeration team would arrive at the segment and was generally greeted by the entire male population of the douar. The enumerators would explain the purpose of their visit and request an interview with any of the operators that owned or operated land inside the segment. Using the headman of the doaur as their guide, they would then go and locate the boundaries of the segment. Usually, everyone present followed the enumerators. After the boundaries had been verified, the enumerators would conduct the interviews.

There were some problems encountered during the survey with the use of the aerial photographs. The enumerators were unable to delineate operations and fields on the photographs, primarily because of the small size of the field in relation to the size of the segment. Many operators reported holdings of only one or two-tenths of a hectare. It was difficult for the enumerators to locate and sketch these holdings in a segment containing 100-200 hectares. Other difficulties in sketching the operations were encountered on the farms that were operated collectively. On these farms, the boundaries between operations were difficult to distinguish because they were usually planted in the same crop. Finally, many operators had never seen an aerial photograph before, and when asked to point out their holdings on the photography, they tended to overestimate them.

Another difficulty was encountered in areas devoted to tree crops (arbor-culture). In these areas, there is a considerable amount of inter-cropping, where one operator raises tree crops and another operator raises a crop (usually cereals) between the trees. Each operator demanded that a questionnaire be filled out for his operation, and it was difficult for both operators to understand that only one was required. In several instances the enumerator filled out two separate questionnaires during the interview, noted the problem, then recopied the information onto one questionnaire before turning it in to his supervisor.

The reporting of livestock by the farmers also presented some

difficulty. In most doaurs the livestock is communally grazed, consequently, it was difficult for the enumerator to determine if the operator was under-reporting his head of livestock. Other animals were missed because farmers hesitated to report animals that were located on their tracts but belonged to someone else.

Finally, problems were encountered with operators who reported the area of their operations in units other than hectares. The enumerator was required to make the necessary conversions before he turned the questionnaire in to his supervisor. However, this was not considered a serious problem as the enumerators had completed classroom exercises on local units of measure during their training school.

After each segment was completed, the supervisor conducted a field edit, which consisted of the summation of the area of each field reported in an operation and a comparison of this total to total reported area in an operation. He also verified that a questionnaire had been completed for each operator listed on the screening and inventory form of the questionnaire."

Later evaluations of this pilot effort and further work done by the DPAE with the ASF concluded that the initial effort was successful. The design team felt that up to the present level of effort, field enumeration, while not perfect, was relatively satisfactory. Further training, though necessary, appeared to be within the capability of the DPAE.

The design team was, at this point, only recommending extensive training for the monitoring and evaluation service. This is planned as a training of the Provincial level supervisory staff in a "Training of trainers" program.

However, it is still possible that the enumerators for the DPAE, whether doing the ASF surveys or special economic surveys, will require further training. It is therefore planned, that as a part of the first major evaluation to be undertaken in 1986, that the field level of data collection will be given a thorough review. This review will look at enumerators, enumerator supervision and general level of skills in data collection and handling. If problems are noted, the evaluation should recom mend ways in which these problems can be corrected. These could be further training of supervisors, training of enumerators or improved supervision or control measures.

It is impossible at this stage to determine if, at the level of enumerators, th degree of professionalism exists for accurate data collection. This cannot be know until the full, nationwide survey has been done and a review of training, supervisi and data handling has been done. Additionally, specific survey requirements from the SE will create further demands on enumerators and these should also be reviewed

Contingency funds have been budgeted in the event that enumerator or supervis training needs to be done. The source of such training is unspecified and may be available in-country (for example, INAV Hassan II). However, if major retraining restructuring of the data collection is required as DPAE activities expand an amen program may be needed.

2. Financial Analysis

The DPAE project is an institution building project intended to develop a support service within the Ministry of Agriculture and Agrarian Reform. The DPAE will have as its responsibility, the providing of information and management services to the Government and the private sector. The question to be addressed, therefore in this analysis is what is the cost of the technology chosen and its method of transfer relative to alternatives?

The main method for collecting data on the agriculture sector proposed under this project is the Area Sampling Frame. The technology was developed in the U.S. because of its cost-effectiveness for the quality of data obtained relative to other methods. As is noted by the technical experts on the design team:

> ASF methodology is the only feasible way to improve current agricultural statistics programs for countries such as Morocco. Other sampling frames, have so many statistical deficiencies, with no operational advantages, that they simply do not represent reasonable alternatives. This even includes an agricultural census, which theoretically provides the most accurate statistics. The time delays associated with publication of results and its high cost makes a census an unacceptabel alternative for current agricultural statistics.

In fact, once developed, the ASF will produce more reliable data for Morocco at less cost than their present system. This is the main reason for its introduction. In addition, with regular maintenance, for which training is planned under the project, the ASF never goes out of date, and therefore becomes a capital asset of the country.

The use of satellite imagery for remote sensing data is frequently discussed in terms of the technology and cost effectiveness. The design team notes that:

> Although benefits of using satellite data to estimate crop production and moniter earth resources have been frequently, grossly overstated by proponents of the technology, Research and Operational use of the data by many institutions over the past decade has clearly demonstrated the utility of this data source for improving crop production estimates and natural resource information. Changes in computer capabilities (both hardware and software) have greatly enhanced the benefit/cost ratio for using satellite data by reducing processing cost and capital investment required to implement the technology. Also improvements in sensor capabilities (Thematic Mapper vs. Multi-Spectral Scanner: SPOT) have or will significantly enhance the utility of the data by the Statistical Reporting Service for crop area estimates in the U.S. has demonstrated that the technology has evolved to the point where it is almost cost-effective for improving crop estimates when compared to alternative methods for achieving the same results (i.e. increasing the size of the area frame sample). When the social costs of the alternatives are considered (increased respondent burden, staff increases under hiring freezes, etc.) then remote sensing clearly emerges as a highly beneficial technology for crop area estimates in the U.S.

Research using simulated Thematic Mapper data has shown potential improvements over MSS data with precision of crop acreage estimates reduced by a factor of 3 to as much as 12 for some crops.

There have been many other studies over the past decade which have addressed the potential benefits of remote sensing for agriculture. Eisgruber in 1972 estimated that the overall social benefit from reducing the error in estimates from 3 to 2 percent for some of the major crops in the U.S. (corn, wheat, and soybeans) would be some $14 million per year (based on 1964-1970 prices). Other studies, particularly those done after the 1972 Russian Grain Deal, have estimated positive annual benefits of several hundred million dollars per year to the U.S. economy from the improvements in global crop production estimates potentially possible through satellite remote sensing.

A further benefit from the use of satellite data in Morocco is as a check of ground information. In addition to verifying this information, it offers a partial alternative to the costly operational problems associated with relying solely on field work.

In data processing the design team experts considered 4 options. These varied in cost and complexity. The recommended option chosen was a combination of other options. Although the chosen option was slightly more expensive than the other options, the main benefit was "it's flexibility - the timetable for procurement can change without greatly affecting project cost or the level of assistance to the DPAE". Given the high cost of T.A., a data processing system that runs the risk of requiring increased T.A. could easily, in the long run, be more costly.

The technology to be transferred under the project is largely embodied in the approaches to and methods for problem solving. Very little is represented by "hardware". The approach is clear from the high levels of technical assistance and training in budget figures ($2.209 million or 25% for T.A. and $1.875 million or 21% for training, of U.S. base costs). It is justifiable to consider whether this is the most effective means to achieve technology transfer. The design team considered other options such as shifting more emphasis from T.A. to long-term training, or shifting more long-term training to Morocco through Institutional support to local Universities.

The result was that the proposed mix of T.A. and training represents the best mix for the following reasons:

a. Developing the capacity locally would cost considerabely more and take longer than emphasis on U.S. based training. Many of the skills such as in remote sensing and digital processing of satellite imagery are taught at only a few schools even in the U.S. The numbers of people required in Morocco could not justify building this capacity. Although increasing the local Institutions capability areas of statistics and agricultural economics would offer expanded benefits, the benefits to DPAE would not be available as quickly. Presently, USAID is supporting such a program in Morocco, but preparing professors to teach these subjects has only started. Supplying U.S. trained professors to teach skills locally would not reduce project costs and conceivably would increase them.

b. The project could have reduced the amount of expensive T.A. by concentrating on long term training and introducing other technology later. This would delay development of project outputs by at least 6 years. That delay does not seem cost effective given the high emphasis placed on agricultural investment.

c. Finally, T.A. without long-term training is not a viable option, without high level training of Moroccans, expensive T.A. would always be required.

3. Economic Analysis

Because of the difficulty in measuring the benefit stream from this type of project where no direct revenue stream is created, any economic analysis must be viewed with caution if it is done at all. However, in an effort to demonstrate the benefits that could be generated an analysis based on one benefit stream was undertaken. The method used was to demonstrate the FX savings that could have been generated in the importation of cereal over the decade 1972-82 if the data base had been improved.

Given the assumption that the project will create the accuracy of agricultural statistics specified, and that the data will be used for determining timing and quantity of imports, the benefit stream is sizeable, although this only represents one aspect of the benefits generated (i.e. internal price policies or investment decisions could be larger as economic benefits) the results indicated a 30% IRR against total project economic costs (not including inflation). This is not surprising, considering that grain imports averaged 1429 thousand metric tons per year during this period. Therefore, even a 5% saving would generate over $7 million per year.

4. Social Soundness Analysis

This is a project which is designed to strengthen a national-level unit of the GOM bureaucracy. It will do so through a combination of short and long-term technical assistance, short and long-term participant training, and the provision of related commodities. Given this type of project approach, the usual criteria for an in-depth social analysis do not really apply. There is no project area whose sociocultural context can be adequately described. There is relatively little venue for participation in the usual sense, and while there are some issues of impact and sociocultural feasibility, most analytic concerns relating to this project are more properly technical and economic. Nevertheless, in what follows, an attempt is made to define the sociocultural context, to identify the direct and indirect beneficiaries, to discuss probable impact, assess sociocultural feasibility, and identify some issues which may be said to relate to what is normally meant as social soundness.

a. Sociocultural Context:

The DPAE is one of a number of departments (or directorates) in the GOM Ministry of Agriculture and Agrarian Reform (MARA). The structure of MARA has evolved since Moroccan Independence in 1956, but is largely a composite of French colonial predecessor institutions and/or their descendents. All the professional staff of the DPAE, as all other MARA staff, are members of the civil service (Fonction Publique).

The DPAE, as part of the government bureaucracy, can only recruit professional staff at the level of ingenieur d'etat (M.S. level), no matter what higher qualifications the person recruited may have. Promotion is from step to step in grade, and then from grade to grade on the basis of length of service. Base salary can,however, be supplemented by a variety of fringe benefits which are extremely hard to identify, and which vary from one part of the agricultural public sector to another. Thus, returning participants who will have been trained in the U.S. beyond the M.S. level will, in order to benefit from advancement on the basis of length of service while they are away being trained, have to have been hired by the DPAE before they are sent away for training. This can be done but will be considered somewhat abnormal, according to DPAE senior staff. Given the current budgetary crisis being experienced by the GOM, it is also advisable that any prospective participants already be GOM cadres, since there is going to be an across-the-board hiring freeze for the foreseeable future.

As is noted in the Administrative Analysis, the relationship between the DPAE and other, more technical departments of the MARA is somewhat complex, and is not devoid of conflict and inter-departmental jealousy. Under the present Five-Year Development Plan, the DPAE has a very broad mandate for the development of policy for the agriculture sector. In reality, however, it is being coopted in this area by the staff of the Office of the Prime Minister. There are also rivalries with the staff of the Ministry of Plan which is titularly responsible for development of national-level plans. One of the objectives of this project is to develop a sufficiently highly qualified cadre of professionals in the DPAE that this kind of competition can be decreased and/or eliminated over time, through the creation in the DPAE of something equivalent to the U.S.D.A. SDS and ERS. Whether that kind of apolitical professionalism can be successfully implanted in the political and cultural environment of present-day Morocco is open to question. However, there appears to be sufficient intention on the part of MARA senior management in this direction that U.S. assistance to achieve this objective appears to be warranted.

b. Beneficiaries:

There will be direct, quasi-direct, and indirect beneficiaries of activities under this project. Each category will be discussed separately in what follows. 1) Direct beneficiaries will be those individual GOM professional staff members of the DPAE who will be trained under this project. These include both those at the headquarters offices in Rabat, and the generally lower-level cadres who are placed at the provincial DPAs (Provincial Agricultural Production Departments). It is anticipated that these direct beneficiaries will

benefit not only from the training content to which they are exposed, but also from the training experience and process. For those who are sent to the U.S., there will be the additional status enhancement which derives from overseas travel and experience. To some extent, within the parameters discussed above, these cadres may also benefit in terms of the reward system of the civil service upon their return from overseas training. To the extent that they are trained to an appropriate level and in the appropriate disciplines, they will also benefit in terms of job satisfaction, in sofar as they are enabled better to perform the tasks for which they are responsible. (This, of course, will also depend on the operating budget situation that will obtain when they return, on the quality of their supervisors, and on the extent to which the results of their professional activities are taken seriously by the decision-makers to whom they provide research and study results).

2) Quasi-direct beneficiaries will be the staffs of the DPAE who do not benefit directly from training and technical assistance under this project, such as the members of the planning service, but whose capabilities are strengthened by other project activities. Similarly, the staffs of other MARA departments who will have access to the data gathered and analyzed by the affected DPAE beneficiaries, and to the data analysis capability developed under the project, will be quasi-direct beneficiaries under this project. This level of benefits will also extend to the staffs of other GOM agencies who will be end-users of the data and analysis generated by the DPAE. These will include the autonomous agencies of the MARA, such as ONICIL, SONACOS and FERTIMA, which are all involved in cereal production and/or importation, and the large-scale cereal production/marketing cooperatives (SCAMS), as well as the industrial millers. All of these agencies and organizations will receive the benefits of a better-informed policy making process which, in turn, will have a beneficial impact on pricing and subsidy policies and priorities at the national level. (In fact, some of these organizations are likely to disbenefit as a result of improved national-level policy making capacity, especially with regard to prices and subsidies. This is likely to be particularly true of the industrial millers, who at present benefit from the comparatively lower prices of imported wheat, and the members of the SCAMS, who are able to speculate given the rise and fall in target prices from year to year.)

3) Indirect beneficiaries will be the nation's farmers who should, by the end of LOP, be benefiting from a significantly improved national policy decision-making framework. Specific improvements in agricultural sampling techniques under the area sampling frame approach, the advanced yield modeling exercises that will be made possible under the project, and the variety and effectiveness of economic studies for policy formulation should all lead to a stream of benefits for Moroccan farmers, both large and small. This will be especially true if the capacity to be developed in the DPAE under the project is used in order to rationalize price and subsidy policies in such a way that price incentives increase as subsidies on inputs, for example, decrease. Similarly, if more effective policy analysis at the macro-level enables the GOM to deal with its present problems of decreasing urban consumer subsidies, it is likely that there will be a net benefit to rural dwellers in general, and farmers in particular. To the extent that crop forecasting and yield

modeling are significantly improved, it is also likely that the management system for production-related inputs will also improve, thus enabling farmers to take advantage of new technologies which require higher levels of chemical and other inputs.

To the extent that project outputs lead to enhanced ability on the part of the GOM to determine appropriate levels of imports for cereals, and to control their entry into the local market, it is likely that prices to farmers producing grain domestically can eventually improve, although a number of other policy steps need to be taken before this will be the case. More rational and controlled import policy, in turn, will have a beneficial impact on the national balance of payments situation and the foreign exchange situation such that other benefits in the area of public investment are likely to accrue to the population as a whole.

Similarly, improved capacity in the DPAE project service for project identification, monitoring and evaluation is likely to benefit all the anticipated and actual beneficiaries of a variety of nationally and internationally funded development projects. Monitoring of beneficiary impact will be significantly enhanced by the end of LOP, which, in turn, will be likely to enhance participation in benefits under these projects.

c. Participation

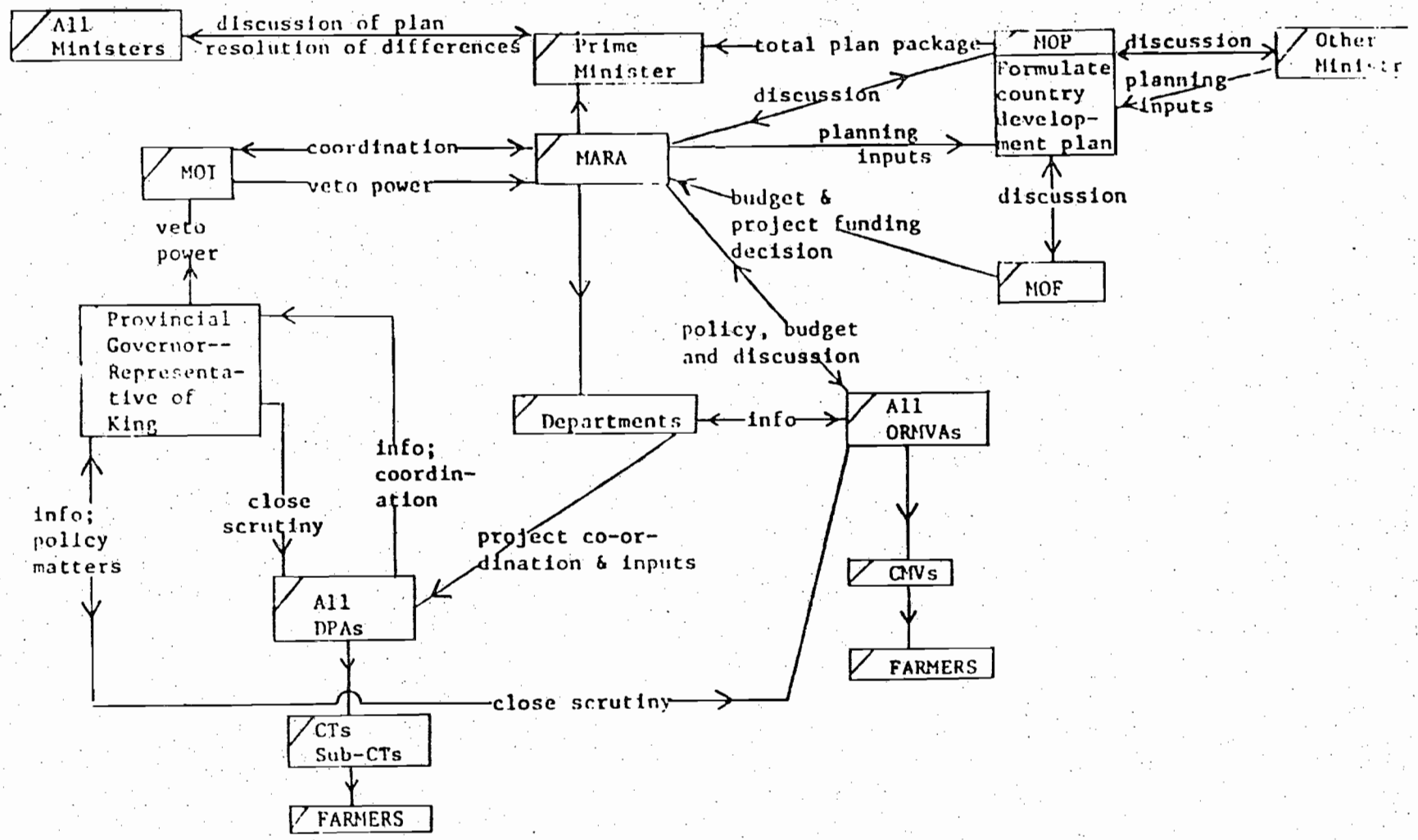
In the process of project design, a considerable amount of time was spent with the anticipated direct beneficiaries under this project, and with their supervisors in the DPAE. Some time was also spent with other MARA directorates in order to assess their views of the strengths and weaknesses of the DPAE, and possible overlaps between the DPAE mandate and the mandate of these other directorates, such as the DPV (see Administrative Analysis). Where possible, the views of key managers in these other directorates have been taken into account in designing project inputs and outputs. By working with the DPAE staff, it was possible to modify some of the initial assumptions in earlier project design efforts, and to build upon the experience in the prior AID/USDA project with the DPAE.

The resulting project design allows for ample input from direct beneficiaries, and for concerted management by DPAE senior staff, as well as for a thorough evaluation plan to see whether project activities are on track and/or how they should be modified. To the extent desirable, the project beneficiaries can be involved in this evaluation process.

e. Impact

Some of the probable impacts of the project have already been discussed under the section on beneficiaries. It can also be argued that what were termed the "quasi-direct" beneficiaries will, in fact, emulate the example set by the high degree of professionalism of the DPAE staff trained under the project, and that there will, indeed, be some spread-effect as a result. There should certainly be some spread-effect within the MARA itself, as improved data collection and analysis capacity becomes available to other departments through the enhanced DPAE establishment including the data bank. In addition, the provision of funds for improved documentation at the Documentation Center at INAV, which has recently been designated as the National Agricultural Library, will have a beneficial impact on students and faculty at INAV and in other autonomous agencies in the agriculture sector as well as on DPAE staff themselves.

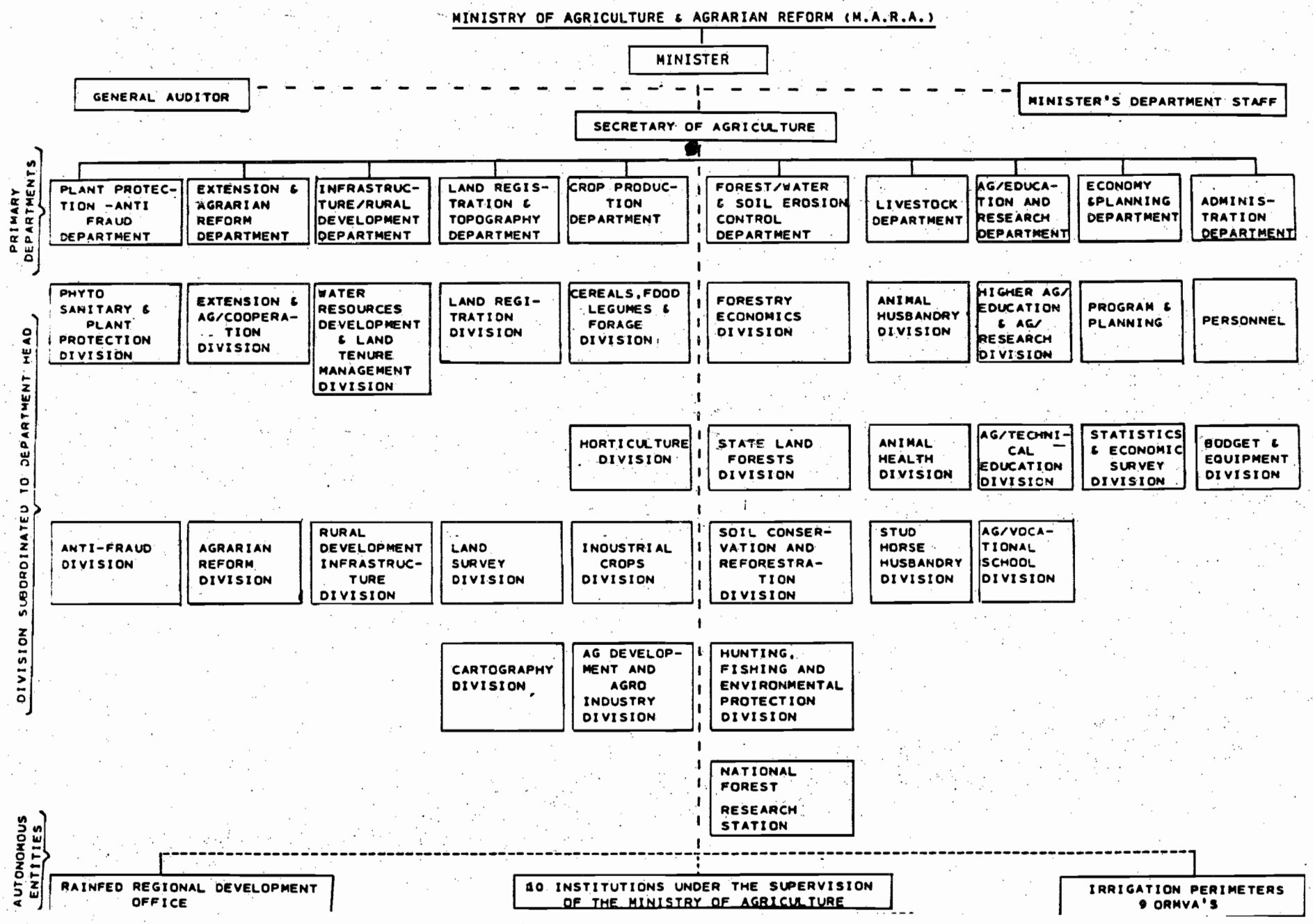
At present, there is an unclear division of labor between the bureaucracy and the academy in Morocco regarding research. This is one of the policy dimensions which the GOM has been asked to address in the context of the self-help provisions of the forthcoming PL 480 Title I Agreement. There is a not surprising view among members of the academy that no one who is a full-time, main-stream bureaucrat can ever do completely objective social and economic research in Morocco. There is at least some feeling, on the part of the bureaucrats, that academics in Morocco (like their counterparts in other countries) are simply not sufficiently aware of policy considerations to do effective national-level policy research. It is the view of the design team that a certain amount of healthy competition between researchers in the DPAE and in the academy is desirable, and may have a beneficial impact on both groups. (Other USAID projects are providing funds for socioeconomic research in two academic institutions.)



Parliamentary Deputies try to influence policy at all levels up to and including the Royal Cabinet

MARA Policy-Influence-Decision Flow

BEST AVAILABLE COPY


MINISTRY OF AGRICULTURE & AGRARIAN REFORM (M.A.R.A.)
MINISTER
GENERAL AUDITOR
MINISTER'S DEPARTMENT STAFF
SECRETARY OF AGRICULTURE
PRIMARY DEPARTMENTS
DIVISION SUBORDINATED TO DEPARTMENT HEAD
AUTONOMOUS ENTITIES
PLANT PROTECTION -ANTI FRAUD DEPARTMENT
EXTENSION & AGRARIAN REFORM DEPARTMENT
INFRASTRUCTURE/RURAL DEVELOPMENT DEPARTMENT
LAND REGISTRATION & TOPOGRAPHY DEPARTMENT
CROP PRODUCTION DEPARTMENT
FOREST/WATER & SOIL EROSION CONTROL DEPARTMENT
LIVESTOCK DEPARTMENT
AG/EDUCATION AND RESEARCH DEPARTMENT
ECONOMY &PLANNING DEPARTMENT
ADMINISTRATION DEPARTMENT
PHYTO SANITARY & PLANT PROTECTION DIVISION
EXTENSION & AG/COOPERATION DIVISION
WATER RESOURCES DEVELOPMENT & LAND TENURE MANAGEMENT DIVISION
LAND REGITRATION DIVISION
CEREALS,FOOD LEGUMES & FORAGE DIVISION
FORESTRY ECONOMICS DIVISION
ANIMAL HUSBANDRY DIVISION
HIGHER AG/EDUCATION & AG/RESEARCH DIVISION
PROGRAM & PLANNING
PERSONNEL
HORTICULTURE DIVISION
STATE LAND FORESTS DIVISION
ANIMAL HEALTH DIVISION
AG/TECHNICAL EDUCATION DIVISION
STATISTICS & ECONOMIC SURVEY DIVISION
BODGET & EQUIPMENT DIVISION
ANTI-FRAUD DIVISION
AGRARIAN REFORM DIVISION
RURAL DEVELOPMENT INFRASTRUCTURE DIVISION
LAND SURVEY DIVISION
INDUSTRIAL CROPS DIVISION
SOIL CONSERVATION AND REFORESTRATION DIVISION
STUD HORSE HUSBANDRY DIVISION
AG/VOCATIONAL SCHOOL DIVISION
CARTOGRAPHY DIVISION
AG DEVELOPMENT AND AGRO INDUSTRY DIVISION
HUNTING, FISHING AND ENVIRONMENTAL PROTECTION DIVISION
NATIONAL FOREST RESEARCH STATION
RAINFED REGIONAL DEVELOPMENT OFFICE
10 INSTITUTIONS UNDER THE SUPERVISION OF THE MINISTRY OF AGRICULTURE
IRRIGATION PERIMETERS 9 ORMVA'S

INAV graduates a number of women B.S. and M.S. holders each year in disciplines appropriate to the DPAE. Women from the INAV program have in some instances done extremely well in responsible and visible jobs in the agriculture sector. Every effort will be made to insure that 20 per cent of the new hires who will be trained under this project will be women. Further, the short-term technical assistance to the project service should be both male and female if possible, and the training module that will be designed for field staff to be administered by the project service headquarters staff should include some discussion of the role of women in agricultural production, a matter which is poorly understood in Morocco, despite a number of studies on the subject.

Similarly, assistance to the SSD for the design of the questionnaires that accompany the area sampling frame approach should include some emphasis on the role of women in agricultural production and household decision-making, so that appropriate steps will be taken to disaggregate data by sex, and to interview women members of sample farm households as well as male household members.

5. Administrative Analysis

a. Administrative Structure of Ministry of Agriculture and Agrarian Reform:

The Ministry of Agriculture and Agrarian Reform (MARA) is responsible by Moroccan law for developing the agricultural sector. MARA defines and implements those agriculture strategies approved by the GOM and Parliament. The MARA is headed by a Minister who is a political appointee assisted by the members of his cabinet.

MARA's Agricultural Strategy is implemented by ten (10) principal central technical departments, plus thirty rainfed development agencies (DPA), nine(9) irrigated perimeters (ORMVA) and ten (10) autonomous agricultural institutions, i.e. INRA and INAV Hassan II. At the operational level, a Secretary General is the chief official to whom technical staff reports. The Secretary General coordinates the Agricultural policies of the ten different departments. He also supervises the implementation of all Agricultural Development projects.

The Secretary General reports directly to the Minister, and coordinates all activities of the MARA with other GOM ministries, i.e., Finance and Interior. He also coordinates the efforts of different donors, and all bilateral and multilateral development cooperation related to agriculture. The Secretary General's office is staffed by a group of technicians, administrative officers, planners and highly skilled secretaries. This staff coordinates and supervises ten (10) principal central technical departments and two Institutes who design and implement the Agricultural Strategies through central and regional services (DPA).

(1) Plant Protection - Anti-fraud Department
(2) Extension and Agrarian Reform Department
(3) Infrastructure/Rural Development Department
(4) Land Registration & Topography Department
(5) Crop Production Department
(6) Forest, Water, and Soil Erosion Control Department
(7) Livestock Department
(8) Agriculture Education and Research Department
(9) Economy/Planning Department
(10) Administration Department
(11) National Institute of Agronomic Research (INRA)
(12) National Agronomic and Veterinary Institute Hassan II (INAV)

b. MARA - The Organization: MARA, as depicted in the attached organization chart, appears to be organizationally sound with most of its departments being "line" or operating departments. This is to say that there appears not to be a vast overlay of staff departments. Or, in other words, it appears to be organized so as to get its job done. When one goes "behind the scenes", however, the reality at times is quite different. The importance given to irrigation (ORMVA's) and the strong linkage with the Ministry of Interior (DPAs) appear in the direct line of reporting of these two areas to the Secretary General and the Minister.

The effectiveness of the organization in meeting all of agriculture's (including forestry) needs is partly determined by GOM's overall agricultural sector policy. The has been a "lopsidedness" in favor of irrigated agriculture (ORMVAs) which GOM, with its 1981-1985 five-year plan, states it plans to correct.

There is also the need by the GOM to import wheat as a means of meeting consumer demand and avoiding potential political problems such as were occasioned by recent attempts at raising bread prices. This policy strengthens the position of the parastatl ONICL (among its responsibilities, the importation of cereals) within the MARA organization, and its (ONICL's) ability to command scarce resources, i.e., funding for port facilities and interior storage.

Certain departments (directions) are more important than others for a variety of reasons--social, strength (clout), and/or ability of the department head, "tenure" of

the department, and importance of activities in the purview of the department. The categorization of strong and weak is meant only within the context of "political strength" within the MARA. "Strong and weak" can have little to do with how effectively the particular department is carrying out its designated role.

c. DPAE - The Organization: Background

In the 1960's the agricultural section of the Five-Year Plan was developed by the Agricultural Service of the Division of Planning within the Ministry of Economic and National Promotion. In 1973, in an attempt to help elicit support for the Plan within the MInistry of Agriculture, preparation of the agricultural plan, programs and projects, was invested in MARA. This activity was co-ordinated by the Division of Planning attached directly to the Ministry's Secretary General's office. At the time, economic studies and agricultural statistics were the responsibility of the Division of Economic Affairs.

Although this movement brought planning for agriculture closer to MARA technicians, the Division lost the services of a trained cadre of planners. In addition, even though the new Division of Planning was attached to the Secretary General's office it did not always have his authority, and hence was not listened to by technical Department heads.

In March, 1980, the Divisions of Planning and Economic Affairs were merged into the Direction of Planning and Economic Affairs (DPAE). In the hierarchy of the MARA, the Director of DPAE is at the same level as Directors of technical Directorates.

The DPAE, as noted elsewhere, is comprised of two technical divisions and one administrative service. The technical divisions are further divided into 5 services. The SSD, which has the major responsibility for the annual agricultural surveys, has the largest number of professional staff with 62 permanent employees. The other Services, S.E., S.P. Technical Cooperation and Planning have 19, 18, 14 and 15 respectively. The national staff, totalling 212, is supported by 390 permanent and 302 temporary staff in 26 provinces. The provincial staff are attached to DPAs and are responsible to the DPA head who reports to a Provincial Governor who is appointed by the king.

It is estimated that total salaries, including some non-budgeted benefits, such as vehicles, for the 104 DPAE staff would be somewhere between $5 and $10 million. In addition, the DPAE receives funds under the capital budget.

In order for effective and efficient implementation of activities under this project to take place, certain assumptions must be fulfilled concerning the relationships between DPAE and other "strong" technical departments of the MARA. Such assumptions relate to DPAE's ability to make itself seen by other technical department chiefs and their staffs as a source of authoritative information about a broad range of subjects. Of particular importance will be DPAE's ability to persuade various technical chefs de projets that the results of its studies, and its project service, can positively contribute to project identification, design, and management, as well as ultimate project evaluation. The Department of Plant Production is probably the most important of these technical departments where DPAE's credibility is concerned.

At present, DPV is responsible not only for the development of integrated projects and cereal production projects, but also for a certain amount and level of crop forecasting in connection with the management of input distribution. Through its staff in the CTs at the lowest field level, as well as its staff at the provincial DPA level, DPV collects a significant amount of crop forecasting-related information. It is DPV which is asked to provide information to the Ministry as a whole on a sort of early-warning system concerning drought conditions. This information, in turn, is used in order to predict the national requirements for imports of cereals. DPV will continue to have this mandate for some time, even though it will utimately be the DPAE, through its Economic Affairs Division that will perfect the crop forecasting system and yield modeling, and that will provide information on the basis of which import decisions will be made.

DPV is one of the "strongest" technical departments of the MARA. A number of outside consultants have pointed out that one of the greatest contributions that donor technical assistance can make is to strengthen the relationship between DPAE and DPV, and eliminate tendencies toward rivalries and/or mistrust between them. The same, however, can also be said of the relationships between DPAE and a number of autonomous agencies of the MARA, such as the National Agronomic Research Institute (INRA), and the National Agronomic and Veterinary Institute (INAV).

It is probably also true that there will be some competition between a more highly-skilled DPAE staff and the staff in the Ministry of Plan, as well as key staff in the Office of the Prime Minister. All of these staffs have a role in the formulation of the National Five-Year Development Plans which affect planning and budgeting for the agriculture sector. The creation of a highly professional cadre of macro-economists and agriculture statisticians in the DPAE may pose a serious threat to the staffs of these other agencies. However, at the same time, the creation of such a cadre which will be somewhat immue to political vecissitudes will constitute a national asset as well as providing a potentially useful example to other agencies of what is possible in the way of career professionalism in the administrative bureaucracy. In any event, in the interim, a bit of healthy competition between and among the staffs of these agencies may be good for all of them, and may enhance individual and agency performance.

Under the project activities proposed in this PP, an effort has been made to address some of these potential points of conflict. The assistance to the project service of the DPAE, in particular, is designed so as to enable a dialogue to take place between the staff of the service and the relevant staff of other, technical departments, about the role and function of project monitoring and evaluation. This will be accomplished through a combination of workshops and seminars which will be designed and managed by short-term U.S. technical assistance personnel.

U.S. long-term technical assistance to the other services of the DPAE can include as part of its role, an educational function for other departments along the same lines. A considerable amount of education is required within the MARA to acquaint other departments with the philosophy and methodology behind the area sampling frame approach to crop forecasting, as well as the kind of sophisticated yield modeling effort that is envisaged under this project. Similarly, long-term TA to the service which will be carrying out macro-economic studies should ensure that data collection and study design are not carried out in ignorance of other, related activities in other departments of the MARA, and/or in other government agencies, including Plan and INAV.

d. Investment Funds - DPAE

In the 1981-1985 five-year plan, a total of 129 million dirhams, or U.S $19,545,545, was budgeted for the DPAE. Of this, almost 17 million dollars was targeted for gathering agricultural statistics and undertaking analysis on various aspects of the agricultural sector. This represents about $3,400,000 per year. Of the 19 statistical surveys to be undertaken, 8 will be covered annually under the ASF (Area Survey Frame). Those eight are budgeted to cost 46.5 million dirham ($7 million) or about $1.4 million per year.

In an assessment of the administration of the MARA done as part of the 608-0170 PID development, Harmon* lists DPAE as one of the weaker Directorates in the MARA. This was understandable given the DPAE's recent creation (1980) and its low level of professional staff. Many of the weaknesses Harmon cites, however, are of a technical nature and are addressed by this project. In addition, the development of a professional staff should have a very positive effect on DPAE. However, USAID will have to monitor closely the ability of the DPAE to develop administratively at the same pace that it develops technically. Fortunately, the proposed project does not place extensive administration burdens on the DPAE. Only the expansion of the professional staff will create major changes. At the field level administrative changes will be limited to timing of surveys. However, given its reported weakness within the MARA structure, USAID should closely monitor the DPAE, especially in the early years of project implementation.

---

*David P. Harmon, Jr. "Institutional Assessment Morocco Rainfed Agriculture Project PID/PP, Nov. 12, 1982.

6. Conditions Precedent and Covenants

a. Conditions Precedent

(1) Prior to the first disbursement of funds or the issuance of procurement documents for the computer equipment, objective yield laboratory equipment and photography laboratory equipment, the GOM will have completed construction, renovation and electrical installation of the physical facilities necessary to house such items procured.

(2) Prior to the first disbursement of funds for participant training the DPAE Director shall furnish to USAID a project training plan, schedule for English language training, departure and return dates, university and degree desired, and replacement or additional employment arrangements as necessary.

(3) Prior to first disbursement of funds, DPAE will furnish to USAID the name and position of a project manager to coordinate all activities of this project.

b. The Grant Agreement will contain covenants in substance as follows:

(1) The MARA will assure that the requirements for ground level data collection are met, including transportation.

(2) MARA will make every effort to increase DPAE's authorized staffing level to accomodate the personnel required to implement this project. These increased staffing levels will be made on a yearly basis to coincide with the implementation plan.

(3) MARA will make every effort to reserve 20 percent of participant training positions for women.

IV. Evaluation Plan

Evaluation DPAE: Due to the diversity and complexity of the technology to be transfered under this project, the determination of the time and source of evaluation is critical. It is therefore recommended that an institution or private sector firm be identified early in the implementation stage to be responsible for the evaluations of project elements. The evaluators would be required to follow the progress of the implementation so that the appropriate time for each evaluation could be targeted as well as the technical skills required for each evaluation. This would permit the firm/institution doing the evaluation a certain flexibility in programming its talent within certain parameters and with consultation with AID.

Discussion: The project assistance designed for the DPAE is in general an integrated system which will require certain interactions by the various Services of the DPAE. However, this integration is not expected to happen immediately, but rather is designed over a 7-10 year period. Therefore, initially, several subcomponents can be identified:

(1) ASF, construction, use and maintenance;
(2) ADP, computers data processing;
(3) Objective yield surveys;
(4) Remote Sensing/satellite imagery use, automating;
(5) Yield modeling, development, testing and refining;
(6) Data Bank development;
(7) Economic modeling;
(8) Survey design and use;
(9) Data interpretation;
(10) Project monitoring and evaluation development, use of methodologies;
(11) Project design - techniques;

Each of these activities must be targeted to build upon previous work. Therefore phasing and training are crucial. The implementation schedule was developed taking this into consideration. However, learning rates, as well as other factors, such as procurement and shipment of commodities, could alter this schedule. Thus it is impossible to target precisely the evaluation times.

The evaluators chosen will have to provide skills specific to certain subcomponents of the project. These include understanding data processing, reevaluating the progress being made in economic analysis and project monitoring and management will be required. The mix of skills will vary according to the stage of development of the various subcomponents. Every effort will be made to utilize the services of small and disadvantaged business firms who have IQC's with AID.

A tentative schedule, presented below, is indicative of the evaluation criteria required at the various stages of project implementation. In addition, skills and abilities are suggested. The length of the efforts required and costs estimates are also given.

In the first evaluation (1986) the evaluation team must make recommendations concerning the following:

(1) The capacity of the DPAE to undertake the ASF surveys. If the enumerators are not adequately trained they must recommend appropriate measures to upgrade skills.

program of aerial photography begins in 1985

(2) Determine if the timing of technological development within the DPAE is correct and make appropriate recommendations for improvement of rescheduling if necessary.

define

(3) Determine if training to date, both in-country and overseas has achieved objectives and, if not, recommend changes including increasing, decreasing, eliminating or changing venues for training.

(4) Determine if the contractor(s) is providing adequate technical assistance to meet project objectives. Suggest changes in level, duration or type of short-term technical assistence. Determine if the type and amount of long-term T.A. is adequate.

(5) Determine if the long-term training is on schedule and, if not, make recommendations as to how this can be accomplished or how project targets should be adjusted accordingly.

(6) If the project requires amending to enable the purpose to be achieved.

In the **second** evaluation (FY 1988) the evaluation should focus its recommendations on:

collect and process data in timely manner

(1) The evolving capability of the DPAE to undertake professional studies and investigations relative to agricultural statistics, and analysis and projec monitoring.

(2) The sophistication in the Remote Sensing Component and required adjustments

(3) Determining if yield modeling and Forecasting objectives are on target and if not suggest appropriate corrective measures.

(4) Determining if the long-term training is on schedule. If not, a determinat as to the effects of shortfalls on the development of DPAE. Recommendation as appropriate.

(5) Determining if the project should continue to be funded in its present form If not, suggest if project should be stopped, contracted or expanded or altered significantly. If so, the recommendations for amendments must be made.

(6) Reviewing contractor(s) performance and making recommendations as to contir uance, alterations or suspension.

The evaluation for FY 1990 should focus on the integration of the system, especially as concerns the collection and handling of data. It should also:

(1) Determine the extent to which data collection is generated by end user demanc

(2) Determine the extent to which data analysis is offering policy makers and others valuable information.

(3) Review the long term training program and determine what effect this has had to date, on the development of DPAE and the achievement of project objective

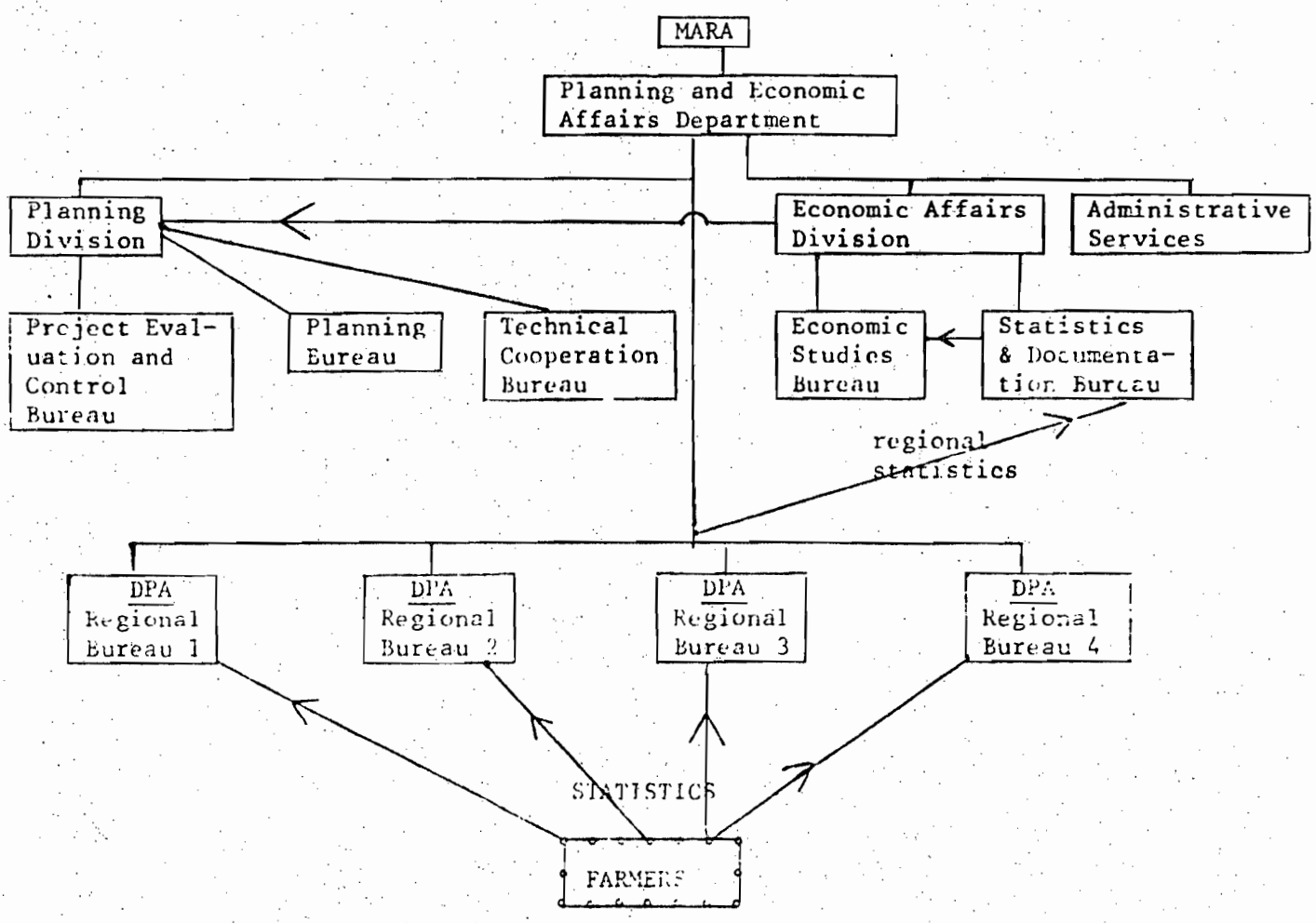
The evaluation should, at this point, access the capacity of the DPAE to fulfill its mandate from the government as an agricultural statistics reporting, economic analysis and project monitoring entity. Recommendations should be made to the DPAE, USAID, and the contractor on any future collaboration.

In order for the evaluators to most effectively fulfill their role, the institution doing the evaluations should be kept constantly informed about the status of the project. Therefore it is recommended that all project reports, auditors reports, training status reports, etc., be forwarded as a regular procedure to the designated evaluation Institution. The Institution should then be prepared to determine the people it needs to undertake evaluations. Based on the evaluator's own understanding of project implementation, evaluation trips should be scheduled by the Institution within the general guidelines suggested above.

A final evaluation should be done in 1992, if no major amendments have been introduced previous to that time. This evaluation will focus on the technical capacity of the DPAE Services supported under this project. It should look separately at the twelve outputs and assess the extent to which they have been produced. It should then look at the extent to which the outputs have contributed to the project purpose. Finally, this evaluation should assess the integration of the project and the overall impact of the project on the availability and use of DPAE's data and analysis within the GOM.

DATES	EVALUATION SUGGESTED	# OF PERSONS	SKILLS	TIME	COST
After Jan. 1, 1986	Review Data Entry System	1	Understanding of microcomputers, BASIC-FORTRAN-PASCAL, Systems Analysis	2 weeks	8,212
	Review Ground Level Data Collection	2	Familiar with Data Surveys	2 weeks	16,424
	Review Economic Analysis Services	1	Ag. Econ - Econometrics	2 weeks	8,212
	Review Project Monitoring, Review Management, Procurement	1	Management, Project Eval. (Team Leader)	3 weeks	11,319
					44,167
Jan. 1987	Financial & Management		AID in-house	2 weeks	
Nov. 87 - April 88	Dev. Of Statistical and Econ. Capability with DPAE	1	Statistician/Econometrician	2 weeks	8,212
	Remote Sensing System	1	Familiarity with Remote Sensing	2 weeks	8,212
		1	Familiarity with use of Satellite Imagery	2 weeks	8,212
	Review Progress on Obj. Yield Surveys	1	Experience in Objective Yields	2 weeks	8,212
	Review Dev. Of Yield Modeling Effort	1	Experience with Yield Modeling	2 weeks	8,212
	Review level of Expertise of DPAE staff at Provincial level in Projeet Monitoring-data collection	1	Experience with survey, data collection, project management	4 weeks	14,425
					55,485
June 1990	Transition to larger component system-Software Changover	1	Computer science/Data Processing/Statistics	2 weeks	8,212
	Review of Remote Sensing, Yield Modeling, Crop Forecasting, ASF Operations	2	Remote Sensing, Yield Forecasting, Ag. Statistics Sampling, ASF Technology	3 weeks	22,638
	Review of integration of L.T. trainees into DPAE	1	Management	4 weeks	14,425
	Review of Proj. Monitor & Evaluation	1	Project Management & Evaluation	2 weeks	8,212
	Review of level of Sophisitication of Economic Analysis	1	Ag. Econ-strong in Quant. Analysis	2 weeks	8,212
					61,699

D P A E
O R G A N I Z A T I O N A L
C H A R T



BEST AVAILABLE COPY

5 YEAR PLAN BUDGET - DPAE

	Dirham (millions)	Dollars (millions)
A. Plan - Monitor & Evaluation	6.82	1.0
B. Agro-Economic Studies		
1. Ag. Production	1.0	
2. Ag. Inputs	1.5	
3. Value Added	1.0	
4. Ag. Industries	1.0	
5. Ag. Prices	.257	
6. Int's Trade	1.0	
7. Nutrition	.500	
8. Ag. Income	1.0	
9. Subsidies	1.0	
10. Credit	.500	
11. Ag. Ind. Needs	.600	
12. Ag- Employement	.500	
13. Ag. Organizations	.500	
	10.357	$1,569,242
C. Statistics and Special Surveys		
1. Gen. Ag. Surveys	12.5	
2. Commercial Gardening	12.15	
3. Livestock	14.35	
4. Markets	5.0	
5. Producer Prices	1.5	
6. Availability of Inputs	7.1	
7. Farm Budgets	15.0	
8. Pasture	5.0	
9. Agro. Industrial Use	.9	
10. Ag. Employment	2.5	
11. Production Techniques	1.5	
12. F.B.C.F. - Private	3.0	
13. Irrigation	1.0	
14. Losses	1.2	
15. Sunflowers	1.0	
16. Rice	.5	
17. Preproject Studies	3.0	
18. Monitoring of Projects	6.0	
19. Data Bank	1.7	
	94.9	$14,378,788
D. Construction		
1. H.Q.	6.396	
2. Provincial	10.527	
	16.923	$2,564,090

A N N E X E S

Annex I	PID Approval Cable
Annex II	Logical Framework
Annex III	Statutory Check List
Annex IV	GOM Request for Assistance
Annex V	Technical Analysis
Annex VI	Economic Analysis
Annex VII	Implementation Schedule
Annex VIII	FAA Section 611(e)
Annex IX	Imports, Exports and GDP, 1973-1982
Annex X1-14	Special Annexes for Budgeting, Procurement Contracting and Waivers

ANNEX 1

UNCLASSIFIED

Department of State

OUTGOING TELEGRAM

PAGE 01 OF 03 STATE 086184 9181 181062 AID3941
ORIGIN AID-00

ORIGIN OFFICE NETC-04
INFO NEPD-04 AAME-01 NEDP-03 NENA-01 PPCE-01 PPPB-03 PPEA-01
PPIA-01 RELO-01 MAST-01 IRM-00 /023 A0

INFO OCT-00 COPY-01 AMAD-01 /009 R

DRAFTED BY AID/NE/TECH/AD:LELAND VOTH
APPROVED BY AID/A;/NE:W. ANTOINETTE FORD
AID/NE/TECH/AD:RICHARD COBB
AID/PPC/PDPR/RO E. LIJEWSKI DRAFT
AID/NE/DP:G. DONNELLY DRAFT,
AID/NE/DP:CHARLES JOHNSON
AID/NE/NENA:GEORGE LE
AID/NE/TECH:KENNETH SHERPER
AID/NE/NENA:D. COHEN
AID/PPC/PB:E. LEONARD-HUGHES
----------041462 300553Z /10

P 300545Z MAR 83
FM SECSTATE WASHDC
TO AMEMBASSY RABAT PRIORITY

UNCLAS STATE 086184

ADM AID

E.O. 12356: N/A
TAGS:
SUBJECT: RAINFED AGRICULTURE PID 636-0170 - NEAC
REPORTING CABLE

REF: STATE 048076

1. THE NEAC WAS HELD FEBRUARY 22, 1983 WITH MISSION DIRECTOR CHASE PRESENT. THE NEAC APPROVED THE PID SUBJECT TO THE FOLLOWING COMMENTS AND RECOMMENDATIONS:

A. THE PID OUTLINES MULTI FACETED APPROACH TO INCREASING CEREALS PRODUCTION IN THE RAINFED AREAS, WITH PROGRAM COMPONENTS INCLUDING TECHNICAL ASSISTANCE TO FOUR GOM ORGANIZATIONS, TRAINING IN RESEARCH AND EXTENSION, COMMODITIES INCLUDING SOME UNIDENTIFIED AMOUNT OF FERTILIZER, SEEDS, AGRICULTURAL EQUIPMENT, AND DATA PROCESSING EQUIPMENT FOR DATA COLLECTION ACTIVITIES, CREDIT RESOURCES AND GRAIN STORAGE FACILITIES. THE NEAC CONCLUDED THAT THE PID ADEQUATELY ADDRESSED TECHNICAL ASSISTANCE TRAINING AND COMMODITY REQUIREMENTS, BUT DID NOT PROVIDE SUFFICIENT INFORMATION AND ANALYSIS ON THE NEED FOR CREDIT AND GRAIN STORAGE ELEMENTS. NEAC SUGGESTED THAT THE QUESTION OF APPROPRIATE RESOURCE SPIGOTS I.E. USE OF DA, ESF OR PL

480 TITLE I SHOULD NOT BE ADDRESSED UNTIL PROBLEM AREAS TO BE ADDRESSED ARE DEFINED, APPROPRIATE RESPONSES ARE DESIGNED, AND THE MAGNITUDE OF RESOURCE REQUIREMENTS ARE ESTIMATED. THUS, IN PREPARING PP, MISSION SHOULD PROVIDE FULL DESCRIPTION OF AND JUSTIFICATION FOR ALL PROGRAM ELEMENTS, WHATEVER THE ANTICIPATED FUNDING SOURCE, AS WELL AS FULL COVERAGE OF HOW PROGRAM ELEMENTS INTERRELATE IN PURSUIT OF OVERALL PROGRAM OBJECTIVE OF INCREASED AGRICULTURAL PRODUCTION IN THE RAINFED AREAS. SOME SPECIFIC POINTS TO BE FOLLOWED IN DEVELOPING PROGRAM/PROJECT DESIGN STRATEGY ARE.

1 MISSION DIRECTOR CHASE INDICATED AND THE NEAC AGREED, THAT BECAUSE OF THE NUMBER OF UNCERTAINTIES SURROUNDING THE PROGRAM LEVEL OF GOM COMMITMENT, USG CAPACITY TO DELIVER TECHNICAL ADVICE AND ASSISTANCE, AND THE FUTURE OF OTHER DONOR EFFORTS, PARTICULARLY THE WORLD

STATE 086184 9181 1

BANK AND THE AFRICAN DEVELOPMENT BANK, IN AGRICULTURAL PRODUCTION IN GENERAL, AND IN THE PROJECT AREA SPECIFICALLY,, WE WILL BE APPROVING A SCALED-DOWN OR PHASED APPROACH, WITH A SHORTER TIME FRAME, LESS FINANCIAL RESOURCES, AND POTENTIALLY FEWER PROJECT ACTIVITIES. THIS IS NOT TO SAY, HOWEVER, THAT PP SHOULD BE LIMITED TO SMALLER EFFORT. PP SHOULD DESCRIBE FULL EFFORT ENVISAGED, E.G. APPROXIMATELY DOLS 150 MILLION PROGRAM OVER 10-YEAR PERIOD, BUT SHOULD ALSO CLEARLY DELINEATE THE INITIAL PHASE AND PROVIDE BENCHMARKS UPON WHICH DECISION TO PROCEED WITH FULL PROGRAM WOULD BE BASED.

2. AID/W HAS NO A PRIORI VIEW AS TO WHETHER NEXT STEPS IN PROGRAM/PROJECT DESIGN SHOULD INVOLVE DEVELOPMENT OF ONE OR SEVERAL PPS. WE WOULD EXPECT CONCLUSIONS ON THIS QUESTION TO FOLLOW FURTHER ANALYSIS, INCLUDING ESPECIALLY THE ISSUE OF HOW THE GOM EXPECTS TO ORGANIZE ITSELF TO COORDINATE THE PROGRAM AND IN THE CONTEXT OF GOM ORGANIZATION, HOW DIFFICULT IT WILL BE FOR AID TO COORDINATE PROGRAM ELEMENTS WITH A NUMBER OF GOM ORGANIZATIONS. IF, HOWEVER, DECISION IS MADE TO DEFER PHASE ONE OR MORE ACTIVITIES, THE RELATIONSHIP OF EACH ACTIVITY TO OVERALL PROGRAM WILL NEED TO BE FULLY DISCUSSED IN THIS OR FUTURE PPS. FURTHER DISCUSSION OF COORDINATION ISSUE FOLLOWS BELOW

3. NEAC UNDERSTOOD THAT RESEARCH COMPONENT WAS EXCLUDED FROM TREATMENT IN THIS PID BECAUSE OF ON-GOING PROJECT 0136, BUT NEVERTHELESS AGREED THAT RESEARCH IS AN INTEGRAL ELEMENT OF THE OVERALL PROGRAM. FORTHCOMING EVALUATION OF 0136 SHOULD PROVIDE BASIS FOR PLANNING FU

FUTURE RESEARCH ACTIVITIES, EITHER UNDER THIS PROJECT OR AS FOLLOW ON TO 0136. WHATEVER PATH THE MISSION CHOOSES IT IS ESSENTIAL THAT PP FOR 0170 PROJECTS, SPECIFICALLY DRAW LINKAGES BETWEEN THESE ACTIVITIES AND EARLIER RESEARCH EFFORT.

4. BECAUSE NEAC CONCLUDED THAT PID DID NOT JUSTIFY UNDERTAKING PP FOR GRAIN STORAGE ELEMENT, A SEPARATE PP OR PID-AMENDMENT WILL BE REQUIRED FOR THIS ELEMENT. MORE DISCUSSION IS REQUIRED IN PARTICULAR ON THE QUESTION OF WHY GRAIN STORAGE HAS BEEN SELECTED AS AID-FUNDED PROJECT COMPONENT RATHER THAN ALTERNATIVE CAPITAL PROGRAM ELEMENTS, E.G., AG MECHANIZATION, FERTILIZER. ASSUMING MISSION WISHES TO PROCEED WITH STORAGE PROPOSAL, THE CURRENT STORAGE CAPACITIES, THE ROLE OF STORAGE IN STABILIZATION, SEASONAL AVAILABILITY OF INPUTS AND SUPPLIES, GRAIN STORAGE TYPES, LOCATION AND COSTS AND INTERRELATIONSHIPS OF STORAGE WITH THE REST OF THE RAINFED PROGRAM SHOULD BE DISCUSSED. IN DETERMINING WHETHER OR NOT TO INCLUDE GRAIN STORAGE COMPONENT IN OVERALL PROGRAM, MISSION IS REMINDED THAT THE POTENTIAL AVAILABILITY OF ESF FUNDS DOES NOT DICTATE INCLUSION OF CAPITAL PROGRAM COMPONENT. SINCE WE ARE NOT LAYING THE FOUNDATION FOR ANNUAL ESF TRANCHES, THE USE OF ESF FOR TECHNICAL ASSISTANCE REMAINS AN OPTION.

5. SIMILARLY, IF MISSION CHOOSES TO PROCEED WITH GRAIN STORAGE, OR OTHER CAPITAL PROGRAM ELEMENT, WE WOULD EXPECT TO USE LOAN FUNDS, EITHER DA OR ESF. GENERAL PRINCIPLE TO BE FOLLOWED THROUGHOUT PROGRAM DESIGN IS BE THAT GRANT FUNDS WILL BE USED FOR TECHNICAL ASSIS AND INSTITUTION BUILDING ACTIVITIES, WHILE LOAN FUND WILL BE USED FOR CAPITAL/COMMODITY COMPONENTS. IN THIS CONNECTION, THE NEAC AGREED THAT THE PROPOSED FY 83 PROGRAM WILL INVOLVE ONLY TA AND INSTITUTION BUILDING AND THAT LOAN FUNDS ARE NOT APPROPRIATE FOR OBLIGATION FY 83. ACCORDINGLY, PPC HAS AGREED TO SEEK ARDN GRA

UNCLASSIFIED

BEST AVAILABLE COPY

FUNDS FROM ELSEWHERE IN THE AGENCY TO REPLACE THE DDLS 1.18 MILLION LOAN FUNDS CURRENTLY IN MOROCCO OYB FOR 8178.

6. ALTHOUGH NEAC CONCLUDED THAT PID'S TREATMENT OF CREDIT ELEMENT IS WEAK, IT WAS AGREED THAT AS THIS ELEMENT IS MOST LIKELY TO BE FUNDED FROM PL 480 LOCAL CURRENCY GENERATIONS, NEAC WILL NOT REQUIRE ADDITIONAL PID OR PID AMENDMENT. HOWEVER, PP'S WILL BE EXPECTED TO FULLY ADDRESS CREDIT UTILIZATION, CONSTRAINTS TO THE DEVELOPMENT AND/OR EXPANSION OF FINANCIAL MARKETS FOR THE BENEFIT OF SMALL FARMERS, AND OTHER ELEMENTS WHICH WOULD BE INCORPORATED IN PP IF THIS ACTIVITY WERE TO BE DA OR

ESF-FINANCED. AGAIN, LINKAGE OF THIS ACTIVITY TO OTHER PROGRAM ELEMENTS IS ESSENTIAL

2. SOME SPECIFIC ISSUES AND RECOMMENDATIONS WERE ALSO RAISED BY THE NEAC.

A. LOGFRAME. THE LOGFRAME PRESENTED IN THE PID OBSCURES THE FACT THAT THE OVERALL PROJECT PURPOSE IS TO INCREASE AGRICULTURAL PRODUCTION, PRIMARILY CEREALS, IN THE RAINFED AREAS.

RECOMMENDATIONS: THE SECTOR OR PROGRAM GOAL SHOULD BE LIMITED TO INCREASING FARM INCOME IN THE RAINFED AREAS, WHILE THE PROJECT PURPOSE SHOULD FOCUS ON INCREASING AGRICULTURAL PRODUCTION, WITH EMPHASIS ON CEREALS. SUB-PURPOSES MIGHT THEN INCLUDE BETTER ACCESS TO INPUTS, INCREASED ADOPTION OF IMPROVED TECHNOLOGIES AND AN EFFECTIVELY FUNCTIONING EXTENSION SERVICE PROVIDING MORE AND BETTER INFORMATION TO FARMERS.

B. COORDINATION OF PROJECT INPUTS: SEVERAL GOM ENTITIES WILL BE INVOLVED IN PROJECT 8178: PLANNING AND ECONOMIC AFFAIRS DEPARTMENT (DPAE), AGRICULTURAL EDUCATION AND RESEARCH DEPARTMENT (DEAR), CNERV, EXTENSION AND AGRARIAN REFORM DEPARTMENT (DVARA); AND PLANT PROTECTION DEPARTMENT (DPV). MOREOVER, THERE IS THE QUESTION OF HOW BEST TO ENCOURAGE THE GOM TO MANAGE OTHER PROJECTS IN THE USAID AGRICULTURAL PORTFOLIO, AND RELATED OTHER DONOR ACTIVITIES, AS PART OF A RAINFED CEREALS PROGRAM. NEAC SUGGESTED THAT THERE MAY BE A NEED FOR AN AUTHORITATIVE GOM COORDINATION BODY TO SERVE AS CENTRAL FOCUS FOR PROJECT IMPLEMENTATION.

RECOMMENDATION: AS PART OF THE PROJECT PAPER DESIGN THERE SHOULD BE AN OVERALL DESCRIPTION AS TO HOW THE GOM INTENDS TO ORGANIZE ITSELF TO CARRY OUT AND COORDINATE THE PROJECT. CONCERNS RAISED IN THE NEAC ABOUT GOM ABILITY AND READINESS TO UNDERTAKE THE PROGRAM ARGUE FOR A LIMITED OR INCREMENTAL APPROACH IN TERMS OF FUNDING AND TIMING OF COMMITMENTS.

C. RELATIONSHIP TO WORLD BANK PROJECTS AND OTHER DONORS: THE WORLD BANK'S INTEGRATED PROJECT IN THE HIGHER RAINFALL ZONE, THE AFRICAN DEVELOPMENT BANK'S ADB, PROPOSAL FOR THE LOWER RAINFALL ZONE OF SETTAT, AND PROJECT 8178 SHARE MUTUALLY INCLUSIVE GEOGRAPHICAL REGIONS. TO HELP INSURE COMPLEMENTARITY OF THESE PROGRAMS, MISSION DIRECTOR CHASE INFORMED NEAC THAT HE HAD WRITTEN THE GOM SUGGESTING A DONORS COORDINATION MEETING BE CONVENED.

RECOMMENDATIONS: 1. USAID SHOULD CONTINUE ENCOURAGING GOM TO COORDINATE THE WORK OF DONORS INVOLVED IN RAINFED AGRICULTURE, AND

2) PRIOR TO PP DESIGN USAID SHOULD REVIEW THE ADB PLAN FOR SETTAT AND ASSESS THE IMPLICATIONS FOR 8178 AND OUR RAINFED AGRICULTURE STRATEGY.

D. POLICY AND PRODUCTION CONSTRAINTS: NEAC WAS IN GENERAL ACCORD WITH THE MISSION ASSESSMENT OF THE POLICY CONTEXT AND INITIAL AREAS OF FOCUS FOR DIALOGUE.

RECOMMENDATION: IN THE NEXT PHASES OF DESIGN AND IN DIALOGUE WITH THE GOM THE MISSION SHOULD KEEP AT THE FOREFRONT THE IDENTIFICATION, REVIEW AND ANALYSIS OF POLICIES RELEVANT TO CEREALS PRODUCTION.

3. OTHER ISSUES:

A. THE ECONOMIC ANALYSIS AND THE SOCIAL ANALYSIS IN THE PP SHOULD BE DISAGGREATED FOR SETTAT AND MEKNES-FES GIVEN THE SOCIAL, ECONOMIC, INSTITUTIONAL AND ENVIRONMENTAL DIFFERENCES BETWEEN THE TWO AREAS. NE/DP PREPARED TO FIELD A STAFF ECONOMIST TO ASSIST MISSION IN NEXT STAGES OF ANALYSIS IF NEEDED

B. THE PP SHOULD INCLUDE A SECTION ON PESTICIDE USES IF ANY. THE MISSION MAY WISH TO UTILIZE THE SERVICES OF CENTRALLY FUNDED EXPERTISE AND TRAINING RESOURCES TO HELP ANALYZE IN-COUNTRY TRAINING OPPORTUNITIES.

C. IN VIEW OF POSSIBLE INVOLVEMENT OF THE PROJECT WITH CNCA THE MISSION ALSO SHOULD CONSIDER ASSISTANCE TO FARMER'S COOPERATIVES. AN ANALYSIS OF THE COOPERATIVE SYSTEM AND POSSIBLE AREAS FOR AID INVOLVEMENT AS PART OF THE CEREALS PROGRAM COULD BE DONE INDEPENDENT OF THE 8178 PP DESIGN WORK.

D. THE ROLE OF THE PRIVATE SECTOR IN PROGRAMS RELATED TO HERBICIDE SALES, FARM EQUIPMENT OR GRAIN STORAGE SHOULD BE ASSESSED AS PART OF THE 8178 DESIGN.

E. ALTHOUGH THE PID HAS AN EXTENSIVE BIBLIOGRAPHY IN APPENDIX 6, THE BIBLIOGRAPHY FOR THE PP SHOULD IDENTIFY PUBLICATIONS RELEVANT TO EXPERIENCE IN DRYLAND AGRICULTURE, AND TO THE EXTENT POSSIBLE CONCLUSIONS OF THE LITERATURE WITH RESPECT TO WHAT WORKS AND WHAT DOESN'T IN RAINFED AGRICULTURAL DEVELOPMENT PROGRAMS.

F. A QUESTION WAS RAISED CONCERNING THE TYPE OF TRAINING WHICH WILL BE OFFERED AT CNERV, I.E., WILL IT BE GENERAL OR WILL IT EMPHASIZE SPECIFIC SPECIALIST TRAINING IN LIVESTOCK, FORESTRY, ETC? THE PP DESIGN SHOULD REVIEW THE CNERV CURRICULUM TO ASSURE THAT IT IS APPROPRIATE TO THE CAPABILITIES OF EXTENSION AGENTS AND THE SKILLS REQUIRED TO CARRY PRODUCTION CAMPAIGNS IN THE TWO PROJECT PILOT AREAS.

G. NEAC AGREED THAT PROGRAM NEEDS TO INCORPORATE ON-GOING SOCIAL AS WELL AS ECONOMIC RESEARCH TO TEST VALIDITY OF UNDERLYING PROGRAM ASSUMPTION THAT ACCESS TO INPUTS AND INFORMATION ARE PRIMARY CONSTRAINTS TO HIGHER PRODUCTION.

H. PP MUST INCLUDE CAREFULLY DEVELOPED CONTRACTING PLAN. THIS IS PARTICULARLY IMPORTANT IF ONE PP IS DEVELOPED TO COVER A NUMBER OF PROGRAM ELEMENTS.

I. PP ALSO SHOULD INCLUDE SEQUENCED EVALUATION PLAN WHICH WILL PROVIDE BASIS FOR FUTURE PROGRAM DECISIONS.

4. THE PP DESIGN TEAM AND SCHEDULE.

A. IN ORDER TO SECURE FUNDING THIS FISCAL YEAR, IT IS SUGGESTED THAT PP DESIGN TEAM BEGIN FIELD WORK NLT MAY 1, 1983, IMMEDIATELY FOLLOWING EVALUATION OF 8136.

BEST AVAILABLE COPY

B. THE SOCIAL SOUNDNESS PORTION OF THE PP MIGHT BEGIN ANYTIME SINCE A LARGE PART OF THE MATERIAL IS ALREADY AVAILABLE. MISSION MIGHT ALSO CONSIDER ARRANGING FOR RELEVANT PP TEAM MEMBER S; TO PARTICIPATE IN TWO MAJOR ACTIVITIES OF THE WORLD BANK -- REVIEW OF CNERV, AND DEVELOPMENT OF A MASTER PLAN FOR AGRICULTURE RESEARCH AND EXTENSION. ON LATTER EXERCISE, BANK HAS ALREADY INDICATED WILLINGNESS TO HAVE AID PARTICIPATION. SUGGEST THAT DR. WILLIAM FURTICK, RESEARCH AGRONOMIST WORKING WITH NE/TECH/AD UNDER RSSA, WOULD BE AN EXCELLENT INDIVIDUAL FOR THIS EXERCISE.

5. WOULD APPRECIATE MISSION COMMENTS. SHULTZ

BEST AVAILABLE COPY

LOGICAL FRAMEWORK

From FY 1983 to FY 1992
Total U.S. Funding $10,296,000
Date Prepared: June 10,1983

Project Title & Number: Planning, Economics and Statistics for Agriculture

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
PROGRAM GOAL: To make available current information and sound analysis that will enable GOM officials to make policy decisions that will lead to increased agricultural production.	MEASURES OF GOAL ACHIEVEMENT: - Policy decisions in agriculture based on DPAE analysis. - Increases in agricultural production resulting from policy decisions that provide Moroccan farmers with production incentives.	GOM Policy decisions Production Statistics	ASSUMPTIONS FOR ACHIEVING GOAL: - Analysis and recommendations provided by DPAE will be accept by GOM Planners. - Policies encouraging production and use of local foods will be based on sound economic analysi
PROJECT PURPOSE: To improve the GOM's ability to collect agricultural statistics, undertake economic analysis and monitor and evaluate agricultural projects.	END OF PROJECT STATUS: (1) An integrated Data collection and processing system based on probability sampling and mathematical modeling. (2) The ability of DPAE to collect crop acreage and yield data for region crops in Morocco. (3) The ability of DPAE to do analysis of Ag. production and distribution systems. (4) The ability of DPAE to manage development projects.	- End of Project evaluation - Inspection of working models used by DPAE. - Comparison of DPAE production estimates and annual imports. - Monitoring and Evaluation of on-going MARA projects.	ASSUMPTIONS FOR ACHIEVING PURPOSE - GOM contributions to operating costs are adequate - Candidates for training are available.
OUTPUTS: (1) Area Sampling Frame for Agricultural Surveys. (2) Program of current (regularly scheduled) Agricultural Statistics based on use of ASF for probability sampling. (3) Expanded data processing capability (4) Aerial Photography Laboratory (5) Objective Yield surveys for Major Crops, with Laboratory equipment and facilities.	MAGNITUDE OF OUTPUTS: Maps, Photography, Satellite imagery, Worksheets, and other materials used for frame construction. * Schedule of Surveys * Statistical Analyses * Publication of estimates Data Processing Hardware and Software Aerial Photographs - Physical Facility * Schedule of Yield Surveys. * Data collected. * Publication of forecasts and estimates * Laboratory equipment and facility	Physical inspection of frame materials Review of DPAE plans, analyses and published results. Inspection of data processing facility and review of actual use. Physical Inspection. Review of published results and analyses. Inspection of actual data collection field and laboratory procedures.	Recommended Aerial Photography and Laboratory Facilities will be provided.

BEST AVAILABLE COPY

LOGICAL FRAMEWORK

Life of Project:
From FY 1983 to FY 1992
Total U.S. Funding $11,945,000
Date Prepared: June 10, 1983

Project Title & Number: Planning, Economics and Statistics for Agriculture

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS				MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
PROJECT INPUTS:	IMPLEMENTATION TARGET					
Personnel;	AID $	GOM	Qty.	Total		Funds will be made available to project inputs by both the GOM and AID.
- Technical Assistance						
Long term	1374		(9 PY)	1374	USAID and GOM Financial Reports	
Short term	835		(237 P wks)	835	Participant Training Reports	DPAE Personnel will be available for training.
- Moroccan staff						
For training		614	(68 PY)	614		
Replacement		4568	(249 PY)	4568		DPAE will be authorized to hire additional personnel
Construction		80		80	Construction contract	
Training;					Procurement contracts	
- Long term U.S. (18 Ph.D, 4 MS)	1747	44	(68 PY)	1791		
- Short term U.S. (16 persons)	128	32	(96 P wks)	160		
- Short term Morocco (600 people)		140	(560 P wks)	140		
- Long term Morocco (8 MS)		96	(16 PY)	96		
Commodities	5156	3460				
Other costs	978	2900		3878		
Inflation	1725	5617		7342		Inflation factors used are correct.
Sub-total GOM/AID contribution	11,945	17,551		29,496		
Other Donors (FAO)				600		
Total	11,945	17,551		30,096		

ANNEX II

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 1983 to FY 1992
Total U.S. Funding $10,296,000
Date Prepared: June 10, 1983

Project Title & Number: Planning, Economics and Statistics for Agriculture, 608-0182

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
(6) Implementation of crop yield modeling effort.	Yield Models for selected crops.	Inspection of actual models and evaluation of forecasts and estimates from them.	
(7) Introduction of digital processing of satellite data for improving crop area and land-use estimates and for ASF Maintenance.	Actual processing of satellite data.	Review of results from digital processing to include statistics, maps and/or other graphic outputs.	Satellite data continues to be available at affordable prices. Data processing system is acquired and installed.
(8) Data Bank	Data Bank operating in DPAE and connected to other sections of MARA.	Physical Inspection	
(9) Models for analyzing agricultural data	Models will be developed to analyze the major studies assigned to DPAE by the GOM including: - Value added in Ag. - Raw material requirements by agro-industry - Subsidies and impacts of subsidies on production and consumption - Requirements and financing of Ag. Credit - Ag. work force - Production of Ag. Labor - Relationship between Food imports and domestic production.	Inspection of models and studies	Necessary survey data will be provided or funds available for their generation. Trainees are provided as scheduled for Ph.D training.
(10) Adapted Project Monitoring and Evaluaton Systems	Monitoring and evaluation systems designed or adapted by DPAE staff will be used on all major MARA development Projects.	Inspection of Monitoring and Evaluation designs and review of systems in use.	MARA policy remains to conduct monitoring and evaluation under DPAE guidance.
(11) Capacity to carry out Project Design.	Assistance to or carrying of major project designs. Major Input into MARA portion of National plans.	- Inspection of Project Designs, Discussion with other MARA agencies or foreign donor Review of Plans and discussion with Ministries.	Policy remains to have DPAE provide technical expertise for MARA Project Design.
(12) Document Center	Physical existance at INAV.	- Inspection.	Collaboration with INAV presents no problem.

BEST AVAILABLE COPY

ANNEX III

PLANNING, ECONOMICS AND STATISTICS FOR AGRICULTURE

608-0182

Statutory Checklist

MOROCCO

Project Checklist

Note: Country Checklist has been completed for Morocco under presently submitted Project 608-0178

GENERAL CRITERIA FOR PROJECT

1. FY 1982 Appropriation Act Sec. 523; FAA Sec. 634A; Sec. 653(b).

(a) Describe how authorizing and appropriations committees of Senate and House have been or will be notified concerning the project;	(a) Congressional Notification
(b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than $1 million over that amount)?	(b) Yes

2. FAA Sec. 611(a)(1). Prior to obligation in excess of $100,000, will there be

	(a) engineering, financial or 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?	None Required
4.	FAA Sec. 611(b); FY 1982 Appropriation 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? (See AID Handbook 3 for new guidelines.)	N/A
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 Regional Assistant Administrator taken into consideration the country's capability effectively to maintain and utilize the project?	N/A Construction is only remodeling costs est. at $80,000 and will be paid by Grantee. 611(e) certification continued Annex V

6. FAA Sec. 209. Is project susceptible to execution as part of 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 industry, agriculture and commerce; and (f) strengthen free labor unions.

Project may indirectly affect all of these according to policy decisions made on the data the project will provide.

8. FAA Sec. 601(b). Information and conclusions 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 channels and the services of U.S. private enterprise).

The project will provi more accurate informat on the agricultural s tor for use by public and private entities.

BEST AVAILABLE COPY

9.	FAA Sec. 612(b), 636(h); FY 1982 Appropriation Act Sec. 507. Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized in lieu of dollars.	It is estimated that th GOM will contribute in excess of 50% of project costs.
10.	FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release?	U.S. does not own exces: foreign currency of Morroco.
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.	FY 1982 Appropriation Act Sec. 521. 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?	N/A
13.	FAA 118(c) and (d). Does the project comply with the environmental procedures set forth in AID Regulation 16? Does	

BEST AVAILABLE COPY

the project or program take into consideration the problem of the destruction of tropical forests?	N/A
14. FAA 121(d). If a Sahel project, has a determination been made that the host government has an adequate system for accounting for and controlling receipt and expenditure of project funds (dollars or local currency generated therefrom)?	N/A

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	The use of accurate agricultur statistics, agricultural econo analysis and imrpoved project management can help to insure development activities reach t rural areas, assist in decentralization and promote involv ment of all groups of people in development.

BEST AVAILABLE COPY

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?	
b. FAA Sec. 103, 103A, 104, 105, 106. Does the project fit the criteria for the type of funds (functional account) being used?	YES
c. FAA Sec. 107. Is emphasis on use of appropriate technology (relatively smaller, cost-saving, labor-using technologies that are generally most appropriate for the small farms, small businesses, and small incomes of the poor)?	YES
d. FAA Sec. 110(a). Will the recipient country provide at least 25% of the costs of the program, project, or activitiy with respect to which the assistance is to be furnished (or is the latter cost-sharing requirement being waived for a "relatively least developed" country)?	YES

e. 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"? (M.O. 1232.1 defined a capital project as "the construction, expansion, equipping or alteration of a physical facility or facilities financed by AID dollar assistance of not less than $100,000, including related advisory, managerial and training services, and not undertaken as part of a project of a predominantly technical assistance character.	NO
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
g. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage	Project will train local government officials in needed technology for decision making.

institutional development; and supports civil education and training in skills required for effective participation in governmental processes esential to self-government.

2. <u>Development Assistance Project Criteria (Loans Only)</u> N/A

   a. <u>FAA Sec. 122(b)</u>. Information and conclusion on capacity of the country to repay the loan, at a reasonable rate of interest. N/A

   b. <u>FAA Sec. 620(d)</u>. If assistance is for any productive enterprise which will compete with U.S. enterprises, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan?

   c. <u>ISDCA of 1981, Sec. 724 (c) and (d)</u>. If for Nicaragua, does the loan agreement require that the funds be used to the maximum extent possible for the private sector? Does the project provide for monitoring under FAA Sec. 624(g)?

3. <u>Economic Support Fund Project Criteria</u> N/A

   a. <u>FAA Sec. 531(a)</u>. Will this assistance promote economic or political

stability? To the extent possible, does it reflect the policy directions of FAA Section 102?

b. FAA Sec. 531(c). Will assistance under this chapter be used for military, or paramilitary activities?

c. FAA Sec. 534. Will ESF funds be used to finance the construction of the operation or maintenance of, or the supplying of fuel for, a nuclear facility? If so, has the President certified that such use of funds is indispensable to nonproliferation objectives?

d. FAA Sec. 609. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made?

b. ISDCA of 1981, Sec. 725(b). If ESF is to be furnished to Argentina, has the President certified that (1) the Govt. of Argentina has made significant progress in human rights; and (2) that the provision of such assistance is in the national interests of the U.S.?

c. ISDCA of 1981, Sec. 726(b). If ESF assistance is to be furnished to Chile, has the President certified that (1) the Govt. of Chile has made significant progress in human rights; (2) it is in the national interest of the U.S.; and (3) the Govt. of Chile is not aiding international terrorism and has taken steps to bring to justice those indicted in connection with the murder of Orlando Letelier?

المملكة المغربية

وزارة الفلاحة والاصلاح الزراعي

ROYAUME DU MAROC

MINISTERE DE L'AGRICULTURE
ET DE LA REFORME AGRAIRE

DIRECTION DE LA PLANIFICATION
ET DES AFFAIRES ECONOMIQUES

N° /D.P.A.E.

RABAT, le

ANNEX 4

OFFICIAL FILE

608-0182

ACTION. AGRw/att due 7/12
INFO. DIR, A/DIR, PROG, CHRON, RF

Monsieur le Directeur

J'ai l'honneur de vous faire connaitre que le renforcement des capacités du Ministère de l'Agriculture et de la Réforme Agraire notamment en matière de statistiques, d'études économiques et de suivi des projets, constitue un des objectifs de ce département dans le cadre du développement des moyens d'action de ses différentes structures.

Ce thème ayant fait l'objet des multiples contacts qu'a eus recemment la mission de l'U.S.A.I.D avec les services de la Direction de la Planification et des Affaires Economiques, je voudrais vous confirmer mon désir de voir votre organisme renouveler de façon plus accrue et plus diversifiée son assistance à cette Direction.

Je vous serais donc très obligé de bien vouloir étudier la possibilité d'élaborer, à cet égard, un programme d'aide pluriannuel et multidisciplaire dont la teneur pourrait correspondre aux besoins exprimés dans la note ci-jointe.

Veuillez agréer, Monsieur le Directeur, l'expression de ma considération distinguée.

MONSIEUR LE DIRECTEUR DE L'U.S.A.I.D.

ACTION TAKEN
No Action Necessary
Replied by

Initials & Date

BEST AVAILABLE COPY

IMPRIMERIE OFFICIELLE — RABAT

REQUETE RELATIVE AU RENFORCEMENT DU SYSTEME DE STATISTIQUE, D'ANALYSE ECONOMIQUE ET DE SUIVI ET D'EVALUATION DES PROJET DE DEVELOPPEMENT AGRICOLE

L'accomplissement des tâches qui incombent à la Direction de la Planification et des Affaires Economiques nécessite la mobilisation d'importants moyens tant humains que matériels.

La disponibilité de ces ressources ne peut être cependant assurée de façon relativement rapide sans une aide extérieure substantielle et multiforme.

L'aide que pourrait à cet égard fournir l'USAID au Ministère de l'Agriculture et de la Réforme Agraire et qui viendrait d'ailleurs renforcer notablement le concours apporté actuellement par cet organisme à la Direction de la Planification et des Affaires Economiques sur le plan statistique, concernerait les domaines suivants :

- les statistiques agricoles : amélioration des méthodes de collecte des données, mécanisation du dépouillement des questionnaires d'enquête, élaboration d'une approche méthodologique fiable de prévision des récoltes...

- le suivi de la conjoncture économique internationale et nationale et l'amélioration de la capacité d'analyse économique du Service des Etudes Economiques des Marchés et Prix.

- l'identification, le suivi et l'évaluation des projets agricoles.

Contenu de la contribution américaine :

a) Statistiques agricoles :

Il est à rappeler à ce propos que l'USAID, dans le cadre d'un accord signé en 1979 avec le Ministère de l'Agriculture et de la Réforme Agraire, a apporté une assistance technique et matérielle au Service des Statistiques et de la Documentation en vue d'introduire une nouvelle méthode de collecte des données (enquête à base aréolaire).

BEST AVAILABLE COPY

A ce jour, près de 50 % des terres agricoles sont couverts par ce nouveau système d'enquêt . Il convient donc de poursuivre cette opération de façon à couvrir l'ensemble des régions agricoles. Mais le concours technique de l'USAID est nécessaire à cet égard.

Par ailleurs, il est souhaitable d'étudier, dès à présent, la possibilité d'introduction de la téledetection dans le système de collecte des données statistiques agricoles (méthodologie, équipements...).

Un soutien est également sollicité en vue d'élaborer une nouvelle approche méthodologique en matière de prévision des récoltes.

b) Analyse économique :

L'assistance demandée dans ce domaine consisterait à contribuer à la mise en place d'un système de suivi et d'évaluation de la conjoncture agricole sur le plan national et international.

Les domaines à couvrir par ce système sont : les disponibilités, en denrées alimentaires et en facteurs de production, les marchés, les prix, les consommations intermédiaires, etc...

c) Identification, suivi et évaluation des projets agricoles :

Il s'agirait d'améliorer l'approche méthodologique utilisée actuellement pour le suivi et l'évaluation des projets agricoles et de renforcer l'encadrement du Service des Projets.

X X

X

L'assistance qu'apporterait ainsi l'USAID à la Direction de la Planification et des Affaires Economiques pourrait concrêtement se traduire par les apports suivants :

- la fourniture de services d'experts et consultants pour l'équivalent de 60 h/m.

...

Le profil des experts serait le suivant :

. un statisticien specialiste dans le domaine de la Téledetection.

. un statisticien spécialiste dans le domaine des prévisions des récoltes.

. un économiste.

Quant aux consultants, dont la mission serait de courte durée, les profils seraient définis au fur et à mesure que la réalisation du projet d'assistance avancerait.

- la formation de cadres nationaux : l'accent serait à mettre essentiellement sur la formation de courte durée des cadres de la Direction de la Planification et des Affaires Economiques.

- la fourniture de moyens de saisie et de traitement informatique correspondant aux domaines de l'assistance à fournir par l'USAID

- l'équipement d'un laboratoire spécial pour le développement des photos aériennes.

- l'équipement d'un laboratoire pour l'étude des rendements.

- la prise en charge des frais afférents à la couverture de toutes les régions agricoles en photos aériennes.

- la fourniture de photos Landsat.

BEST AVAILABLE COPY

ANNEX V

IMPROVING AGRICULTURAL DATA COLLECTION AND ANALYSIS WITHIN THE MOROCCAN MINISTRY OF AGRICULTURE: A TEN YEAR PROJECT PROPOSAL

By: Melissa Cable, Private Consultant
Charles E. Caudill, Director, Statistical Research Division, SRS, USDA
Robert B. Rovinsky, Deputy Director, Data Services Center, ERS, USDA

Final Technical Report:
Data Collection Project Component -
Morocco Rainfed Agriculture Project (USAID Project No. 0170)

MAY 1983

FINAL OUTLINE

DATA COLLECTION PROJECT COMPONENT

		Page
I.	BACKGROUND	1
	A. Current Status of Data Collection in Morocco	1
	1. Organization	1
	2. Methodology	2
	3. Data Processing Capability	2
	B. Traditional Methodology	3
	1. Sampling for Estimating Crop Area	3
	2. Sampling for Estimating Crop Yield	3
	3. Problems	3
	C. Area Frame Methodology	4
	1. Concepts	4
	2. Remote Sensing for Agriculture Project in Morocco	5
II.	DATA COLLECTION PROJECT PROPOSAL	6
	A. Introduction and Overview	6
	B. Area Sampling Frame Methodology	6
	1. Area Frame Construction	7
	2. Area Frame Maintenance	8
	3. Use of the Area Sampling Frame	8
	C. Yield Forecasting and Estimating Methodology	9
	1. Objective Yield Surveys	10
	2. Yield Modeling	11
	D. Digital Processing of Satellite Remote Sensing Data	12
	1. Justification	14
	2. Proposed Remote Sensing Capability to be Developed for Morocco	15

		Page
III.	DATA PROCESSING SUPPORT REQUIREMENTS	17
	A. Introduction	17
	B. Review of the Present DPAE Data Processing System	17
	1. Current Operations	17
	2. Problems, Constraints, Limitations	18
	C. An Overview of Data Processing in Morocco	19
	D. Recommendations	21
	1. General Hardware/Software Specifications	21
	2. Specific Options	26
	(a) Minimum Option	27
	(b) Expanded Data Entry Option	27
	(c) Two Microcomputer Option	28
	(d) One-Computer Option	28
	(e) Combination of Options	29
	3. Recommended Option	29
	(a) Suggested Timetable	30
	(b) Costs Estimates	32
	4. Requirements for Government of Morocco (DPAE)	33
	5. Benchmarks for Evaluation	33
Appendix A:	Area Frame Construction and Use in Morocco 1979-Date	35
Appendix B:	Excerpt from 1980 Evaluation Study, by Strommen, et al	45
Appendix C:	MIDAS (Microcomputer Based Image Display and Analysis System)	47
Attachment 1:	Computer Systems Chart for Recommended Option	
Attachment 2:	Analysis of Current SSD Computer System and Future Needs (In French)	
Attachment 3:	Analysis of Data Entry Storage Requirements	
Attachment 4:	USDA Furnished Equipment and Supplies Remote Sensing for Agriculture Project	

I. BACKGROUND

Long term concerns about the economic, social and political future of Morocco are closely linked to food security issues. In particular the Government of Morocco (GOM) is concerned about the decrease in cereal production, (available data indicate that from 1974-80 production of all cereals decreased by 1.2 percent per year) the worsening agricultural trade balance and rural income disparities. The Ministry of Agriculture (MARA) with help from the FAO has completed a plan of action to increase cereal production in the rainfed areas. The plan calls for a well coordinated effort with the goal of increasing cereal production from the current average of 4.0-4.3 million M.T. annually to 7.1 million M.T. by the year 2000. One of the serious constraints to overcome if this goal is to be met is the lack of a comprehensive program to provide accurate and timely data collection and analysis required for improved policy decisions and sound agricultural planning. Successful economic planning requires detailed basic information on a country's resources. Due to the dynamic nature of agriculture, timely and accurate information is perhaps even more critical if development is to be successful in this sector. Information includes not only the basic data on agriculture, the accuracy and timeliness of which is extremely important and needs to be improved for Morocco, but also the economic, social and political analysis of this data in view of the inherent interdependence between all sectors of the economy.

A. Current Status of Data Collection in Morocco

1. Organization. The MARA Direction of Planning and Economic Affairs (DPAE) was created in 1980 as part of the 1978-1980 tri-annual plan. DPAE is composed of two technical divisions and one administrative service. The responsibilities of DPAE cover the gathering and analysis of agricultural statistics as well as the preparation of economic studies and agricultural development plans.

   Within the DPAE, the Division of Planning (DP) is responsible for the evaluation of agricultural development projects, the installation of analytical methodology for planning and programming of agricultural development and for preparation of agricultural development plans.

   The second technical division, the Division of Economic Affairs (DAE), is comprised of two services. The first service, the Market and Price Studies Service (SE), is responsible for agroeconomic studies and analysis. The Statistics and Documentation Service (SSD) is responsible for gathering and analyzing agricultural statistics.

   Currently, SSD's main data collection activities are the yearly agriculture area (Enquete Agricole) and yield (Enquete Rondement) surveys. In addition the GOM 1981-85 five year plan charges SSD with conducting over twenty additional surveys. Examples of the new surveys are: detailed surveys of selected crops, market and price surveys, surveys of agricultural production techniques, farm budget surveys and surveys of agricultural employment. The five year plan budgets 94,900,000 DH for the statistical survey program.

2. Methodology. Presently, the SSD is using both their traditional agricultural survey methods and the Area Sampling Frame (ASF) survey methods to collect agricultural statistics.

To date an ASF has been constructed for all or parts of 20 provinces in Morocco. ASF area and yield surveys have been conducted for four years in Kenitra province, for three years in the provinces of Ben Slimane, Casablanca, Fes, Khemisset, Rabat-Sale and Taounate, and for two years in all or part of the provinces of El Kelaa, Ifrane, Marrekech, Meknes, Safi and Tanger.

ASF surveys have not yet been conducted in the provinces of Bene Mellal, El Jadida, Nador, Ouarzazate, Oujda, Settat and Taza primarily because of the poor quality of the aerial photographs available for the ground survey and, more recently, because of budgetary constraints.

The MARA has completely replaced the traditional agricultural survey with the ASF survey in the thirteen provinces with an operational area frame. All official MARA agricultural estimates in these 13 provinces are from the ASF.

The MARA eventually intends to fully adopt the ASF as its primary data collection technique. Primary constraints to its' immediate adoption are: the lack of quality aerial photographs for the construction of the frame in the remaining provinces, and as a result of the present budgetary crisis, the lack of means with which to conduct the survey. This second problem is especially severe during the first year the ASF survey is conducted in a province largely because the ASF survey is conducted in addition to the traditional survey. Therefore, the ASF survey competes with the traditional survey for use of the same scarce resources. It is not until the second year the ASF survey is conducted that the traditional agricultural survey is discontinued.

3. Data Processing Capability. The survey results from the traditional agricultural survey are manually summarized by the SSD staff. With the arrival in June 1981, of a Northstar Horizon Microcomputer summarization of ASF survey results became largely automated. The addition of a second Northstar in September 1982, assisted with automation of summarization of the increased volume of ASF survey data from the new provinces.

Current SSD data processing hardware consists of 2 Northstar Horizon microcomputers, 4 Televideo 920C CRT terminals and 2 IDS-560 Impact Printers. The data processing staff consists of 2 analysts, 1 Biometrician, 1 programmer, 4 data entry specialists and 2 people responsible for manual verification of the questionnaire data. An additional programmer is expected to begin work soon.

The primary responsibility of the data processing unit is the automation of ASF survey results. Specifically, the staff is responsible for the control

and verification of questionnaires, the entering and correction of survey data, data tabulation and the printing of survey results.

The staff presently uses 4 programs for entering and correcting the data, 17 programs for data tabulation and 5 programs for printing the results.

The greatest problem faced by the data processing unit is the volume of data they are required to tabulate.

B. Traditional Methodology

The Traditional Agricultural survey (Enquite Agricole) conducted by the MARA is a list frame survey. The universe from which the sample is selected is based upon a list of 30,000 douars (villages) which was established as the result of the exhaustive 1976-77 agricultural census.

The listed douars are stratified into six groups based on the number of farm operators and the area of the douar used for agricultural purposes (superficie agricole utile). From each of these groups a sample of douars is selected for the intensive agricultural survey. The survey is run in two parts.

1. Sampling for Estimating Crop Area. Part one is a survey designed to determine the area planted to each crop. The survey is conducted in the months of February, March, April and May. During these months, enumerators from the provincial offices (DPA or ORMVA's) contact the caids of the selected douars to arrange a general meeting with the entire population of the douar. Each resident of the douar is expected to attend this meeting. At this meeting all the operators that the caid identifies as residents of the douar are interviewed by the enumerators and a questionnaire is completed.

2. Sampling for Estimating Crop Yield. The second part of the survey deals with the estimation of the yields of selected crops. This survey is conducted during May through September. Sample plots from three fields of the crop to be estimated are harvested in each of the selected douars. The fields from which the 3 cuttings taken are determined by systematic random sampling. In the chosen fields, the area to be cut (approximately $2m^2$) appears to be randomly determined, but written explanations are unclear as to exactly how the areas are located. After the cuttings are done, the crops are sent to the SSD central office in Rabat, threshed if necessary, then weighed. The weights are converted to yield per hectare and used in conjunction with the area planted to the crop to calculate the expected production.

3. Problems. Problems with the Enquite Agricole are due to both the design and the way in which the survey is conducted.

   Perhaps the largest difficulty rests in trying to define a douar. The limits between one douar and another are often not accurately known even by

local inhabitants and therefore must be estimated. In addition the exact area of a douar is never determined.

The universe of douars is not static and the list from which the sample is selected is therefore likely to be incomplete. Each year the population of douars and the land area within the douars used for agriculture changes but the douars remain within the same list frame stratum. The sample is changed infrequently, thus each year the selected sample of douars becomes less and less representative. Additionally, forested areas are not sampled, so an important part of the livestock population in particular is excluded from the survey.

Within each sample douar the survey is conducted as if it were an agricultural census. Every person in a selected douar must be enumerated. As a result, the number of questionnaires to be filled out for any one douar becomes unmanageable. To save time, questionnaires are kept short. This necessitates the conduct of several different surveys annually since the MARA requires additional data which is not contained on the Enquete Agricole questionnaire.

Under the Enquete Agricole the data collected are not able to be verified. As a result, it undoubtedly contains considerable non-sampling error.

Lastly, it is very difficult to compute statistical measures of precision and as a result, they generally are not computed. Therefore it is almost impossible to determine how reliable the estimates prepared from this survey really are.

The "crop-cutting" yield surveys are not currently summarized correctly to be representative of the yield of the country. Three sample cuttings are taken from each douar regardless of how much area is planted to that particular crop in that douar. For example: three cutitngs of wheat taken from a douar which has a total area of 10 hectares planted to wheat, are given the same weight as three cuttings of wheat, taken from a douar which has a total area of 200 hectares planted to wheat.

C. Area Frame Methodology

1. Concepts. The concepts of an area sampling frame (ASF) are very simple: divide the total land area of a country into N small blocks, without overlap or omission; select a random sample of n units (e.g. area segments); obtain the desired data for the farm or land units that are in the sample; estimate the desired population totals (e.g. number of farms, hectares of wheat, wheat production, etc.) by multiplying the sample unit totals by N/n. The simplicity of the idea is in striking contrast to the complexity of successful application of the concepts.

A major advantage of an ASF for agricultural purposes is that it is always complete--it accounts for the total land area. A further advantage is its' permanence since the total land area of a country is relatively static,

with dramatic changes in use usually occurring over fairly long periods of time (5-10 years).

2. Remote Sensing for Agriculture Project in Morocco. The area sampling frame method of gathering current agricultural statistics was first introduced in Morocco in 1979 under the Remote Sensing for Agriculture Project (No. AG/DSB 931-1224) which was funded by the AID Bureau for Science and Technology and was implemented by USDA's Statistical Reporting Service (SRS). Morocco is one of 11 developing countries in which this project has been implemented.

   The original project consisted of four phases. Development of an area sampling frame; Data collection of primary agricultural data; Digital processing of remotely sensed data for estimating crop areas, and Objective yield forecasting using agrometeorological yield models.

   Phases 3 and 4 were not realized in any of the countries due to a number of factors: the failure of Landsat 3 and the delayed launch of Landsat 4, inadequate coverage of the countries involved by Landsats 2 and 3; and primarily because of insufficient project funds. Phases 1 and 2, however; provided participating countries with a current, reliable and timely agricultural data collection system, plus the capability to begin using remote sensing techniques as training, technology and funds become available in each country.

II. DATA COLLECTION PROJECT PROPOSAL

A. Introduction and Overview

Given the preceding background account of the current agricultural statistics program in Morocco it is evident that there exists a strong desire within the SSD to modernize its current program as rapidly as possible. Also conversations with DPAE officials indicated that this desire is supported by them and by higher level policy officials within the MARA. The rapid adoption of ASF technology under the Remote Sensing for Agriculture Project to replace the traditional methodology in 13 provinces provides convincing evidence of MARA's intentions to improve its operational program within available resources.

The objectives of the data collection component of this project are to:

1. Identify aspects of the current agricultural statistics program in Morocco for which technical assistance to provide improvements will be beneficial in improving future development policies and strategies.

2. Propose a detailed program for improving the overall agricultural statistics program in Morocco to include:

   a. Improvements in the quality of basic agricultural data through implementation of ASF technology and through introduction of digital processing of satellite remote sensing data for ASF maintenance and improved crop and land-use estimates;

   b. Improvements in yield forecasts and estimates through objective yield surveys for major crops and the implementation of a crop yield modeling effort for selected crops;

   c. Enhancement of the present data processing capability in DPAE to enable more timely processing and publication of survey results, to provide for implementing an agricultural data base for economic and policy analysis, and to permit the introduction of remote sensing and yield modeling technologies; and

   d. A strategy and plan for a phased technology transfer and training program whereby the Moroccan Agricultural Statistics Program will be able by 1990-1993 to be largely independent of the need for further technical assistance.

B. Area Sampling Frame Methodology

ASF methodology is the only feasible way to improve current agricultural statistics programs for countries such as Morocco. Other sampling frames, have so many statistical deficiencies, with no operational advantages, that they simply do not represent reasonable alternatives. This even includes an agricultural census, which theoretically provides the most accurate statistics.

The time delays associated with publication of results and its high cost makes a census an unacceptable alternative for current agricultural statistics.

The following areas have been identified for which USAID assistance to the MARA will provide significant improvements for the current agricultural statistics organization and program for the country.

The first area for which assistance is needed is in the acquisition of current aerial photography. This is urgently needed if the ASF technology is to be expanded from the current 13 provinces where it is operational to the remainder of the country. The single most important barrier to the adoption of ASF methodology in almost all developing countries is the lack of good quality aerial photography. Success of projects to improve agricultural information systems through area sampling has been limited in country after country largely because donor agencies and those providing technical assistance have consistently refused to address this problem. One hope was that satellite imagery would solve the problem, and it may eventually; however, the limited (80 meters for the Multispectral Scanner (MSS); 30 meters for the Thematic Mapper (TM) spatial resolution of available satellite imagery is simply not adequate by itself to solve the problem. Unfortunately flying current aerial photography for even a small country is very expensive and most donor agencies have not supported such requests. The current proposal for Morocco should be viewed in a broader development context. Even though it is mandatory for improving the agricultural statistics program, acquisition of this photography would be a wise capital investment, useful to many other institutions in the country for a wide range of development activities.

Together with the acquisition of current photography is the need to enhance the existing photographic laboratory in the Direction of Land Conservation and Topographic Works (DCFTT) or alternatively, to assist in building and equipping a photographic laboratory for direct support of the SSD. This latter option is preferred by the SSD, based on past difficulties and delays in acquiring photography and planned organization changes in the DCFTT which will make future procuremennts more difficult and more expensive for SSD. Based on discussions with SSD staff and further exploration of the feasibility of establishing a photographic laboratory it is recommended that the project include assistance for this unit.

1. Area Frame Construction. Under the Remote Sensing for Agriculture Project SSD staffed and equipped a permanent ASF Unit as an integral part of the organization. This staff has been well trained in frame construction methodology and is completely competent to pursue this activity without additional technical assistance, except for acquisition of photography as mentioned earlier, and acquisition of newly available satellite imagery. In fact, the unit has continued to function since the termination of the Remote Sensing for Agriculture project and has completed the ASF for at least parts of 7 additional provinces beyond the 13 completed under the Project. Since ASF construction is not considered complete until it is sampled and a first year pilot survey completed, there

is a need for assistance in the first year's data collection. This is due to the fact that, following good statistical practice, SSD conducts both the traditional survey and the ASF survey the first time the ASF sample is enumerated for a province. This effectively doubles data collection costs for that year. Since SSD has had no budget for this duplicate cost it has been taken out of their regular program, or the ASF has not been sampled. This happened in 1983 when the frame was completed for additional provinces for which there was no money for data collection. It is recommended that this project provide for sharing of data collection costs the first time the ASF sample is enumerated.

2. Area Frame Maintenance. An outstanding characteristic of an ASF is the fact that it never becomes unusable for sampling no matter when it was constructed. However, to maintain sample sizes at reasonable levels, periodic frame updating may be necessary. This is especially true for areas where land use and agricultural patterns are changing rapidly. As land use strata become more heterogenous, due to these changing patterns, an increase in sample size will be required to maintain the same level of precision as when the frame was first constructed. Because of the increased cost for this extra enumeration, over time it is necessary to periodically update any area frame. In the United States the ASF is updated for two to four states each year with an average update time for the entire country of about once each 15 or 16 years. In Morocco, unless the mapping materials (maps, photographs, ground data, etc.) were badly out of date when the frame was first constructed, a formal maintenance and update effort need not be started until the frame is completed for the entire country. If survey results for some provinces show that the frame is particularly inefficient this may indicate a need to reconstruct or at least update the ASF for these provinces, providing additional more up-to-date materials can be acquired. Regarding technical assistance which should be provided under this project for this area, the most effective approach would be for a TDY mathematical statistician with ASF experience to conduct a workshop on ASF maintenance procedures for SSD staff. The workshop would include instruction on statistical analysis techniques for determining when it would be beneficial to update the frame for a particular province and how new materials should be used for frame updating. This would include mostly manual procedures and would serve as an interim technology, pending successful implementation of digital processing of satellite remote sensing data. It could be adopted as the long-term solution to frame maintenance if research currently underway in the United States and further work in Morocco shows that the remote sensing techniques are not cost effective. Frame maintenance could then be monitored by the resident statisticians recommended under other parts of this project to determine future assistance requirements.

3. Use of the Area Sampling Frame. The primary use of the ASF will be for the primary, regularly scheduled crop and livestock surveys. The annual survey which provides the basic crop area estimates will serve as a base for future subsamples which can be used for objective yield surveys or other special surveys such as cost of production surveys, etc. Also the

annual survey will serve as a "ground truth" base which is necessary for computer classificiation of satellite remote sensing data. The ultimate use of the ASF is largely dependent on the skills and ingenuity of the statistician in planning and designing surveys. The long-term solution for improving Survey design capabilities in the DPAE is for advanced training in statistics, especially in sampling. To meet this need it is recommended that DPAE staff members be selected for long-term training in order to provide by 1990-1993 at least two statisticians with Ph.D training, and at least four to be trained at the Masters level. The near term solution would be to provide a resident consultant statistician for two to three years, beginning in 1984. This resident should have experience in Survey design, especially using ASF and experience with either Remote Sensing technology or Yield Modeling. For special projects, such as objective yield surveys, the resident statistician would have to be backed-up by TDY consultants with specific expertise in the specialty area. Two- four TDY assignments of at least three weeks each per year will be required for this back-up plus providing the TDY technical assistance for support of the Yield Modeling and Remote Sensing parts of the project.

Primary emphasis of work in this area will not be to change the current Moroccan Program of surveys which seems more than adequate in terms of comprehensive coverage. This is true at least in the plans and responsibilities assigned to DPAE. Emphasis should be placed on providing assistance for designing future "ad hoc" surveys and in survey planning and scheduling for the present program. To integrate objective yield forecasts and digital processing of remote sensing data will require a significant improvement in current DPAE planning and survey management.

The overall performance of DPAE could be substantially improved by assistance to establish a management and planning unit, as suggested by Harmon in his November 1982 Institutional Assessment paper and by strengthening the SE. DPAE has been accused of a "shotgun" approach to data collection. This is undoubtedly true because information needs from the top down may not have been well articulated. SSD is, or will be if the proposed data collection assistance is provided, in a position to respond to information requirements, however this unit should not be placed in the position where it alone is forced to determine what data is collected. Other units in MARA must do a better job of defining their data requirements.

C. Yield Forecasting and Estimating Methodology.

One of the planned phases in the Remote Sensing for Agriculture Project was to develop and implement crop yield models for selected crops in Morocco. Unfortunately under that project there was no intention "to equip...country institutions to analyze satellite multi-spectral imagery and model crop yield" (Project Paper, P. 22). Unfortunate, because it was recognized that none of the countries were in a position to implement this technology and because later evaluation and feasibility studies which recommended this technology be

implemented in Morocco (and Bolivia) were incorrect in their assessment that incountry computer facilities would be available for DPAE to use for this implementation. As time later revealed this computer support was not even available for DPAE to process the ASF data, much less for the more stringent processing requirements associated with either remote sensing and/or yield modeling.

Current yield forecasts in Morocco are based on largely subjective opinion surveys conducted by SSD and (DPV) with final end of season estimates based on objective "crop-cutting" surveys. Both forecasting and estimating methodologies need improving. This is recognized by SSD staff and they have requested technical assistance to address the problems associated with their yield estimates. To address this area the logical first step is to develop objective yield surveys for providing both forecasts and estimates (starting with the major cereal crops) and to enhance this with a crop modeling program as rapidly as possible.

1. Objective Yield Surveys. The objective yield surveys envisioned for Morocco would use a random sample of fields selected with probabilities proportional to size from the annual ASF survey. Within each sample field small units would be randomly located and identified for counting and eventual harvest at maturity. In order to implement a forecast survey to coincide with heading of cereal crops (or just after most fields have passed this stage) scheduling of data collection for the ASF survey will have to be tightened and perhaps the survey will have to be started earlier. The harvest yield survey would be done when the grain is mature and would be equivalent to, or replace, the current "crop-cutting" survey done by SSD.

   For both these surveys, data collection ideally would require only about three weeks, with tabulation of results completed in about ten days. For the harvest survey, data collection could be scheduled over a longer period of time if required because of variation in maturity dates in different parts of the country.

   Data collected for the forecast survey would include at least the following characteristics:

   a. Plants per Unit Area
   b. Tillers per Unit Area
   c. Heads per Unit Area, (classified by maturity category)
   d. Kernels per Head for subsample of heads

   For the harvest survey a fifth characteristic would be obtained:

   e. Weight of Kernels per Head for a subsample of heads

   In addition the sample plots would be harvested and the grain brought to the laboratory for threshing, weighing, moisture determinations and summarization to obtain final yield estimates.

After about three years of these surveys the data from the forecast survey and the harvest survey would be used to develop forecast models for providing objective forecasts of yields earlier in the season as a significant improvement over the subjective procedures now used.

To successfully plan and implement objective yield surveys in Morocco will require technical assistance in the form of both long-term residents and periodic TDY visits as mentioned previously. Because of the time required to establish a survey of this kind, this assistance should be provided in time to implement at least a pilot survey for one or two crops in 1984. Also it is assumed that the data entry and computer equipment in the data processing portion of this paper will be provided.

An objective yield survey program as visualized will require the establishment of a laboratory for processing the crop samples. This laboratory will need to be equipped with the necessary instrumentation for handling a large volume of samples within a relatively short time. Equipment required will include, micro-threshers, seed counters, scales, moisture meters and ovens, as well as the necessary containers and packaging materials required to transport samples from the field to the laboratory. After a central laboratory is established and functioning then actions should be taken to build smaller laboratories at the regional or provincal levels as required for crops other than the major cereals. Assistance to establish these laboratories is strongly recommended.

2. Yield Modeling. An evaluation report for the Remote Sensing for Agriculture project in September 1980 recommended Morocco as one of the countries for which "agromet" yield modeling should be implemented. Current investigations supports this recommendation providing adequate computing resources are made available. According to SSD staff, historic yield and weather data are available for up to 20 years at the province level for important cereal crops. This data could be used in regression models as a first step toward more sophisticated models in future years. Even the simple regression models, if used with caution, could provide an improved forecasting ability for Morocco in a relatively short period of time. In order to develop more advanced yield models additional data inputs, not now available in Morocco, will be required. Some of these will come from the Objective Yield survey program and as an evolutionary development as more training and in-country expertise becomes available.

To implement yield modeling technology in Morocco the following steps are proposed:

a. Use the resident consultant mentioned under the ASF discussion to guide assembly of weather and yield data for several crops/provinces.

b. Follow by jointly constructing, with counterpart staff participation, models using this data, do some "boot-strap" testing to evaluate these models and start running them for the 1984-85 crop year as a real-time test.

c. Select 3-4 Moroccan scientists for a one year academic training program in the United States. Training should address aspects of the following disciplines: statistics, climatology, computer science, plant science, or plant physiology.

d. Conduct an in-depth workshop for the trainees from step 3 near the end of their training program to review the various types of yield models and their advantages and disadvantages.

Steps (a) and (b) can be completed rather quickly while steps (c) and (d) represent a longer term solution for yield modeling in Morocco.

D. Digital Processing of Satellite Remote Sensing Data

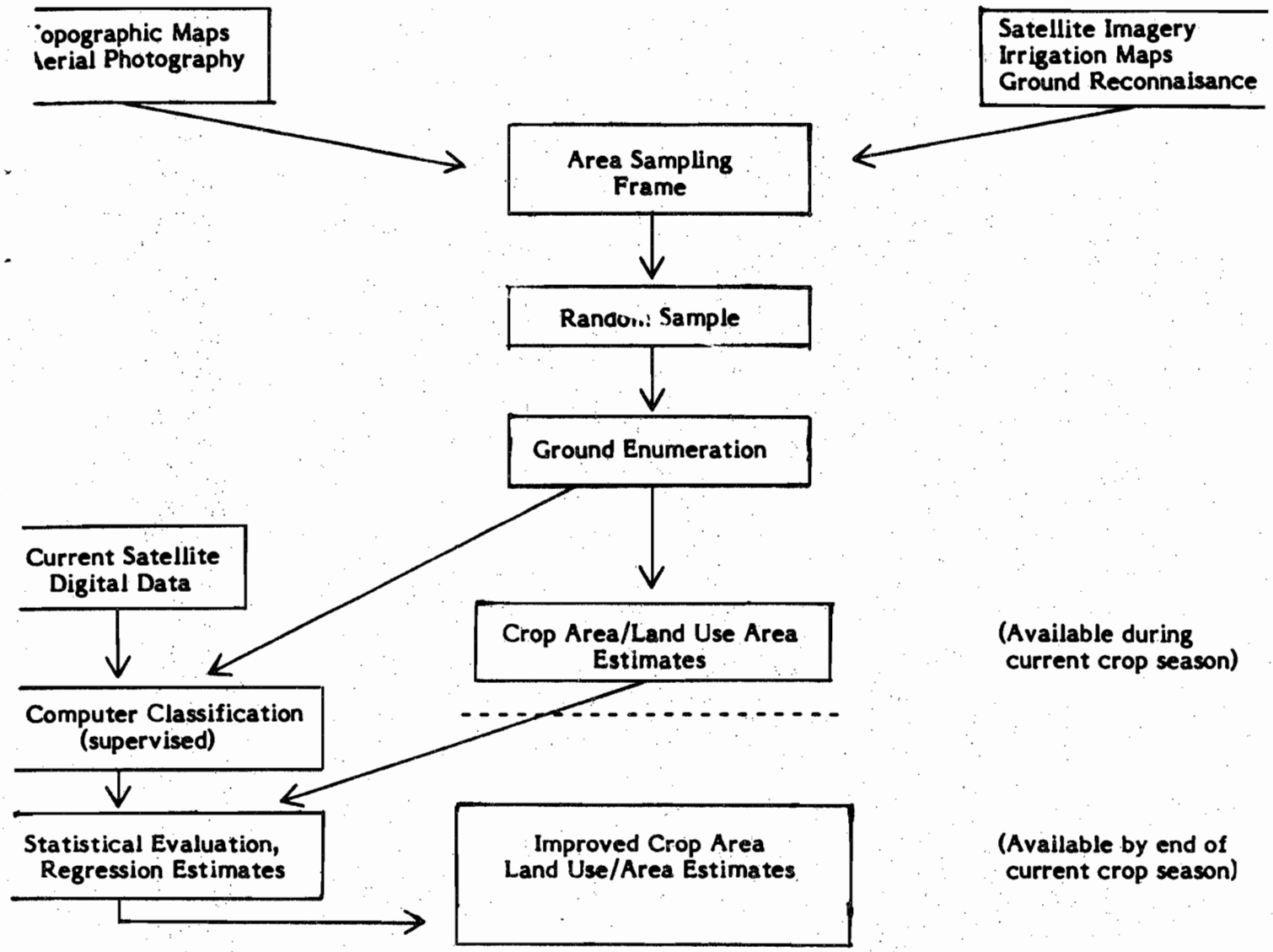
The original concept of using satellite remote sensing data for crop area estimates under the Remote Sensing for Agriculture project was to process the improved data (TM) from Landsat D to provide more precise crop area estimates for Morocco. This application was planned based on the same model successfully used by SRS for improving U.S. crop area estimates. (see Figure 1)

In September 1980 the Evaluation and Feasibility Study report prepared by Strommen, et al, recommended Morocco as one of the two countries for which technical assistance should be provided, "to develop an in-country capability to classify Satellite Multispectral data and to derive appropriate in-season information on major crop types, their areal distribution and extent." This team thoroughly reviewed options for digital classification in Morocco, a capability which they concluded did not exist at that time. In 1980 it was anticipated that SSD would be able to use the IBM 170-135 computer in MARA for processing the area frame survey data, (availability of this system to SSD has not as yet materialized and from all available information the system will not be used by SSD in the future). However, since the earlier project was not intended to provide digital processing equipment, the evaluation team discussed at length the options for using the IBM 170-135 system before arriving at the following conclusion. "Timesharing demand on the current system would most likely require the installation of a dedicated computer configuration to ensure the institutionalization of an operational capability preceded by significant in-and-out country training, a suggested element under a technical assistance program."

Two possible options were considered for a possible Moroccan system:

-"A Mini-Computer-based System--ERDAS (Earth Resources Data Analysis System)
-A Micro-Computer-based System-ERDAS (Earth Resources Data Analysis System)"

These options are discussed in detail in Appendix B. The 1980 evaluation team finally recommended a "more in-depth analysis--to define the final system



Basis for additional use, e.g.

- Improved Future Crop Area Estimates
- Feedback for Updating ASF
- Inputs to Crop Yield Forecasting
- Land Capability Assessment
- Change Monitoring over time, etc.

Figure 1: Model proposed for implementing digital processing of satellite data in Morocco

BEST AVAILABLE COPY

design specifications (including specific software needs) and the timing of the system installation, training and future support activities" was needed.

Developments since 1980 have made most of the specific options discussed by the evaluation team obsolete; however, their basic recommendations are still valid and essentially the present recommendation is that USAID provide technical assistance and support to implement a digital analysis capability for satellite data in Morocco.

1. Justification. Although benefits of using satellite data to estimate crop production and monitor earth resources have been frequently grossly overstated by proponents of the technology, research and operational use of the data by many institutions over the past decade has clearly demonstrated the utility of this data source for improving crop production estimates and natural resource information. Changes in computer capabilities (both hardware and software) have greatly enhanced the benefit/cost ratio for using satellite data by reducing processing costs and capital investment required to implement the technology. Also improvements in sensor capabilities (Thematic Mapper vs. Multi-Spectral Scanner; SPOT) have or will significantly enhance the utility of the data for agricultural purposes. Operational use of the MSS data by the SRS for crop area estimates in the United States has demonstrated that the technology has evolved to the point where it is almost cost-effective for improving crop estimates when compared to alternative methods for achieving the same results (i.e. increasing the size of the area frame sample). When the social costs and constraints of the alternatives are considered (increased respondent burden, staff increases under hiring freezes, etc.) then remote sensing clearly emerges as a highly beneficial technology for crop area estimates in the U.S. Research using simulated Thematic Mapper data has shown potential improvements over MSS data with precision of crop acreage estimates increased by a factor of 3 to as much as 12 for some crops.

   There have been many other studies over the past decade which have addressed the potential benefits of remote sensing for agriculture. Eisgruber in 1972 estimated that the overall social benefit from reducing the error in estimates from 3 to 2 percent for some of the major crops in the U.S. (corn, wheat, and soybeans) would be some $14 million per year (based on 1964-1970 prices). Other studies, particularly those done after the 1972 Russian Grain Deal, have estimated positive annual benefits of several hundred million dollars per year to the U.S. economy from the improvements in global crop production estimates potentially possible through satellite remote sensing.

   One cautionary note should be raised. Thematic Mapper data will not be routinely available until early 1985 even if current problems with Landsat 4 are solved. (Communications link for TM data to ground stations is not operating; power problems with the satellite itself may result in a complete loss of TM and possibly MSS also). Should there be a complete failure of Landsat 4, it is anticipated that Landsat D′ would be quickly

launched as a replacement and also that the successful launch by France of it's SPOT satellite in 1984 will assure continuity of remote sensing data from space for the next several years.

2. Proposed Remote Sensing Capability to be Developed for Morocco. Based on the SRS conceptual model (Figure 1) and in agreement with the 1980 evaluation study a dedicated computer configuration for digital processing is recommended for SSD. This system to be installed by mid-1985 if proven feasible by activities recommended between the time of project approval and then. The following phases are recommended to establish this technology in Morocco, specifically within the SSD of DPAE.

Review, evaluation and design phase: This phase should begin as soon as the project is approved and should be completed by the end of June 1984. Remote Sensing State-of-the-Art technology has changed dramatically since 1980. Both hardware and software changes have made transfer of this technology much more feasible in terms of reduced costs and simplicity of operations. While other options need to be researched and reviewed, the NASA-Ames Research Center (ARC) has configured a micro-based Image Processing System (MIDAS, See Appendix C) capable of implementing the SRS Methodology for integrating ASF data and satellite remote sensing data. Also the current EDITOR software system is being converted by SRS and ARC personnel to achieve full portability to either the MIDAS system or other alternative systems which have PASCAL compilers. Completion of this conversion and installation on MIDAS is expected by the end of 1984 or sooner. USDA is currently exploring sharing this software with scientists in France and Spain for remote sensing applications in those countries, in exchange for some sharing of, and future joint research using SPOT data.

The review and systems design under this phase should be carried out by selected host country staff, in cooperation with U.S. counterparts, to analyze and define Moroccan objectives as well as the operational framework anticipated. An essential part of this process would be to assess other current capabilities in digital processing of remote sensing data in addition to the aforementioned MIDAS system. This assessment should include visits to U.S. remote sensing institutions such as EROS, ERIM, LARS, and the Space Sciences Laboratory at the University of California at Berkeley, as well as the ARC and USDA user agencies such as SRS and the Foreign Agricultural Service (FAS).

Basic Training Phase. This phase should focus on the training of host country staff in the fundamentals of remote sensing and data capture from space-born sensors. Training should include visual as well as digital classification techniques. Training in digital processing of remote sensing data could be accomplished by assignment of Moroccan staff to work with USDA user agencies for on-the-job training for 2-3 weeks with participation, before the OJT assignment, in a basic remote sensing short course such as those offered by LARS. Perhaps this training could be made an integral part of the design and review phase depending on needs

of the selected participants. For the longer term, to assure the technology transfer is successful, at least one Moroccan scientist should be selected for academic training in remote sensing leading to an advanced degree in this discipline.

In addition to the above training, an in-country Fundamentals of Remote Sensing Short Course of 1-2 weeks should be designed and conducted for DPAE staff. Expertise for conducting this work-shop could be provided by many of the remote sensing institutions in the U.S. including many Universities and private firms or it could easily come from other countries, e.g. France, Switzerland or others involved in this technology.

Institutional Support Phase. This phase calls for the establishment of GOM support of a management structure for system maintenance and transfer of operational techniques to new staff. This support frameowrk includes the institutional arrangements for budget and staff support and the long term plans for complete integration of this technology into the countries operational agricultural information system.

III. DATA PROCESSING SUPPORT REQUIREMENTS

A. Introduction

The purpose of this section is to review the current data processing situation in DPAE, to discuss the general data processing environment within the GOM and Morocco as a whole, and to make both specific and general recommendations for computer support to the Data Collection and Analysis component of the Rainfed Agricultural Project.

B. Review of the Present DPAE Data Processing System

1. Current Operations. As mentioned above in the background section of this paper, the SSD has two Northstar Horizon microcomputers, one of which is on loan from USDA. Each Northstar is connected to two Televideo terminals, two of which are also on loan from USDA. There are two Impact Printers, and a fairly complete set of associated hardware peripherals, tools, and supplies. A list compiled in 1982 by the resident on this project is attached.

   Software to support data entry and editing was supplied by SRS, much of it written by SRS staff. The BASIC and PASCAL programming languages were also supplied. BASIC was used by the SSD staff to develop several tabulation and editing programs. PASCAL was never used, as the documentation supplied was inadequate.

   The design team observed this computer system on several occasions. We also received a document, in French, prepared by the SSD staff, which contains their analysis of the computer system and future needs. This document was partially translated so that most of it was coherent, and is attached.

   The Microcomputer system is primarily used to process the questionnaires gathered using the ASF Survey. Each questionnaire has 427 cells for coding, although the number of non-zero elements is usually much less. Since less than one-third of the cells are usually nonzero, a variable field data entry technique is used, whereby a code number and value is entered for each nonzero entry. After each section or subsection of a questionnaire is entered, the data entry software checks for a series of possible errors, and blocks future data entry until the errors have either been corrected or an indication is given to ignore the error. Thus it can take an operator a considerable time to enter each questionnaire. Because of this the DPAE staff has estimated that each data entry operator can process only 25-30 questionnaires per day. There is currently one shift of data entry staff which can be increased to two only if transportation can be arranged for the data entry staff.

   After the questionnaires are entered, the microcomputer is used to produce summary statistics. Some special tabulations are also prepared. We were shown a considerable number of reports, edit sheets, and other

data listings prepared on the impact printer. All of these documents are for use only by the SSD. Summary reports, even when they are composed primarily of the data printed out by the microcomputer, are prepared manually.

The SSD data processing staff currently consists of 4 analysts/programmers; several of these programmers are also statisticians. Another programmer is currently assigned elsewhere. They all know BASIC well enough to have written about 25 simple to moderately complex tabulation and file processing programs, and they have been able to display these programs in a systems flow chart. A brief examination of several programs showed relatively good programming style, with limited documentation, consisting of comments within the programs, but no other documentation. At this level of programming, however, there may not be a compelling need for more systematic documentation. Each diskette containing survey data has been numbered, catalogued, and backed up, and the operation runs reasonably well. (A diskette is a high speed storage medium used by most microcomputers).

2. Problems, Constraints, Limitations. The SSD staff expressed several major problems with the existing system. These were: (a) The length of time it takes to enter each record; (b) the large number of diskettes required to store the data for each province; (c) the limited size of the Northstar computer, which forces them to do their processing sequentially, rather than doing several steps simultaneously; (d) the severe maintenance problems with the Northstar and its peripheral equipment; (e) the lack of a sufficient number of adequately trained data entry staff; (f) insufficient computer capacity to handle future surveys; (g) the fact that the Northstar cannot support the digital processing of remote sensing data; (h) the insufficient capacity on the Northstar for statistical analysis: (i) the insufficient capacity to build a data bank; and (j) the Northstar's lack of a graphics capability.

Because of these problems, the SSD staff has not been using the system as was originally intended. Several of the edit checking programs have been disabled by the programming staff, to speed up data entry; several of the required summaries are done by hand, and the summaries only are entered, also to save data entry time.

The SSD staff asked for either: (a) Two additional computer systems, one to handle the data entry, editing, sorting, and tabulation of the AFS data, and one to be devoted to the Remote Sensing project; or (b) one large "mini" computer to handle all current and planned work.

The design team agrees with most of the observations of the SSD staff. However, we are not convinced that the maintenance problems are as severe as mentioned, and believe that coordination among the USDA, AID, and DPAE staff could alleviate this problem somewhat. Also, a possible upgrade of the Northstar System (see below) could alleviate some of the storage and processing time problems encountered. The use of the

MICROSTAT package or equivalent, which can easily be provided to DPAE, can help improve the statistical analysis capability. New software packages for graphics and database management are also entering the marketplace at a rapid rate, and should help meet some of the SSD's requirements.

The design team are in agreement with the SSD on the following basic points:

a. That the data entry system needs to be revised to fit the needs of SSD.

b. That the diskette system needs to be replaced by a hard disk or tape system.

c. That SSD needs increased capacity for their current operations.

d. That the Northstar alone, even with upgrades, cannot handle the future data processing requirements of SSD.

e. That the existing maintenance system needs improving.

f. That more software needs to be provided, to handle further statistical analysis, database management, and graphics.

g. That the key entry staff needs to be improved, through training and additional personnel.

There are several additional problems with the existing system:

a. The current system, with its needs for retyping all documents, is too slow, and will not be sufficient to handle future requests for reports.

b. The system lacks the capacity to provide any electronic outputs; therefore any further machine processing on the data collected by DPAE by an outside Agency requires re-keying of DPAE data. This is a practical limit on the data's usefulness for analytical studies or research.

C. An Overview of Data Processing in Morocco

As a first step to preparing specific recommendations for a computer system in Morocco, the design team reviewed the existing data processing environment in the GOM. There are several large computer centers within the GOM, two of which are potentially available to process DPAE data. The DCFTT has an IBM 370/135. The Ministry of Plan (MOP) has a Honeywell Bull 66/40. The computer within the MOP is used on a limited basis by other ministries, but heavy loads from the Censuses of Labor, Population, etc., can tie it up for long periods of time. The MOP is currently considering a chargeback system to use in making their system more available to other GOM

ministries and to private firms, but it is unlikely that they will expand in the near future. The DCFTT's computer and staff are also apparently dedicated to the demands of those Directions within MARA dealing with land, and attempts to use their computer for processing the DPAE workload have failed. (The SSD staff recommended, in a paper written in June 1981, that data entry terminals be purchased and connected to the IBM 370/135 in DCFTT. It was partly their inability to link to this computer that led to the procurement of the Northstar system in 1981).

The design team also briefly reviewed the overall data processing environment in Morocco. The principal computer vendors in Morocco in 1982-83 are: Honeywell Bull, DEC, IBM, and Burroughs. Several other manufacturers (e.g. Toshiba) are represented through third party vendors, while other computer manufacturers (NCR, Hewlett-Packard) market only their other products (for NCR, typewriters, cash registers; for Hewlett-Packard, calculators). In the past several years, many small firms have begun introducing microcomputers, and several hundred to several thousand have been sold. APPLE has a national distributor in Casablanca and he has a local distributor in Rabat.

Those persons contacted by the design team have agreed that microcomputers, while they may represent the future of computing in Morocco, have a number of major obstacles to overcome. Many suppliers are small firms, often consisting only of a salesman and a secretary; they lack maintenance capability and spare parts, and several have folded in recent years. The inability of any of these firms to obtain spare parts, the maintenance problems and the lack of trained personnel, were cited several times. As a result, many microcomputers have become, in the words of one contact, "electronic paperweights." A further complication is the current economic situation in Morocco. As a result of their negative balance of payments, the Ministry of Finance has implemented, and is considering expanding, a ban on certain types of imports. If this expands to include computers, or peripheral equipment, spare parts, tools or manuals, the fledgling Moroccan microcomputer firms may not grow or even survive.

The design team received various opinions concerning the quantity and quality of available data processing training within Morocco. INSEA (National School of Statistics and Economic Analysis) is regarded as the best technical school, while other universities such as Mohammed V have or are developing a computer science curriculum. Several ministries have developed training institutions within their directions. Nonetheless, many ADP shops send their staff to France, Tunisia or the United States for training, and a foreign degree still seems to be preferred.

The design team was unable to discover any schools for data processing maintenance training in Morocco. One knowledgeable contact felt that the best course for a donor would be to help create a school for maintenance of microcomputers, where staff could learn in 9-12 weeks how to fix, enhance, and link together a variety of machines. There seems, unfortunately, also in Morocco to be a stigma attached to manual labor, and hence the combination of a university education and mechanical skills is rarely found in one person.

The design team has prepared a short report which contains the additional information collected on the data processing environment in Morocco, and this may be consulted for further details.

D. Recommendations

Additional computer hardware, software, and telecommunications equipment needs to be provided to improve the data capture function, to support the requirements of digital processing of Landsat data and yield modeling, and to increase the capability within the DPAE for statistical analysis, economic analysis, data management, project cost accounting, and preparation of reports. Each of these is discussed separately below. We also include a discussion of issues involved in integrating these additional capabilities. Within each section, the required training, installation support, and maintenance needs are listed. A series of options which AID and DPAE can adopt follows, along with the recommended option. For the recommended option, an implementation plan, with proposed levels of financial, material, and TDY support is given, as well as a set of benchmarks for possible evaluation purposes.

1. General Hardware/Software Specifications. For the completion of the National ASF and its associated processing the requirements are:

   a. There must be sufficient computer capacity to process all SSD surveys. The total capacity required will range from a minimum of 54 million bytes (MB) of storage required to do just the ASF survey, to approximately 550 MB per year.

      The larger calculation comes from the estimates prepared by the SSD staff, which give the capacity required if all surveys in the 1980-85 plan were completely key-entered. These estimates were modified to reflect redundancies in the survey questionnaires, and an estimate of the reduced size of the files when the variable format is used. It is estimated that a removable tape or disk system with 50-100 MB of storage would be sufficient for the needs of the SSD. (See attachment 3 for an explanation of these calculations). There must be sufficient redundancy to provide a backup and maintenance capability. A reduced capacity of several 20 MB removable hard disks, while less efficient, is feasible, but will require a file management system. The additional capacity should be a form or random access memory, to provide sufficient processing speed for key entry work.

   b. The key-entry software system should be revised to allow the key-entry operator to more effectively enter data. This system should be written in BASIC, so that the SSD staff can modify it as required. Further, the training and supervision of data entry personnel, a weak link in the present system, must be improved. The design team supports the recommendations of the SSD staff in this area.

c. To improve the maintenance function, a backup data entry system and/or complete set of spare parts and tools should be provided to the DPAE. Further, the DPAE should develop its own internal capacity to maintain, and enhance this system. This expertise could be developed by TDY assistance, or by sending DPAE staff for training in the U.S. or elsewhere.

For the support of digital processing of remote sensing data the following support is required:

a. A computer capable of supporting the SRS-ARC revision of the current EDITOR system in needed. Since the system is not yet complete, only estimates of requirements can be given. To handle expected contingencies such a system should have:

(1) 32 bit operation;
(2) An addressable memory of at least one MB;
(3) A 1600 bpi Magnetic tape drive;
(4) A large disk storage capacity, of at least 50 MB;
(5) An Operating System which can support a sophisticated directory and file structure.
(6) A PASCAL Compiler, which meets current IEEE and any future ANSI standards;
(7) A FORTRAN compiler, which meets ANSI standards;
(8) An extensive utility library for Input/Output routines, file name generation, and segmenting;
(9) A hard copy printer (does not have to be very fast);
(10) Coordinate Digitizer and plotter;
(11) Several terminals;
(12) Image processing hardware.

b. A higher level of computer sophistication is required to use this system. To most effectively use this system, the principal users should be statisticians with some computer training, which should include basic computer concepts and file maintenance and management. Some remote sensing analyst training is also required.

c. The system installation and maintenance will require programmer support, although this support does not have to be full time. Operator/programmer support should be limited to the maintenance of parameter, input, intermediate, and output files. The program should not be modified in Morocco during the first years of operation. Should errors be observed, or difficulties encounterd, help from the appropriate parties should be sought, and supplying this help should be sought be part of any contract awarded. The principal users and at least one member of the DPAE data processing unit should be brought to the U.S. to observe the working of the U.S. system, and to verify that it will meet their needs.

d. Maintenance of the hardware of such a system is vital. Either the contractor must be responsible for assuring maintenance within tight time constraints, (required for the system to operate at full capacity), or the maintenance capacity must be built in Morocco.

For the system to operate as required, there can be no more than 1 week of total machine downtime during the critical period from April-September. (During the other 6 months, there should not be more than one or two downtime periods of 1-2 weeks). Any more downtime than this and the amount of remote sensing data that could be processed would be significantly reduced.

The building of an in-country hardware maintenance and system capacity will not happen overnight, and several years will probably be necessary for the staff to gain familiarity with the system and to get the "bugs" out. There is no need, however, for a resident consultant/Data Processor or Maintenance Specialist as the DPAE staff have the capacity themselves to learn these skills, given sufficient training and experience. It may be necessary, however, to provide at least a complete set of spare parts, and to schedule a regular set of preventive maintenance visits (at least annually, probably in January or February, before the critical processing period), by the Contractor (or other vendor with experience in the Computer System purchased).

For enhanced statistical analysis support, there exists a large variety of low cost, highly portable statistical software packages. Many of these packages would provide fully adequate analytical and data handling support for the needs of both the statistical and economic studies services within DPAE. (It should be noted that the software recommended here will fully support the requirements of the proposed yield forecasting and estimating methodology mentioned in the previous sections). The principal requirements of such statistical systems, in order of priority are:

(1) Sample Selection programs, to automate the sample selection process for the ASF or other frames used by the SSD. Such programs must include a random number generator, and sample selection procedures for alternative survey design (for example, simple random sampling, systematic sampling, replicated sampling, etc.)

(2) An allocation program, which would use multiple characteristics to allocate a sample. Standard software packages can also give analysts the ability to easily write such programs.

(3) Multiple Regression and Correlation programs, to handle up to 50 variables.

The remaining elements are desirable, and could be used to select among competing programs, although since their costs are low, they can probably all be included.

(4) Analysis of Variance (ANOVA and MANOVA).

(5) Discriminant Analysis.

(6) Component/Factor Analysis.

(7) Multiple and cross-classification analysis.

(8) Graphics.

(9) Non-parametric statistics.

(10) Time series analysis.

Adequate documentation is a key factor in the successful use of any statistical software. Preference should be given to packages with clearly written, short and simple documentation, preferably with a short tutorial and many examples. If possible, the documentation should be in French, or be translated at least in part into French (say the tutorial and/or examples).

Preference should also be given to statistical packages which can accept a large variety of data input formats, to allow the DPAE to receive and process data from outside the DPAE, and to packages which can output data and/or statistics in a variety of formats.

For enhanced economic analysis processing support, the principal requirements for software packages are as follows:

(1) Simple and Multiple regression.

(2) Simple modelling routines, including the iterative solution of simultaneous one-and-two stage systems of equations.

(3) Time series analysis.

(4) Simple Simulation, e.g. Gauss-Seidel.

(5) Econometric smoothing and interpolation functions, to aid in simple projections.

Other functions, such as linear programming, advanced regression techniques, and graphics are desirable but not necessary at this time. The comments made in the section above on statistical packages about documentation and data formats apply to the economic packages as well.

Two more software features should be considered to augment the work of the DPAE. The first is a data base management system, to create and manage the DPAE's growing data bank.

The DPAE has identified the development of a data bank as one of their principal goals. From an examination of the number and size of surveys which the DPAE alone collects, as well as other data which it has access to (including land, forestry, and trade records), it is clear that any data bank will be too large and unmanageable except through the use of specialized data base management software. Such a system, properly developed, maintained, and used, will allow both the DPAE and agencies outside DPAE to make inquiries, do necessary sorting, merging, and scaling of such data, and produce reports. This will be an invaluable aid in meeting the short term policy, modeling, and analysis needs of the DPAE.

Such a system, in addition to the documentation features mentioned above, should contain:

(1) A query capability to allow simple information about the data to be retrieved.

(2) A data dictionary, which names and indexes each data element.

(3) Password protection, and data integrity.

(4) Ability to accept a variety of data inputs.

(5) Report writing capability.

(6) Simple analytical and arithmetic functions.

(7) The ability to handle up to 7500 data series of up to 50 items in length, or about 500 thousand data elements.

The second feature is a project management and accounting system. This will enable the DPAE to monitor survey costs, personnel costs, etc. Most systems would be adequate, provided they meet the documentation standards above, and the DPAE should participate fully in the selection of these systems.

It is inevitable that the DPAE, as it expands its data entry and data bank operations, and its analytical and statistical capabilities, will require help in creating and modifying reports. Currently one of the bottlenecks in responding to requests in a timely manner is the need for typing support. Currently even data listings are retyped for publication purposes. A word processing and report writing capability should therefore be provided to the DPAE. In the case of word processing, ergonomic factors such as keyboard quality, work station features (desks, chairs, etc.) and clarity of screen are as important as

any technical features. Therefore the DPAE should participate fully in the selection of a system based on these requirements, as well as ease of documentation and quality of training. Further, at some point a letter-quality printer should be purchased so that most reports leaving the office can be produced electronically.

Finally, such a system should, as a desirable feature, include the ability to produce output in machine-readable form, for use by other Ministries and interested parties. The data collected in DPAE should be electronically available to other directions, and within DPAE, the data collected in SSD should be electronically available to the SE staff, or to the Planification unit. This integration should be accomplished through the use of telecommunications hardware and software. To accomplish this requires that (1) all different hardware within DPAE be connected via internal cabling and appropriate systems software; and (2) that a dedicated line connect the principal DPAE computer and the IBM 370/135 maintained at the DCFTT. Several details will clearly need to be worked out between the two Directions within MARA before this can happen, and we encourage this coordination.

A final recommendation is that most data processing be performed via the packages procured above. The programming staff of the DPAE should be concentrated on maintenance of existing programs, and installation and understanding of the software to be provided. In most cases the packages should be sufficient to do the work required, and purchasing updates is less expensive in time and money than additional programming.

The requirements of the computer system specified above would support the following activiities in DPAE: survey processing, statistical and economic analysis, digital processing of remote sensing data, yield modelling, the creation and maintenance of a data bank, and the preparation of reports. Since this is an integrated system, it will also have the added benefit of aiding coordination of DPAE functions. Before any hardware of software is selected, however, a technical systems analysis should be performed. Existing technology should be renewed in the U.S., and a feasible, cost effective systems plan should be prepared and presented to AID and DPAE management. To aid in this systems analysis, five feasible options are presented below, with a discussion of their costs, possible dates of implementation, advantages, and disadvantages. A systems implementation plan is drawn up for option (e), which appears to be the best option now, and rough cost and time estimates are given. The technical systems analysis should develop improvements in this recommended option, but should be required to justify any significant increase in the cost or delays in the time estimates.

2. Specific Options. The following options are identified as worthy of consideration. They are listed roughly in the order of increasing

complexity and cost. Cost estimates are very approximate, and do not include GOM costs.

a. The Minimum Option consists of the following steps:

(1) Upgrade the Northstar microcomputer by adding a 20 MB hard disk, an upgraded data entry system already developed by SRS, a future data base management system, MICROSTAT or an equivalent statistical package, a word processing package, and an economic analysis package. (Cost - $15,000, Time-October 1983).

(2) Rewrite and reorganize the data entry software to speed processing and reduce errors. (Cost - $10,000, Time-January 1984).

(3) Upgrade the data entry staff to allow them to enter corrections themselves; provide training as necessary. (Cost - $20,000, Time-April 1984).

(4) Provide a backup Northstar system and sufficient spare parts. Train one member of the SSD staff in maintaining the system. (Cost-$20,000, Time-April 1984).

(5) Procure a separate Microcomputer System for digital processing of Remote Sensing data, which meets the requirements specified above. Use the Northstar microcomputer for digitizing maps, photography, ASF, and ground data. (Cost - $100,000, Time-1985).

(6) Provide limited training on the Northstar to the Economic Studies Unit; provide microfiche, Xerox facilities to ease their storage problems. (Cost - $20,000, Time-1983-84).

b. The Expanded Data Entry Option consists of the following steps:

(1) Replace the Northstar with a machine dedicated to data entry, with a full contingent of 6-10 terminals. The machine should have tape or disk capacity up to 250 MB. (Cost - $40,000, Time-1983-84).

(2) Provide BASIC and convert all present data entry software. Rewrite some software to speed data entry. (Cost - $20,000, Time-April 1984).

(3) Same as a.(3).

(4) Provide extra terminals as a backup, and sufficient spare parts. Provide training to one member of the SSD staff to enable them

to maintain and manage the system. (Cost - $50,000, Time-April 1984).

(5) Same as a.(5).

(6) Same as a.(6).

(7) Use the Northstar to enhance statistical processing. Add MICROSTAT or equivalent software, a data base management system, and graphics to the Northstar. Upgrade the Northstar with a 20 MB hard disk. Provide appropriate training via TDY. (Cost - $20,000, Time-1984).

c. The Two Microcomputer Option consists of the following steps:

(1) Procure a micro or minicomputer powerful enough to handle the data entry capacity of 6-10 terminals. The machine should have tape or disk capacity up to 250 MB. Purchase a full complement of Statistical and data base management software, so as to fully meet the needs of SSD. Provide BASIC and convert all present data entry software to the new system. Rewrite some software to speed data entry. (Cost - $50,000, Time-January 1984)

(2) Same as a.(3).

(3) Same as b.(4).

(4) Same as a.(5).

(5) The Northstar micro computer should be transferred to the SE, along with the statistical, database, and economic software mentioned above. Upgrade the Northstar with a 20 MB hard disk and use to ease the data storage problems of the unit. Provide a Xerox copier machine to the economic Unit. Provide limited training and spare parts. The SSD unit will assume responsibility for maintenance assistance for several years. (Cost - $20,000, Time-1984).

d. The One-Computer Option consists of the following steps:

(1) Replace the Northstar by a large microcomputer or a minicomputer with full capability to handle digital processing of remote sensing data, but with room for additional ports (terminals) to handle data entry and economic and statistical analysis. Since the technology is changing so rapidly, this computer should be procured at least 12-18 months from now, although the procurement actions can start much sooner. The computer should be able to accommodate 12-18 terminals with approximately 8 terminals to begin with and perhaps several

more as backups. The computer should meet all the specifications for remote sensing above in A-5. (Cost - $120,000, Time-January 1985).

(2) In the interim, the Northstar Micro should be upgraded, but no backup system need be provided. (a.(1), a.(2), a.(3)). The USDA Northstar should remain on loan however. In 1985 the DPAE Northstar should be used to support digital processing of remote sensing data. The software for the "super micro" or minicomputer should include BASIC, FORTRAN, and PASCAL. All data entry programs should be converted to the new computer. In addition, the statistical, economic, and data base software should be procured, and at least 2 terminals each reserved for statistical and economic analysis. (Notice that this presumes that the SSD and SE will remain in the same building). SSD will be primarily responsible for building and maintaining the data bank, but both services will use the same bank. (Cost - $40,000, Time-1985)

(3) At least 1 member, and preferably two, of the DPAE staff needs to be extensively trained in the operating system, system software and utilities, and maintenance of this system. A complete set of spare parts, tools, documentation manuals, etc. need to be provided, and regular on-site preventive maintenance (Jan.-Feb., of each year) needs to be scheduled. (Cost - $30,000, Time-1985).

(4) The data entry staff, in addition to the training above, should be given training to use the microcomputer for more technical applications than just data entry; e.g. tape copies and file backups, utility processing, and operating the system. (Cost - $30,000, Time-1985-86).

(5) A word processing capability should be introduced into both SSD and SE with one terminal for each being dedicated to its use by 1986. As mentioned above, ergonomic factors should be considered in keyboard selection, and clerical staff should be carefully trained in its use, as well as the other staff. (Cost - $20,000, Time-1986).

e. Combination of Options. Other factors may require that several features of the above options be combined, and in fact, this is the recommendation of the design team. (see below).

3. Recommended Option. While option (a) will permit the gradual expansion of the DPAE capacity to handle data collection and processing, it will not meet their long run needs, nor will it permit integration of data collection and analysis. Option (b) is close to that requested by the DPAE. It will meet the data entry needs of the ASF, and supply computer capability for digital processing of remote sensing data, it lacks the capacity for

expansion and integration. Nor will this option meet the DPAE's long run needs for economic analysis or aid in the development of a data bank. Further, the training requirements for up to 3 separate systems may be excessive for the capacity obtained. Option (c) will meet both the short and long terms needs of the SSD, and start SE towards computerization. It does have a heavy training need, and in the long run the maintenance of these separate systems will prove a hinderance to further progress. Option (d) meets the long run needs of the DPAE, but with some short run dislocations. It provides for full integration of the services within DPAE, and is flexible enough for future expansion into database management and word processing. Its difficulties lie in the sudden jump to this technology, while not giving full support to the DPAE's need for additional data entry capacity in the short run. The design team, after considerable analysis of the above options, recommends a combination of options (c) and (d) as their solution. In this solution, the steps outlined in option (c) are begun, but the data entry microcomputer is only regarded as a temporary solution, and is either only leased by AID or purchased and loaned to DPAE, with perhaps another use developed for it elsewhere at a later time. When the microcomputer for remote sensing is purchased, it should be chosen to meet the requirements of Option (d). The disadvantages of this solution are its increased complexity (3 computers are involved) and the increased cost for training. A further difficulty may ensue if the DPAE is reluctant to "give up" the first computer, and/or delays conversion of programs developed on one system to another system. These disadvantages are greatly outweighed by the advantages of flexibility-the timetable for procurement can change without greatly affecting the project cost or the current level of assistance to DPAE, and the fact that the training on different machines should be advantageous to the DPAE staff. This time period can also be used to integrate the DPAE computer capability with the rest of MARA. Thus these additional training programs could be shared with other staff within MARA. This option also gives time for the SE to "catch up" with the SSD staff in data processing capability. The procurement of the two computer systems should involve one or more visits by selected data processing staff of the DPAE to the U.S., where they, together with their U.S. counterparts, can examine and benchmark several computer systems. The final technical specifications for procurement of each system should be written by TDY computer specialists together with the appropriate DPAE staff.

a. <u>Suggested Timetable for Option (c)-(d) - The Stepped Integration Option</u>

1984
- i) Procure a replacement microcomputer for the Northstar.
- ii) Begin upgrading data entry staff with necessary training.
- iii) Procure extra parts and begin maintenance training.
- iv) Buy statistical software for the replacement microcomputer, and statistical and economic analysis software for the Northstars.
- v) Redesign the data entry system and convert old software.

1985
i) Finish maintenance and data entry training.
ii) Continue training in use of new data entry and statistical software.
iii) Begin using new data entry system.
iv) Begin procurement of remote sensing system.
v) Turn one Northstar over to the SE staff.

1986
i) Complete procurement of remote sensing system.
ii) Fine tune analytical and data entry software and operations within SSD.
iii) Begin maintenance and system training on the remote sensing system.
iv) Turn the other Northstar over to the remote sensing system for digitizing and plotting.
v) Complete training of SE staff on the Northstar.
vi) Begin development of data bank.
vii) Perform pilot test of digital processing of remote sensing data.

1987
i) Begin first year of operational processing of remote sensing data.
ii) Continue and expand economic analysis on Northstar.
iii) Complete maintenance and systems training on remote sensing system.
iv) Begin training of data entry staff on utilities and simple job operation on data entry computer.

1988
i) Finish procurement of all remaining microcomputer equipment for full operation.
ii) Begin conversion of statistical software to main microcomputer.
iii) Begin procurement and discussions of word processing. (may begin 1-2 years earlier).
iv) Begin maintenance and systems training on main systems.
v) Begin conversion of data entry operations to main system.

1989
i) Begin installing and/or converting data bank and economic software to main system.
ii) Finish maintenance and systems training.
iii) Begin dual operation of both systems.
iv) Begin training of computer technicians (principally the data entry staff).
v) Finish procurement of word processing software.
vi) Finish conversion of all data entry, data bank operations.

1990
i) Release the SE Northstar back to USDA.
ii) Release the data entry microcomputer to AID or elsewhere.

iii) Begin integration of all operations within DPAE.
iv) Finish word processing training.

1991 i) Complete integration of all operations within DPAE.

This timetable is illustrated in the attached system flow chart.

b. Cost Estimates (GOM means that the DPAE will have to bear some additional costs)

1984	i)	$40,000			
	ii)	$20,000	GOM		
	iii)	$20,000			
	iv)	$20,000			
	v)	$20,000		total:	$120,000
1985	i)	$10,000			
	ii)	$10,000			
	iii)	GOM			
	iv)	$100,000			
	v)	GOM		total:	$120,000
1986	i)	---			
	ii)	$10,000	GOM		
	iii)	$30,000			
	iv)	$10,000			
	v)	$10,000	GOM		
	vi)	$10,000			
	vii)	$20,000	GOM	total:	$ 90,000
1987	i)	$20,000	GOM		
	ii)	$10,000	GOM		
	iii)	$20,000	GOM		
	iv)	$30,000		total:	$ 80,000
1988	i)	$40,000			
	ii)	$10,000	GOM		
	iii)	$10,000	GOM		
	iv)	$20,000	GOM		
	v)	$10,000	GOM	total:	$ 90,000
1989	i)	$20,000	GOM		
	ii	$20,000	GOM		
	iii	$20,000	GOM		
	iv)	$20,000	GOM		
	v)	$10,000			
	vi)	$10,000		total:	$100,000

1990	i) -	ii) ---			
	iii)	$30,000	GOM		
	iv)	$20,000	GOM	total:	$ 50,000
1991	i)	$20,000	GOM	total:	$ 20,000

To these totals should be added a continuing maintenance and spare parts inventory cost of about $15,000 per year. The total computer expenditures, not counting overhead costs and other costs detailed elsewhere in this report, is then approximately $800,000 over an eight year period.

4. Requirements for the Government of Morocco (DPAE). The requirements for the DPAE will be considerable and will include freeing up of almost all the staff for extensive training at one time or another, and the upgrading of their data entry staff. It will also need careful coordination between the economics and statistical services, and this will require careful management oversight. It also requires that the size of the DPAE staff be increased at least 4 data entry/computer technician positions, 2 programmer/analyst positions and 1-2 new positions of systems manager; this additional staff are only for data processing, and do not include increases mentioned elsewhere for the statistical and economics services.

   The DPAE will also be responsible for the creation, maintenance, and expansion of the required physical plant needed to house the new computer systems. While such requirements are system-specific, and as such cannot be precisely specified at this time, they will include requirements for additional space, reliable electrical power, backup power, air conditioning, lighting, cabling, and such furniture requirements as files, work stations, and shelving.

5. Benchmarks for Evaluation. Careful evaluations of the progress of this project should occur at specific "benchmarks." More importantly, however, is the development within the DPAE (and any resident TDY consultants) of a peer review capability, so that computer programs, purchased software, documentation, and system problems are routinely and regularly discussed within the staff. Nothing is more detrimental to a computer operation than the loss of key personnel, and nothing is more inevitable. Thus this sharing capacity should be built into every training session, so that the DPAE can develop the capacity to train others within MARA and the GOM.

   The process outlined above is subject to changes, and delays and temporary failures are inevitable in any large data processing project. Therefore evaluations should focus on the process rather than the product. Are the DPAE staff members developing good data processing habits and skills, is there commitment to overcome obstacles, are the staff relying too heavily on TDY assistance, etc. Having made these observations, we recommend the following benchmarks be used:

a. An evaluation should be done of the data entry operations in 1985-86, at which time these operations should have been underway for 1 year. The evaluation should focus on the quality of the data processing staff, on the speed and capacity of the data entry microcomputer, on the quality of the data entry software, and on the quality of maintenance.

b. An evaluation should be done on the development of statistical and economic capability within the DPAE in 1987-88.

c. An evaluation should be done on the remote sensing system in 1986-87.

d. An evaluation should be done on the transition to the proposed larger computer system in 1989-90.

e. An evaluation should be done on the integration of all systems within DPAE in 1990-91.

ANNEX VI

DPAE PROJECT

Macroeconomic Assessment of AID Assistance to DPAE/Division des Etudes Economiques et des Statistiques (DPAE/DEES)

Goals of DPAE/DEES

Among various goals of this Division, one is closely related to a more effective policy analysis of grain imports that could enable the Moroccan government to save valuable foreign exchange. Through the development of more accurate crop forecasting and demand estimation procedures the Division will be able to provide coherent, well reasoned and timely advice on the import requirements for grain (and other imported commodities) for the following year.

This analytic capability, combined with a GOM willingness to purposefully cut back on grain imports in years of large domestic production, in spite of a possible much higher domestic producer price as is the case now, would enable the GOM to match annual grain imports to desired levels, perhaps expressed in terms of target per capita consumption levels. The potential benefits of reduced grain import prices that other analysts have suggested might be available if the GOM improved its ability to make forward purchases of grain in the futures market may have been overemphasized, however, "Playing the futures game" may be too risky and require too much sophistication to gain such benefits.

There are, of course, numerous other goals of AID assistance to the Division. This one is highlighted because it is so closely linked to the Rainfed Agricultural Development support that characterizes Project 0170 (as well as all of the Mission's other agricultural efforts). But one need only review the responsibilities for the Service des Etudes Economiques, outlined in Chapter I, where a variety of areas other than those related to rainfed cereals production can benefit from project activities. Improved policy analysis in these areas could also contribute to improved management of public economic policy, with similar types of benefits to those identified if the above goal is achieved.

Policy Difficulties in Reducing GOM Grain Imports

Since GOM producer price support policy maintains producer prices of grains above world prices, it is cheaper for the GOM to purchase imported grain than domesticaly produced grain. Although this policy aggravates the external resource gap by soaking up scarce foreign exchange, it reduces the GOM budgetary gap because it reduces the aggregate purchase price to ONICL (and therefore to the GOM) of all official grain purchases. In a very real sense, importing cheap foreign wheat to substitute for expensive domestic grains is quite rational from an economic standpoint Over the medium term, however, it would be even more economically rational to allow domestice grain prices to reach equilibrium with world price levels, once parallel efforts to increase productivity of domestic grain production began to show success.

If productivity of domestic grain producers could keep up with population growth at world producer prices, the GOM budgetary advantage of foreign over domestic grain purchase would be largely eliminated. The higher marketing and transport costs associated with domestic compared to foreign grain purchases, however, would still remain a major cost consideration for ONICL.

But not only are domestic producer prices for grain kept above world market prices; most major agricultural inputs are also subsidized and sold at lower than world market prices. Subsidized agricultural inputs have a direct impact on the domestic budgetary gap, to the extent of the subsidy "wedge" between the price paid by farmers and the real purchase price paid by the GOM. Since most of these modern agricultural inputs aggravates the external gap by inducing greater use of the inputs (and consequent expenditure of scarce foreign exchange) than is economically justified. Furthermore, the subsidized inputs only reach the larger commercial farmers, with over 20 hectares, who would be likely to use them anyway since these farmers are more responsive to profitable opportunities, assuming that use of these subsidized input does have a significant economic return. (See page 32 of Annex 1 to FY 84 CDSS). This is analogous to the case of the higher-than-world-market official prices for wheat, which also accrue primarily to the benefit of the larger commercial farms who sell their grain production to ONICL. (ONICL purchases about 10% of domestic grain production, the remainder being consumed on-farm or sold by small farmers in the local souks or to the artisanal flour mills).

If Morocco is to slow its increasing dependence on imported grain, the GOM will have to supplement programs to increase domestic grain productivity and to increase the amounts of domestically produced grain brought to market (such as AID's Rainfed Agriculture Program) with an expansion of ONICL's ability and willingness to reach into the country-side and purchase greater amounts of domestically produced grain, particularly barley (see Tables 18-20). To the extent that the grain productivity-enhancing programs have a significant impact on smaller farms (those with less than 20 hectares and even those with less than 10 hectares) then ONICL will need to either establish a more extensive grain marketing system, or increase the capacity of the artisanal millers.

As mentioned earlier, one impediment to a greater role for ONICL in the marketing of domestic grain is the relatively high level of domestic grain support prices. Another involves the commercial flour milling industry itself, which tends to be located near the major ports and which has grown accustomed to the highly standardized clean, easily milled, imported bread wheat.* Per capita consumption of bread wheat is increasing by over 5% a year and total consumption of bread wheat is increasing by almost 8% a year. Furthermore, per capita bread wheat consumption in rural areas is still less than half what it is in urban areas, but increasing rapidly, perhaps even faster than in the urban areas.

On the production side, however, Morocco's capacity to increase bread wheat production is limited. In the rainfed areas with average annual rainfall below 450mm, typical of the 170 extension project area, it is severly limited, whereas, in the higher rainfall areas to the north, such as the Meknes-Fez area with 450 mm - 600 mm

*Bread wheat is usually considered a "soft" wheat as opposed to durum wheat, which is usually hard, but the distinction is not always so clear. The distinction between "bread" wheats and "durum" wheats is in the uses and baking properties rather than their hardness.

of average rainfall, bread wheat attains acceptable yields. Bread wheat, apparently, is very susceptible to drought, moreso than barley or durum wheat, particularly with modern planting practices and higher yielding barley (and durum) seed varieties being developed.

With limited domestic production potential for bread wheat, it may be advisable for the GOM to reassess its expanding appetite for bread wheat. This might be accomplished through a halt or a reversal of recent trends, in both rural and urban areas, with a shift toward greater use of durum and barley grains, instead of tacitly promoting the steady increase in consumption of bread wheat. A potentially successful policy package could include an increase in the relative prices to the consumer of bread wheat, this in addition to any general policy of reducing the overall grain subsidy drain on the GOM budget. Furthermore, the GOM might begin an advertising campaign promoting the use of barley, or at least reduce its promotional efforts with respect to bread wheat.

Finally, a few words are necessary to remind the reader that the overall grain price subsidy to consumers also acts as a policy impediment to reduced imports. The problem here is not the fiscal drain on the GOM budget (estimated at DH 620 M in 1982 - $97.3M) which accounted for slightly over 3% of GOM revenues but almost 10% of the GOM budgetary deficit. What is relevant about overall grain price subsidies in this context is the degree to which lower consumer grain prices induce increased demand for grain, that is, the price elasticity of demand for grain.

Identification of Benefits

General Approach

1. Using historical data, estimate a desired level of per capita human consumption of grain, in the aggregate and by type of grain, for urban and rural areas, perhaps using the trend of annual per capita values (Tables 1 & 2). This desired level of grain consumption actually varies with consumer grain/flour prices--grain/flour prices relative to all food prices and relative prices among the three competing grains--and perhaps also with per capita income. Ideally, the effect of relative prices should figure in the formulation of desired consumption.

2. Multiply the "desired" level of per capita human consumption times the population to estimate the desired level of total annual human consumption, for any given year. (See Table 2)

3. Estimate domestic production of grain, by crop, destined for human consumption. To do so, subtract annual feed and seeds plus losses from total domestic production. (Domestic production of grains, particularly for human consumption, will depend on the level of producer prices, whereas the mix of grains produced will depen on the relative producer prices of the major grains.)

4. Estimate the"desired" level of imports by subtracting domestic production from the estimated desired level of human consumption. "Desired" imports are then compared with actual imports, over the historical period 1960-1982, to determine the variability of actual grain import levels around the "desired" levels. When actual grain imports are above "desired" levels it can be argued that the GOM wastes foreign exchange reserves, while in the opposite case it can be argued that the populace does not attain the desired nutritional level or must dip into any available stocks.

5. Conceptually, the benefits resulting from an import policy more closely tied to domestic production levels would be expressed as a reduction in the variability of actual compared to "desired" imports. In technical statistical terms, this means a reduction in the standard error of estimate of "desired" grain imports when used to "predict" actual import levels.

6. Assigning a value to the reduced variability of actual compared to "desired" imports requires one methodology for treating the cases where actual imports exceed "desired" imports and another for treating those cases where actual imports are less than "desired". As a first approximation, it is assumed that when actual exceeds desired imports the excess has no value to consumers in terms of that year's domestic consumption, even though it may in fact, be consumed. (Excess imports are not stored from one year to the next) The excess imports do, however, result in a cost to society valued at the $ value of foreign exchange costs necessary to purchase the excess grain imports. Conversely, it is assumed that when actual imports are less than desired imports, any increase in imports would, up to the desired level, have present consumption value to domestic consumers. The benefit to domestic consumers, if larger amounts of grain imports were available in deficit years, is not valued at the foreign exchange value of the grain. Rather, it is valued at the $ equivalent of the subsidized consumer price of bread wehat, which is below the import price.

7. Assuming that DPAE/DEES is successful in implementing planned procedures to more accurately forecast grain crops and project aggregate grain demand, and assuming that the GOM is willing to act on the basis of DPAE estimates of grain import requirements for the following year, then actual imports should eventually begin to vary much less compared to "desired" import levels. The assumption is made that starting five years after the DPAE project begins (for the grain crop harvested in the summerof 1989), DPAE will have established the analytical capacity to accurately forecast crop yields and demand levels. It is further assumed that the GOM will be willing to set actual orders for the next year's import levels in line with DPAE analysis and recommendation.

8. Correct benefit-cost analysis procedures require that future estimates of desired and actual grain imports and consumer and world market grain prices be used. But as a first approximation of the benefit-cost analysis, historical data has been used.

The historical differences between actual and desired imports showed no linear time trend (an r^2 = .03!) but a very large standard deviation of 547,000 MT annually. Nor is there a trend in the absolute value of the differences, that would indicate a trend in the standard deviation. There is an indication of some serial correlation when a linear regression is calculated between the difference in year "t" and the difference in year "t-1". The r^2 = .3 and the relationship is negative, that is, a negative difference in year "t-1" implies a positve difference in year "t". Howeve: since there is no <u>long-term</u> commercial grain storage capacity in Morocco, this does not imply a carry-over of stock from one year to the next. It may, however, indicate that ONICL realizes, in some sense, that it has made an error in imports in one year and simply overcompensates the next because it has no systematic analysis on which to base its estimates of import requirements.

Therefore, it may be reasonable to assume that, without policy analysis intervention of some sort, the future variability of actual compared to desired grain import levels will not be any less than it has been historically.

Given the validity of this assumption it was decided to use historical data to estimate what the benefits "would have been" if the DPAE project had begun in 1972 instead of as scheduled in 1983, and to estimate the benefits in reduced variability of actual compared to desired imports that would have begun five years later (in 1977) and would have continued up through 1982 (and of course beyond).

Specific Calculations

Table 2 presents a comparison of actual and desired imports of wheat and barley over the period 1960-1982. The question was then asked, what would have been the benefits over the past few years of the proposed project with DPAE if it had begun in 1972, rather than 1983. Beginning in 1972 and assuming that improved crop forecasting and other analytical techniques are effectively implemented during the sixth year of the project (1977), a 10% reduction in the undesirable variability of grain imports* (very conservative estimate of the potential improvement in import policy) can be attained in that year and continues on to the end of the project (1981) and beyond. (Using historical data requires that the benefit stream be cut off at 1982, further underestimating the effective benefit stream, which would have continued on unabated beyond 1982, just as it is assumed that these benefits will continue on beyond 1993 for the DPAE project as actually proposed.)

Table 3 shows the increases in grain imports during deficit years and decreases in grain imports during excess import years, that would have resulted from a 10% reduction in the estimated annual variability in actual compared to "desired" imports. Table 4 then evaluates the benefits from reducing imports when they were too high and the benefits from increased imports in years when they were insufficient.

Next, estimated project costs of the proposed DPAE project over the proposed life of the project (1983 to 1992) have to be translated into corresponding values for the historical period 1972 to 1981. The cost estimates presented in Table 5 assumes constant dollar and dirham costs at 1983 prices, salary levels, etc. The actual project cost in dollars and dirham of the historical period would have been much less than it is now calculated to be in 1983 dollars and dirham. On the other hand, the estimated value of the benefits in Table 4 are expressed in dollars and dirham of the particular historical year.

Rather than converting the cost estimates into different values corresponding to each year over the historical period, the nominal value of benefits from more accurate import levels (10% better than without the project) were converted to constant dollars in 1982 in Table 4. The result is a benefit stream valued in constant dollars 1982 and a cost stream valued in dollars 1983 (table 5).

Since valuing benefits in dollars 1982 and costs in dollars 1983 will underestimate the net benefit stream and thereby also underestimate the IRR (assuming a positive, although as yet unknown, rate of world inflation in 1983) no further adjustment in benefit and cost streams was performed.

---

*A small (10%) change in the variability is used to help insure that all consequent changes in consumption levels could be assumed to occur at the margin and to compensat for inaccuracies in the estimation of desired imports.

Even under conditions of gross underestimation of benefits and overestimation of costs, the IRR is a hefty 30% (hypothesis 1 in Table 6). With even more drastic underestimation of the benefit stream in Hyporthesis 3, and a reordering of net benefits over time from the smallest to the largest in Hypothesis 2, the IRR is still above 16%.

In conclusion, the DPAE project seems to pass the test of economic viability based on only one of the types of benefits that will flow from higher quality DPAE analytical capacity.

TABLE 1

ESTIMATED URBAN CONSUMPTION OF WHEAT IMPORTS

	(1) Per Capita Urban Consumption (Kg/Cap)		(2) Estimated Total Urban Consumption (000 MT)		(3) Imports of Soft Wheat	(4) Estimated Imports For Rural Consumption	
Hypothesis	I	II	I	II		I	II
Year							
1960	62	43	211	147	175	-36	28
1961	66	48	235	171	369	134	198
1962	71	54	259	197	359	100	162
1963	75	59	280	225	118	-162	-107
1964	79	64	315	255	150	-165	-105
1965	84	70	349	291	241	-108	- 50
1966	88	75	382	325	579	197	254
1967	92	80	416	362	855	439	493
1968	97	85	458	402	592	134	190
1969	101	91	499	450	102	-397	-394
1970	106	96	547	496	358	-189	-138
1971	110	101	595	546	682	87	136
1972	114	107	646	606	382	-264	-224
1973	119	112	706	664	905	199	241
1974	123	117	763	726	778	15	52
1975	127	123	824	798	1352	528	554
1976	132	128	895	867	1012	117	145
1877	136	133	963	941	1317	354	376
1978	140	138	1034	1020	1555	521	535
1979	145	144	1117	1110	1497	380	387
1980	149	149	1198	1198	1652	454	454
1981	153	154	1282	1290	2228	946	938
1982	158	160	1379	1397	1800	421	403

TABLE 2

DESIRED GRAIN IMPORTS OF WHEAT AND BARLEY

Year	(1) Desired PC Grain Consumption (Kgs)	(2) Desired Total Grain Consumption (000 MT)	(3) Grain Production (000 MT)	(4) Actual Imports of Wheat/ Barley (000 MT)	(5) Desired Grain Imports (000 MT)	(6) Difference (4-5)
1960	187	2,174	1,991	175	183	-8
1961	189	2,254	936	566	1,318	-752
1962	191	2,336	2,411	443	-75	518
1963	193	2,421	2,299	119	122	-3
1964	195	2,509	2,086	152	423	-271
1965	197	2,599	2,411	241	188	53
1966	199	2,695	1,325	606	1,369	-763
1967	201	2,791	2,112	890	679	211
1968	203	2,891	3,943	592	-1,052	1,644
1969	205	2,995	2,374	105	621	-516
1970	207	3,101	2,620	362	481	-119
1971	209	3,211	3,279	687	-68	755
1972	211	3,326	3,193	384	133	251
1973	213	3,445	1,997	965	1.448	-483
1974	215	3,568	2,894	783	674	109
1975	217	3,695	2,174	1,443	1,521	-78
1976	219	3,826	3,403	1,012	423	589
1977	221	3,961	1,838	1,343	2,123	-780
1978	223	4,101	2,882	1,572	1,219	353
1979	225	4,246	2,567	1,507	1,679	-172
1980	227	4,395	2,760	1,662	1,635	27
1981	229	4,549	1,252	2,470	3,297	-827
1982	231	4,708	1,151	1,800	1,557	243

TABLE 3

IMPROVEMENTS IN IMPORT LEVELS AND

BENEFITS FROM REDUCED IMPORTS

YEAR	ACTUAL IMPORTS	DESIRED IMPORTS	ACTUAL MINUS DESIRED IMPORTS (000 MT)	10% REDUCTION IN DIFFERENCE 1/	WORLD MARKET PRICE WHEAT ($/MT)	FOREIGN EXCHANGE SAVINGS ($000)
1977	1,343	2,123	-780	+78		
1978	1,572	1,219	353	-35	140	4,900
1979	1,507	1,679	-172	+17		
1980	1,662	1,635	27	-3	170	510
1981	2,470	3,297	-827	+83		
1982	1,800	1,557	243	-24	150 2/	3,600

1/ Positive changes show reduction of deficit, i.e., increased imports. Negative changes show reduction of surplus, i.e., decreased imports. Benefits from reduced surpluses are saved foreign exchange based on C.I.F. price of imports. Benefits from reduced deficits ares increased flour consumption valued at consumer prices.

2/ Estimate

TABLE 4

YEAR	REDUCTION IN DIFFERENCE (000 MT)	FLOUR EQUIVALENT OF ADD. IMPORTS (000 MT)*	CONSUMER PRICE FLOUR (DH/MT)	VALUE OF ADDITIONAL IMPORTS (000 DH)	EXCHANGE RATE (DH/$)	CONSUMPTION VALUE OF ADDITIONAL IMPORTS ($000)	BENEFITS FROM 10% REDUCT. IN VARIABILITY OF IMPORTS ($000)	U.S. CONSUMER PRICE INDEX (1982=$1)	BENEFITS IN THOUSANDS OF 1982 (DOLLARS)
1977	+75	60	950	57,000	4.34	13,134	13,134	1.42	18,650
1978	-35						4,900	1.32	6,468
1979	+17	13	1040	13,520	3.75	3,605	3,605	1.22	4,398
1980	-3						510	1.14	581
1981	+83	64	1250	80,000	5.35	14,953	14,953	1.04	15,551
1982	-24						3,600	1.00	3,600

* 1 KG of grain yields .77 Kg flour

TABLE 5

DPAE PROJECT COST ESTIMATES

($000)

Year	AID Costs	Estimated AID Costs Plus Contingencies 1/	GOM Project Related Costs 2/	Estimate GOM Costs Plus Contingencies	Total AID Plus GOM Costs Plus Contingenci
1983 (1972)	55	72	-	-	72
1984 (1973)	2,560	3,328	235	306	3,634
1985 (1974)	1,669	2,170	1,926	2,504	4,674
1986 (1975)	1,222	1,589	586	762	2,351
1987 (1976)	977	1,270	695	904	2,174
1988 (1977)	418	543	751	976	1,519
1989 (1978)	253	329	767	997	1,326
1990 (1979)	208	270	782	1,017	1,287
1991 (1980)	139	181	744	967	1,148
1992 (1981)	75	98	1,079	1,403	1,501
1993+ (1982)	0	0	759	987	987

PV of the cost stream is 15% (last year of cost stream 1993): $14,390
(thousands 1982 dollars)

1/ AID and GOM Costs Plus Contingencies were estimated at 130% of the base costs.

2/ Estimated from DH costs estimates converted to $ at $1 - 6.6 DH

3/ Economic costs

TABLE 6

NET BENEFIT STREAM OF DPAE SUBPROJECT

($000)

Year	Net Benefits Hypothesis 1	Hypothesis 2	Hypothesis 3
(1972)	-72	-72	-72
(1973)	-3,634	-3,634	-3,634
(1974)	-4,674	-4,674	-4,674
(1975)	-2,351	-2,351	-2,351
(1976)	-2,174	-2,174	-2,174
(1977)	17,131	-938	8,565
(1978)	5,142	2,274	5,142
(1979)	3,111	3,111	3,111
(1980)	-567	5,320	-567
(1981)	14,050	14,050	7,025
(1982)	2,613	17,663	2,613

Hypothesis 1: Benefits ($ Current) Costs ($ 1982): IRR = 30.6%

Hypothesis 2: Reordering benefit stream from least to greatest: IRR = 18.6%

Hypothesis 3: Halving the two large net benefits: IRR = 16.5%

NPV of Benefit Stream (Hyp 1) (i = 15%): $6,809,000

ANNEX VII

EVENT #	DATE(S) Start	Finish	EVENT	Responsibility	Latest Acceptable Date	Required Preceding Event	Action Procure-T.A.	
1	5/1/83	6/15/83	Complete Project Papar	W.J.E.	6/30/83	1		
2	6/20/83		Mission Approval	Director AID/Rabat	6/30/83			
3	7/30/83		AID Washington Approval	Review Com.	10/30/83	2		If # 3, 4, 5 move to FY 84 add FY 83 budget items to FY 84.
4	7/30/83	8/30/83	Congressional Notification	AID/W		3		
5	8/30/83		Pro.Ag. Signed	AID/Rabat	11/30/83	4		
6	7/30/83	8/30/83	Contract, PASA type, with OICD, USDA for T.A. 0,1,2 - and software and hardware for Northstar.	AID/W contracts OICD	1/30/84	3 5		
7	8/83	9/83	Contract(s) for Data Processing, Remote Sensing, Yield Modeling, ASF, Economic Analysis, and Monitoring and Evaluation technical assistance and procurement. Negotiations.		3/84	3		
8	9/83	10/83	Review existing systems analysis. Complete systems design for the LOP including necessary changes in the existing analysis.	TA_1	3/84	6		
9	9/83		Prepare complete technical specifications for the procurement of new ADP systems required for LOP. This includes the intermediate 8 terminal computer system and the final 16 + terminal system.	TA_2	3/84	6		
10	9/93		Det. Specs for Objective Yield Lab	TA_0	3/84	6		
11	9/83		Prepare software specifications for new computer (intermediate) and statistical and economic analysis software for the Northstars.	TA_2	3/84	6		
12	9/83	10/83	Assess training requirements and make recommendations	TA_2	6/30/84	6		
13	9/83		Upgrade the Northstar micro-computer with new software and hard disk (supplied through USDA, 50-100 MB of storage and software being developed for handling ASF).	TA_0, TA_1 USDA	12/30/83	6		TA_0 could be done in U.S.
14	9/83		Install statistical analysis software in the Northstar	TA_1 USDA	12/30/83	6		
15	9/83		AID DPAE staff in making improvements in existing software to speed data entry.	TA_1	12/30/83	6		
16	9/83		Train data entry and programming staff of SSD in the new system (N.S.)	TA_1	1/30/84	6		
17	9/83	10/83	Determine precise specifications for aerial photo lab equipment	TA_0	8/84	6		
18	10/83	12/83	Long Term TA contract agreed upon and signed.	AID/M AID/W	6/30/84	7		
19	10/83	6/84	Procure equipment for O.Y. lab	USDA		10		
20	10/83	6/84	Procure intermediate (8 terminal) computer	USDA	6/30/84	9		

BEST AVAILABLE COPY

EVENT #	DATE(S) START	FINISH	EVENT	Responsi-bility	Latest Acceptable Date	Preceding Event	Action Procure T.A.	
21	10/83	6/84	Procure Office equip. - photocopier, typewriters, etc.	USDA		5		
22.	10/83		Contract for aerial photography	AID/M-DPAE	5/30/84	5		AID L.C.
23	10/83	9/84	Fly to take photo.	Contractor	10/30/84	23		
24	11/83		Plan Obj, Yield Survey for 1984	TA_y		18		
25	11/83	6/84	Order equipment for aerial photo lab	USDA	10/30/84	17		
26	11/83		Det. candidates for training, L.T. 7 people	MARA	12/30/83	5		
27	1/84	8/84	Start English lang. class for 7 people	American Language Institute	3/1/84	27		AID L.C.
28	1/84		Workshops for monitoring and evaluation	TA_{sp}		18		
29	3/84		Assist with training for Obj. Yield Survey for further planning	TA_y		25		TA_y = For OBJ yield survey
30	6/84	8/84	Determine space - prepare for computer including electric, air conditioning, etc.	DPAE	9/1/84	21		
31	7/84	8/84	Ship Equipment for O.Y. lab	USDA		20		
32	7/84	8/84	Ship computer and equipment to Morocco	USDA	12/84	21		
33	7/84	8/84	Ship office equipment	AID/W	12.84	22		
34	7/84	6/87	Arrival of 2 L.T. TA	Contractors	11/84	18		
35	7/84	8/84	Ship aerial photo lab equipment	USDA	11/30/84	26		
36	7/84	9/84	3 Month S.T. TA for S.E.	Contractor DPAE	6/85	18		
37	8/84		Train operators of photo lab equipment	TA_p		18-35		
38	9/84	11/84	Installation of new data entry system including terminals printer, software, one Northstar to S.E.	$TA_{3 \& 4}$	1/85	32		
39	9/84	10/84	Train 1-2 SSD staff in maintenance operation of new machine	$TA_{3 \& 4}$	1/85	18-38		
40	9/84	10/84	Assist in software conversion	$TA_{3 \& 4}$	1/85	18-38		

				Responsibility	Latest Acceptable Date	Preceding Event	Action Procure T.A.	
40_b	9/84		T.A. of 3 people (3PM) for training in use of computers financial analysis, project impacts, M & E.	USDA		5		
41	9/84	10/84	Review existing data entry, staffing and procedures.	TA 3&4	2/85	18 - 38		
42	9/84	10/84	Write specifications for all remote sensing equipment software.	TA 3&4	11/85	18 -9		
43	9/84		2 people depart for Yield Modeling training.	ST/IT		28		
44	9/84		5 people depart for long term training.	ST/IT DPAE	Determined by Semesters	28		
45	9/84		Install aerial photo lab equipment.	DPAE T.A.(C)		35		
46	10/84		Aerial photography contract signed	AID/M DPAE	5/30/85	5		GOM L.C.
47	10/84	9/85	Fly and take aerial photos.	Contractor	11/30/85	46		
48	10/84	6/85	Procurement of 16 terminal computer.	USDA	12/30/85	9		
49	10/84	6/85	Procurement of all remote sensing equipment; terminals, printer, software, digitizer, plotter, spares, tools.	USDA	12/30/85	42		
50	11/84	12/84	Select 7 people for L.T. training.	MARA AID/M	1/30/85	5		
51	11/84		Review results of 1984 O.Y. survey.	TA_y		29		
52	1/85	8/85	7 people in English language training.	Amer. Lang. Institute	3/1/85	50		
53	1/85		Review data entry process on Northstar.	TA 5		13-14		
54	1/85		Review use of S.E. Northstar - assist.	TA 5		38		
55	1/85		Complete conversion of data entry software to new machine.	TA 5	1/85	38		
56	1/85		Aid in training of data entry operators on new machine.	TA 5	1/85	38		
57	1/85		Review data entry process on new machine.	TA 5	1/85	38		
58	1/85		Aid in SSD's use of statistical software and review.	TA 5	1/85	38		
59	1/85		Send two people to USDA for 1 month for observation and training, from S.E.	OICD - USDA	1/86			
59_b	1/85		Workshops for monitoring and evaluation.	TA_{sp}	6/85	40_b		

60	1/85		Review use of new computer and suggest improvements.	TA 5		38		
61	1/85		Review maintenance procedures.	TA 5		39		
62	3/85		Assist with training for Objectives Yield Survey.	TA_y		51		
63	6/85		3 month S.T. T.A. S.E.	USDA		19		
64	6/85		Remote sensing workshop for DPAE staff and ASF maintenance	TA_r		18 - 49		
65	7/85	8/85	Ship new 16 + terminal computer to Morocco.	AID/W	1/86	48		
66	7/85	8/85	Ship remote sensing equipment to Morocco.	AID/W	1/86	49		
67	7/85		Third L.T. T.A. arrives	USDA	12/85	18		
68	9/85		7 people leave for L.T. training.	DPAE ST/IT Trng. AID/M	Determined by Semester	52		
69	9/85		Assist in installation of new remote sensing computer system - 16 computer system.	TA 6&7	3/86	65		
70	9/85		Install economic software on the Northstar (2) and train economists in use.	TA 6&7 L.T. T.A.		38		
71	9/85		Train 2 people SSD staff in machine oper. systems software of new computer.	TA 6&7	4/86	69		
72	9/85		Northstar (1) turned over to remote sensing.	DPAE	4/86	69		
73	9/85		Train SSD staff in statistics packages on new machines.	TA 6&7	4/86	55 - 69		
74	9/85		Review specs. for word processing hardware/software - data bank software.	TA 6&7	1/86	9 - 55		
75	9/85		Train SSD staff and resident TA in remote sensing.	TA 6&7	4/86	55 - 69		
76	9/85		Review use of data entry system.	TA 6&7	4/86	55 - 69		
77	9/85		English lang. training starts for 20 people (non-academic for use of texts etc.)	Amer. Lang. Institute	1/87	5		
78	10/85	5/86	Procure all word processing hardware and software and data bank software.	USDA	5/30/86	74		
79	10/85	11/85	Select 6 people for L.T. training.	MARA AID/M	12/87	5		
79_b	10/85		Contract for 3 people (3PM) for M & E workshop.	USDA	1/86	5		

80	10/85		2 people return from training (Yield model)	ST/IT	10/86	43		
81	11/85		Review results of Obj. Yield Survey and plan 1986.	TA_y		62		
82	1/86	8/86	6 people in English lang. training.	A.L. Inst.	3/1/88	79		
XC 1	1/86		External Evaluation	Eval. Cont.	6/30/86			
83	2/86		Provide training in use of remote sensing hardware/software and plan 1986 work.	TA_r		69		
84	5/86	9/86	3 months S.T. T.A. S.E.	USDA		19		
85	5/86	6/86	Ship word processing and data bank equipment to Morocco.	AID/W	6/30/86	78		
86	5/86	6/86	Workshop for M & E 1 month management.	AID/M	9/86	79_h		
87	6/86		Review existing ADP operations on all three systems, suggest/aid in improvements.	TA 8&9	12/88	68 - 69-70		
88	6/86		Begin planning for increased analytical use of main remote sensing, including data bank software installation and word processing.	TA 8&9	12/88	55 - 78		
89	6/86		Install data bank software and train SSD staff.	TA 8&9	12/89	78		
90	6/86		Install word processing equipment.	L.T. T.A.	12/89	78		
91	6/86		Review economic analysis on Northstar, do additional training and make other improvements as neccessary.	TA 8&9	12/89	70		
92	6/86		Review statistical software use.	TA 8&9	12/89	58		
93	6/86		Review remote sensing operation.	TA 8&9	12/89	64 - 69		
94	8/86		Review maintenance and general systems operations on remote sensing and data entry systems.	TA 8&9	12/89	69		
95	9/86		Review 1986 Obj. Yield surveys & work on developing forecast models from 1984-85-86 data. Review agromet modeling with resident statistician and Moroccan trainees.	TA		81		
96	7/86		1 person (MSc) returns from L.T. training.	DPAE	8/87	44		
97	9/86		2 people depart for training yield model.	ST/IT		82		
98	9/86		4 people depart for L.T. training.	DPAE AID/M Training ST/IT	9/88	82		

99	10/86	11/86	Select 2 candidates for L.T. training.	DPAE USAID/M	12/87	5		
XC 2	1/87		External Evaluation	Eval. Cont.	6/87			
100	1/87		Begin first year of operational processing of remote sensing data.	L.T. T.A. DPAE	1/88	88 - 93		
101	1/87	6/87	2 people begin language training.		3/1/88	99		
102	1/87		Expand Economic analysis on Northstar.	S.E. L.T. T.A.	12/87	70		
103	3/87		Review completed ASF and plan for integration of remote sensing info. maintenance activities, plan 1987 remote sensing program.	TA				
104	6/87	9/87	Three month S.T. T.A. S.E.	USDA		19		
105	7/87		Review ADP operations.	TA 10&11	12/87	88 - 94		
106	7/87		Complete training on data base, maintenance, systems software, other software or hardware operations as needed.	TA 10&11	9/88	88		
107	7/87		Review/refine needs for word processing.	TA 10&11	9/88	90		
108	7/87		Assist in the training of data entry staff on simple job operations such as utilities, job entry, etc.	TA 10&11	9/88	106		
109	7/87		Finish installation of any further hardware or software required for remote sensing.	TA 10&11	9/89	83		
110	7/87		Review all equipment and software, specifications and procurement plans, advise as necessary.	TA 10&11	9/89	103-107-109		
111	7/87		2 people return from L.T. training, Ph.D.	DPAE		44		
112	7/87		Two L.T. T.A. depart.	Contractor		18 - 19		
113	8/87	4/88	Procure any/all remaining equipment, software, spares, etc. necessary for all systems.	AID/M AID/W procure	6/90	110		
114	9/87		Two people leave for L.T. training.	DPAE ST/IT	9/88	101		
115	10/87		Two people return from training, (Y.M.)	AID/M		97		
XC3	11/87		External Evaluation	Eval. Cont.	4/88			
116	2/88		Review Obj. Yield program and develop plans for extension to other crops than major small grains.	TA		95		
117	5/88	6/88	Ship any remaining equipment.	AID/W	6/90	113		
118	6/88	9/88	3 months S.T. T.A. S.E.	USDA		19		

EVENT #	DATE(S)		EVENT	Responsibility	Latest Date	Required Preceding Event	Action Procure T.A.
119	6/88		Review all ADP operations both hardware & software, including: data entry; statistical analysis; data bank operations; economic analysis, word precessing.	TA_{12}	9/90	90 - 91 108-109	
120			Assist in conversion of statistical & data entry operation to main computer.	TA_{12}	9/90	90 - 91 113	
121			Review maintenance procedures on main machine & do supp. training.	TA_{12}	9/90	90 - 91 94	
122	7/88		4 people (Ph.D) return, 2 (MSc) return.	DPAE	12/91	44 - 68	
123	7/88		Third L.T. T.A. departs.	Contractor		18	
124	10/88		Review and assist with advanced crop modeling work. Review Obj. Yield program for old & new crops & plan for 1989 surveys.	TA		116	
125	7/89		5 Ph.D's return, 1 MSc return.	DPAE	12/91	68 - 98	
126	7/89	9/89	3 month S.T. T.A. S.E.	Contractor		19	
127	4/89		Assist with training and review fieldwork for Obj. Yield program.	TA		116	
128	8/89		Review operations on main computer & suggest improvements.	TA_{13}	12/91	100	
129			Convert economic software to main computer (or install new software).	TA_{13}	12/91	119	
130			Review dual operations on both data entry & main machines.	TA_{13}	12/91	109 - 120	
131			Plan for removal of Northstar & data entry machine.	TA_{13}	12/91	119	
132			Begin converting data bank to main system as necessary.	TA_{13}	12/91	119	
133	5/90		Compete any conversion of data bank, economic analysis to main system.	$TA_{14,15,16}$	12/92	129 - 132	
134			Release Northstar back to USDA.	DPAE AID/M	12/92	133	
135			Assure complete integration of all components of DPAE with main system.	$TA_{14,15,16}$	12/92	119 - 120	
136			Connect main system with other MARA systems.	TA_{14} DPAE MARA	12/92	135	
137			Release intermediate computer for other use.	DPAE MARA	12/92	135	
138	6/90	9/90	3 month S.T. T.A. S.E.	Contractor		19	
XC4	6/90		External Evaluation	Eval. Cont.	12/90		

EVENT #	DATE(S)		EVENT	Responsibility	Latest Date	Required Preceding Event	Action Procure T.A.
139	7/90		2 Ph.D's return from L.T.	ST/IT	12/92	98	
140	7/91	9/91	3 month S.T. T.A. S.E.	Contractor		19	
141	7/91		1 Ph.D returns	ST/IT	12/92	114	
XC5	1992		Final External Evaluation	Eval. Cont.	12/92		

KEY:

TA_{sp} = Service des Projets

TA_y = Yield Modeling Technical Assistance

TA_r = Remote Sensing Technical Assistance

TA_p = Aerial Photography Technical Assistance

TA_o = Stateside Technical Assistance

TA_{1-16} = designated Technical Assistance

ANNEX VIII

FAA Section 611 (e)

Certification on Capacity to Maintain and Utilize the Project

The Planning, Economics and Statistics for Agriculture Project will provide support to the GOM at an estimated cost to AID of $11,945,000 over a ten year period. The Project will provide technical assistance, commodities and training in support of a program which is designed to increase the DPAE's ability to collect and analyze agricultural statistics.

The Project will finance the procurement of an estimated $5,158,000 worth of commodities, including computers, (hardware and software), satellite imagery, aerial photography and peripheral equipment.

Use of computers and computerized equipment is widespread in Morocco. Agencies such as the Ministry of Finance, the Prime Minister's Office and most of the other Ministries and parastatals use computers. The DPAE has been using micro-computers since 1980 and the Mohamed V University has recently established a school for computer science which will train computer users, computer programmers and computer maintenance specialists. The understanding and use of the computer equipment that is proposed in this project is well advanced in Morocco. The maintenance training proposed in the project and recent developments within Morocco should assure proper maintenance of the equipment.

Aerial photos and aerial photography lab equipment have been and are being used in Morocco by several Government and private agencies. The aerial photos financed by this project will not only be available to the DPAE, but will also be available for use by other GOM agencies.

Satellite imagery and computer compatible tapes will be purchased for remote sensing purposes. These will be used in conjunction with the Area Sampling Frames and to make crop acreage projections as well as to facilitate crop forecasting. Project financed technicians will assist the DPAE to train their personnel in the utilization of this technology. In addition, DPAE staff will also be trained in the U.S. in the use of satellite imagery.

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

Robert Chase
USAID Country Director

ANNEX IX

IMPORTS, EXPORTS, GDP: 1973-1982

(MDH)

MAJOR FOOD IMPORTS	1982	1981	1980	1979	1978	1977	1976	1975	1974	1973
Bread Wheat	1,622 1/	2,044	1,255	973	856	587	726	960	708	483
Sugar	-	1,054	627	269	305	510	610	971	632	245
Dairy Products	-	349	252	200	156	148	141	124	119	73
Tea	-	278	153	190	156	103	88	104	105	70
TOTAL FOOD	3,496	4,613	2,833	2,143	2,005	1,944	1,976	2,593	1,834	1,978
Bread Wheat %	46%	44%	44%	45%	43%	30%	37%	37%	39%	24%
FARM EQUIPMENT	356	134	119	160	111	173	110	78 2/	20 2/	28 2/
FERTILIZER (Natural and Chemical)	-	253	232	198	83	81	93	144	154	52
TOTAL IMPORTS (TMP)	25,989	22,455	16,793	14,328	12,361	14,401	11,555	10,394	8,292	4,684
Food %	13%	21%	17%	15%	16%	14%	17%	25%	22%	42%
Bread Wheat %	6%	9%	7%	7%	7%	4%	6%	9%	9%	10%
TOTAL EXPORTS (EXP)	12,349	12,002	9,645	7,622	6,261	5,860	5,579	6,238	7,440	3,746
(of which food)	(3,019)	(3,040)	(2,599)	(2,283)	(2,022	(1,705)	(1,800)	(1,456)	(1,647)	(1,847)
Total %	24%	25%	27%	30%	32%	29%	32%	23%	22%	49%
GDP	90,900	76,500	70,161	62,043	55,154	46,820	41,310	36,418	33,602	24,915
IMP/GDP	29%	29%	24%	23%	22%	13%	28%	29%	25%	19%
EXP/GDP	14%	16%	14%	12%	11%	13%	14%	17%	22%	15%
Food Exp/Food Imp	86%	66%	92%	107%	101%	88%	91%	56%	90%	93%

1/ Estimate

BEST AVAILABLE COPY

SPECIAL ANNEXES FOR BUDGETING, PROCUREMENT, CONTRACTS AND WAIVERS

TABLE OF CONTENTS

Annex X-1 Special Contingency Funds Requirements

Annex X-2 Computer for Monitoring and Evaluation - Division of DPAE

Annex X-3 Cost Estimate for Intermediate Computer

Annex X-4 Other Commodity Requirements

Annex X-5 Long Term Training Costs

Annex X-6 Discussion for Local Cost Procurement

Annex X-7 Proposed Long Term Consultant to be Provided to DPAE SSD and Economic Studies Service

Annex X-8 TDY Consultants

Annex X-9 Additional Staff Requirements

Annex X-10 Procurement Plan for Technical Assistance

Special Contingency Funds Requirements

1.	Emergency repairs for computers. (provides for 4 one week trips)	20,424.00
2.	Software add-on, particularly with new developments.	15,000.00
3.	Spare parts - hardware add-ons. May be necessary to maximise equipment use, or if continuous problems develop.	8,000.00
4.	Long term education. May be required for Ph.D programs particularly in statistics or econometrics.	100,000.00
5.	Interfacing requirements. Possible needs for integrating into any present or future MARA computer systems.	20,000.00
6.	T.A. for stateside requirements, particularly specs. and procurement listed as TAo in implementation schedule.	10,000.00

7. Train and upgrade staff at the Provincial and below levels in data collection techniques. Determination of training needs will be done as part of the first joint evaluation to be performed in the first quarter of FY 1986. If training needs are determined to be beyond the capacity of DPAE staff at that time a separate training contract would be awarded. The assumption is made that this would require 3 years to accomplish and may need to cover the 513 province level staff of DPAE in 1-2 week training sessions.

2 people x 4 weeks (preparation and training) = 28,850.00/yr. plus other expenses:

vehicle	2,800.00/yr
sec.	1,152.00/yr
supplies	1,048.00/yr
	5,000.00
Equals	33,850.00/yr.

8. French training. Contingency funds may be needed for French language training by contracters for both long and short term T.A.

	1984	1985	1986	1987
L.T. T.A.	20,000.00	10,000.00		
S.T. T.A.		10,000.00	10,000.00	10,000.00
	20,000.00	20,000.00	10,000.00	10,000.00

The calculations are based upon $20/hour for 50 hrs./wk for a minimum of 5 weeks. L.T. for husband and wife. Short assumes 2-3 people each year, but some of the people would be returning each year.

9. The short term technical assistance for the data processing, objective yield surveys, remote sensing, and crop forecasting efforts have been established at 100 weeks LOP.

The timing and duration of these technical assistance trips is based on the best forecast of time and expertise needed. It is possible that circumstances would develop which would require either longer duration of some trips or additional contingency time for T.A. Two extra man weeks per year are allowed for contingency as follows:

Total	83	84	85	86	87	88	89	90	91
91,908	10,212	10,212	10,212	10,212	10,212	10,212	10,212	10,212	10,212

SPECIAL CONTINGENCY COSTS - CAPITAL AND PERSONNEL

	1983	1984	1985	1986	1987	1988	1989	1990	1991	Total
Emergency Repiars		5,106	5,106	5,106	5,106					20,424
Software Add-on				5,000	5,000	5,000				15,000
Spare Parts				4,000	4,000					8,000
Long-Term Training				25,000	50,000	25,000				100,000
Interfacing							20,000			20,000
Stateside T.A.	2,500	5,000	2,500							10,000
Training-Enumerators				33,850	33,850	33,850				101,550
French Training		20,000	20,000	10,000	10,000					60,000
Short-Term T.A.	10,212	10,212	10,212	10,212	10,212	10,212	10,212	10,212	10,212	91,908
Totals Per Year	12,712	40,318	37,818	93,168	118,168	74,062	30,212	10,212	10,212	426,882

ANNEX X-2

COMPUTER FOR MONITORING & EVALUATION - DIVISION OF DPAE

By the end of the Project the integrated data processing facilities of the DPAE will provide computer capacity, data bank access, word processing ability and other facilities to the entire DPAE including the Monitoring and Evaluation Division. However, this capacity will not be available to all divisions until 1990. In the interim a small computer will be provided to the economic analysis division, this will be one of the Northstars presently at DPAE. A second mini or micro computer similar to the present Northstars will be furnished to the Monitoring and Evaluation Division through the Project. The unit will have capacity to provide data processing functions on both prewritten or operator produced programs. It will also have word processing capabilities and must have compatible software for statistics, economic analysis, financial management and budgeting and cost accounting.

Several models are currently available in the U.S. that are relatively inexpensive and have all of the above capabilities. The DPAE presently has two Northstars, (one on loan from the USDA) which can provide the requirements of the Monitoring and Evaluation Division. An advantage of adding another Northstar would be that training and maintenance requirements would be minimised. The cost estimates and narrative given below is taken from a report by Ronald Steele of Dec. 1, 1982. To Steels's estimates are added a letter quality printer which is essential for production of reports.

HARDWARE

The typical two-user micro-computer system installed for this project consists of:

ITEM	COST
North Star Horizon micro-computer with two 64K RAM boards and two dual density 5 1/4" disk drives, each disk capable of storing 178K characters	$4,500
Additional disk drive and cabinet	1,000
Two (2) Televideo 912C CRT's	1,600
Integral Data Systems IDS-560G printer	1,500
Voltage regulator/transformer	800
Off-the-shelf software	1,700
Diskettes, paper and other supplies	500
Spare boards and tool kit	2,000
Letter Quality Printer	2,500
TOTAL	15,600

"With this configuration, two operators can do independent processing simultaneously. They can both enter data for the same program or different programs, or one can enter data while the other is working on program development. Each operator has 64K of central memory, approximately 40K of which is available for the program and data. Resources shared are the Z-80 processor, the disk drives and the printer. Typically, for processing survey data, each operator uses one disk drive for on-line data storage, and one drive is used for the operating system, programs, and parameter files. The system can be expanded to accommodate a third user simply by adding a CRT, disk drive, 64K RAM board, and serial I/O board, at a cost of $2500.

The criteria for selection of all equipment were reliability, performance, and versatility. Additional criteria for selection of the micro-computer were a Z-80A microprocessor, S-100 bus, and ability to be configured for bank-switching (timesharing) for two or more users with off-the-shelf hardware and software. Frequency of hardware failures has been greater than was initially expected. Most of these problems are attributable to the "hostile" environment of the developing countries - the heat, humidity, dust and "dirty power". The frequency of these problems has been reduced considerably by:

- establishing maintenance schedules and training host country personnel in maintenance procedures;

- installing systems in air-conditioned offices; and

- utilizing power conditioners.

SRS has utilized numerous types of power conditioning devices: high isolation transformers; ultra-isolators; and line filters. None of these has proven totally satisfactory. In some countries, they have provided adequate protection - in others, they haven't. Uninterruptable power supply systems (UPS's) provide maximum protection, but they are expensive ($5,000 +) and heavy (250-600 lbs.) which make them difficult to transport. SRS recently installed two UPS's in the Sudan. Some much needed experience will be gained from this installation. Alternatives to UPS's also need further exploration." Source:
Steele, Ronald J., "Microcumputer Applications in Agricultural Statistics Offices", Dec. 1982.

It should be noted that the Project will provide assistance to the DPAE for operations and maintenance of their computer equipment including the present Northstars, so that maintenance problems should be minimised.

TRAINING

The table below shows the type and length of training provided to host country personnel. This length of training generally proved sufficient for host country personnel to start utilizing the system. The training introduces them to the major features of the system. Expertise is developed with experience.

PERSONNEL	TRAINING	TIME
Data Entry	enter and edit survey data	1-2 days
Computer Operator	hardware maintenance and repair	4-5 days
Programmer	BASIC programming	1 week
Statistician & Programmer	survey data processing system	1 week
Statistician/ Analyst	use of MICROSTAT package	1-2 days
Word Processing		1-2 days
Management Programs		1-2 days

This training can be provided by the SSD Division of the DPAE as well as scheduled consultants.

ANNEX X-3

COST ESTIMATE FOR INTERMEDIATE COMPUTER
(FY 1984)

1.	Multibus chassis with power supply MC 68000 CPU board with 256K-RAM Bit mapped graphics board 1024 x 800 black and white monitor Detachable keyboard System software	8,800
2.	10 megabit/second Ethernet interface	2,000
3.	768K extra memory	4,000
4.	Screen pointing device (mouse on tablet)	2,000
5.	512 x 512 x 24 color frame buffer w/controller	23,000
6.	19" high resolution R G B monitor	2,600
7.	160 megabyte fixed disc drive w/controller	9,500
8.	1600/3200 bpi magtape drive w/controller	7,000
9.	Upper/lower case matrix printer	10,000
10.	Array processor (small scale)	4,000
	TOTAL	72,900
	4 station network	149,000

Prices from MIDAS quoted as of 9/1/82.

ANNEX X-4

Other Commodity Requirements

USAID funded commodities to be supplied under the project in addition to those previously discussed include office equipment, vehciles and publications. These are detailed below:

ITEMS	FX	LC
Office Equipment		
Calculators:		
4 Hewlet Packard model 41C or T.I. programable 59 or equivalent	800	
2 H.P. 97 Desktop-Printing Calculator or equivalent	1,179.95	
5 H.P. 37E Financial or T.I. MBA or equivalent	423.75	
	2,803.70	
Photocopiers:		
2 Photo copiers capable of using plain bond paper, with reduction capacity and colator for a minimum of 10 copies. At least 30 copies per minute. Representative model would be Xerox 3450		21,200.00
Filing/Storage Units:		
At least 2 filing/storage units for computer tapes, diskettes, etc. The units must be of steel construction, locking and fire proof. Est. Cost $2,000/each	4,000	
	6,803.70	21,200.00
TOTAL OFFICE EQUIPMENT	28,000.00	
Vehicles:		
Three station wagon type vehicles are required for the project long-term technical assistance.		
These should be diesel powered, have rear passenger seat, be 4 or 5 door models.		
It is proposed that locally assembled vehicles be provided.		60.000.00

Documents: It is proposed that USAID furnish over LOP, approximately $90,000 of FX costs for documents, publications books, sybscription and professional reference materials. The materials to be purchased should be determined by the professional staff of DPAE and consultants. It is presumed that the majority of those items would come from the U.S.	90,000		
	96,800	81,200	
TOTAL EXPENSES			178,000.00

ANNEX X-5

LONG TERM TRAINING COSTS. 000;

U.S. $

FY	USAID FX Scholarships				USAID LC English	GOM LC Travel
	SSS	SE	SP	Total	Total DPAE	Total DPAE
1983						
1984	25	50	50	125	5	5
1985	150	100	100	350	29	9
1986	175	150	150	475	11	9
1987	175	125	125	425	2	6
1988	75	75	75	225		6
1989	25	25	25	75		6
1990	25			25		2
1991						1
Total 000 U.S. $	650	525	525	1,700	47	44

ANNEX X-6

DISCUSSION OF LOCAL COST FINANCING

The value of goods and services to be procured locally with dirhams is estimated to be $661,000 over the 10 year life of the project. These costs include an estimated $230,000 for local field surveys, $191,000 for commodities and $240,000 for in-country English language training for project participants and local support costs of AID financed technical assistance personnel.

Procurement source/origin waivers are requested for an estimated $81,200 worth of geographic Code 935 commodities that are to be purchased locally.

ANNEX X-7

Proposed First Long Term Consultant to be Provided to DPAE SSD

Senior Survey Statistician

Must have experience in planning and operation of large scale surveys and data collection efforts with some background knowledge of agriculture. Experience should include survey design, including probability sample design preparation of questionnaires, data collection and processing instructions, data summarization and data analysis.

Degree in (statistics) helpful but not mandatory. Statistician with education in Agricultural Economics and proven managerial or technical experience in the production of agricultural statistics is actually preferred. Incumbent must have good communication skills, both oral and written, and should have demonstrated ability to work cooperatively with other people. This characteristic along with ability to plan is actually more important than strictly technical qualifications. Incumbent should have some experience with crop yield forecasting and estimating. Particularly in objective yield surveys and crop yield modeling.

Duties:

(1) Overal project coordination with DPAE.

(2) Work with DPAE staff to develop detailed implementation plans within overall project, to include scheduling of TDY requirements.

(3) Provide advice and counsel to DPAE on optimum use of equipment provided under project.

(4) Work closely with DPAE staff to assemble data and information required for developing agromet yield models.

(Note: The second long term consultant should have similar skills and experience except the selected individual should have a strong background in remote sensing, especially in digital processing of satellite remote sensing data (either MSS or TM data).

ANNEX X- 8

TDY CONSULTANTS

SUBJECT AREA	KNOWLEDGE/SKILLS/ABILITIES
ADP Computers	-Knowledge of Microcomputers -Familiarity with BASIC, FORTRAN, or PASCAL -Systems Analysis -Maintenance of Mini or Microcomputers -Systems Procedures & Installation
Area Sampling Frames Construction/Use	-Theoretical & Applied Statistics especially sampling and Data collection for Agriculture. Background in use of ASF; construction, and maintenance.
Objective Yield Surveys	-Theoretical and Applied Statistics especially Survey design and data collection for yield surveys. Background in sampling, questionnaire design, and Objective Yield forecast modeling.
Remote Sensing	-Applied Statistics Background skills and experience in Remote Sensing, including digital processing skills, knowledge of double-sampling applications, knowledge of ASF & joint use of ASF-RS data.
Yield Modeling	-Strong background in Statistics and yield modeling plus some of the following disciplines: Agronomy, Plant Science, Ag. Engineering, Soil Physics, Climatology and Atmosphere Sciences, Agricultural Economics, etc.

TDY TECHNICAL ASSISTANCE, APPROXIMATE DATES,
PURPOSE, LENGTH, AND NUMBER CONSULTANTS

Date (mo/yr)	PURPOSE	Length (weeks)	Number Consultants	Total Manweeks
9/83	Upgrade NorthStar w/hard disk DP Systems Design	3 5	1 1	8
11/83	Plan Obj. Yield Survey for 1984	3	1	3
3/84	Assist with training for Obj. Yield Survey & Further Planning	2	1	2
8/84	Train Operators of Photo. Lab Equipment	2(?)	2(?)	4
9/84	Assist with installation of 8-term. System and Operational Training Maintenance Training	3	2	6
11/84	Review Results of 1984 OY Survey and Plan for 1985	2	1	2
1/85	Data Entry Training & Software Training	3	1	3
3/85	Assist with Training for Obj. Yield Survey	2	1	2
6/85	Remote Sensing Workshop for DPAE staff. ASF Maintenance Training	2	2	4
9/85	Assist with installation of New 16 Terminal ADP System & Remote Sensing Equipment & Software & Maintenance Training	4	2	8
11/85	Review Results of 1985 Obj. Yield Survey and Plan for 1986	3	1	3
2/86	Provide Training in use of Remote Sensing Hardware/Software and Plan 1986 work	3	2	6
6/86	Review & Evaluate ADP Operations. Begin Planning for Linkup with other System. Software Enhancements & Training.	3	2	6
9/86	Review 1986 Obj. Yield Surveys and Work on Developing Forecast models from 1984-85-86 data. Review Agromet modeling with Resident Statistician & Moroccan Trainees	3	2	6

TDY TECHNICAL ASSISTANCE, APPROXIMATE DATES, PURPOSE, LENGTH, AND NUMBER CONSULTANTS

(Cont.)

Date (mo/yr)	PURPOSE	Length (weeks)	Number Consultants	Total Manweeks
3/87	Review Completed ASF and plan for integration of R.S. into Maintenance Activities. Plan 1987 Remote Sensing Program	2	2	4
7/87	Review ADP operations and Update plan for Future Changes. Provide Training as Necessary.	3	2	6
2/88	Review Obj. Yield Program & Develop Plans for Extension to Other Crops other than Major Small Grains	2	1	2
6/88	Review ADP operation, Upgrade Software, Develop Final Plans for Linkup and Training if necessary	3	1	3
10/88	Review and Assist with Advanced Crop Modeling Work, Review Obj. Yield Program for old and new crops & plan for 1989 Surveys	2	2	4
4/89	Assist with Training and Review Field Work for Obj. Yield Program	3	1	3
8/89	Assist with ADP Linkup and Plan for Diversion of 8-terminal System to other uses, Training as necessary	3	1	3
5/90	Overall Review and Assessment of ASF-Surveys Integration of Obj. Yield, Remote Sensing & Yield Modeling & Recommendations for Future	4	3	12

Professional Skills - Short-term TA - Project Service, DPAE

FY 1984

1. 1 1/2 p/m Training of Trainers. Skills in statistics, survey design, evaluation methodology. Experience in design and implementation of training of trainers program.

2. 3 p/w Formative Evaluation Concepts and Techniques. Skills in statistics, sociological survey design methodology, with emphasis on experience with summative project evaluation. Can be anthropologist with project experience in AID or IBRD. Experience more critical than academic qualifications.

3. 2 p/w Summative Evaluation Concepts and Techniques. Same as (2) above, but with greater experience in ex-post project evaluation. Experience with AID, IBRD or other major donor evaluation systems a prerequisite. Experience in teachin evaluation approaches.

4. 3 p/w Case Study Approach to Project Evaluation. Skills and experience in Harvard Business School or equivalent Case Study Method for use in project evaluati Development of case materials, analysis of case.

5. 3 p/w Monitoring and Evaluation Systems Development. Skills in management information systems design, monitoring and evaluation systems, including use of micro-computers. Field experience in design and implementation of such systems.

FY 1985

1. 1 p/m Training in Use of Micro-computer Hard and Software. Skills in micro-computer systems, including programming and software development, with social science applications. Experience in training in LDCs. If possible, prior experience in application to project monitoring and evaluation systems.

2. 1 p/m Project-level Financial Analysis. Skills in development administration, financial analysis. Experience in project-level financial analysis with AID or other major donor.

3. 1 p/m Indicators and Evaluation Criteria. Skills in social science and/or development administration. Prior experience in social indicators development, and elaboration of success criteria for project evaluation, including impact evaluation.

4. 1 p/m Project Identification. Skills in agricultural economics, agronomy, development anthropology, rural sociology, ag engineering. Experience with identification of projects in irrigated and rainfed ag subsectors, and with integrated rural development/area development projects.

5. 1 p/m Training of Field-level Staff. Skills in survey design methodology, statistics, with experience in training in LDCs. FSR experience preferred. Experience in training low-and mid-level cadres in data collection and analysis.

FY 1986

1. 1 p/m Program Planning and Administration. Skills in Program planning and administration - development administration, MBA plus experience in USDA/ERS, or similar organizational situation, such as AID/PPC. Manpower development and assessment an asset. Personnel systems development an asset.

2. 1 p/m Project Monitoring and Evaluation Systems. Skills in management informat: systems design, and implementation, including use of micro-computers. Field experience in implementation of such systems.

3. 1 p/m Project-level Financial Analysis. Skills in development administration, economics, financial analysis. Experience in project-level financial analysis with AID or other major donor.

T.A. SHORT TERM

			A	B	C
	Rate	Cal.	Wk	Trip	Total
1. Base Salary	at 240/day	X6	1440		
2. Per Diem	50/day	X7	350		
3. Travel Costs (1)	2000	R.T.		2000	
4. Ins. Etc./Dir. Costs	15% of Base 33.75		236.25		
5. In-Country Travel (2)					
6. Secretarial (3)					
7. Other (3)					
8. Tot. Dir.			2026.25		
9. Contractor's Overhead	80% of base 180	X6	1080		
10. Total Costs/week			3106.25	2000	(4)
11. Cost per Month			12,425.00		14,425.0

(1) International from anywhere in U.S. except Hawaii, Alaska, includes excess baggage.

(2) Train, plane, rental car when not provided by AID.

(3) Specify.

(4) A10 X weeks plus B10 equals C10.

ANNEX X-9

PROPOSED LONG TERM CONSULTANT TO BE PROVIDED
TO DPAE
ECONOMIC STUDIES SERVICE

Agricultural Economist

The person will have major responsibilities to assist the economic studies service in the development of national economic studies related to agriculture. He/she will work with a group of Moroccan professionals to determine the studies to be undertaken, the methods to employ and most importantly the economic models needed to analyse the economic factors. The first responsibility as defined by DPAE is to assist in a study of the grain production and markets and the relationshop to grain imports. As a part of this study, a method for monitoring in international grain markets is to be developed.

Qualifications

The person should have either a Ph.D in agricultural economics or a comparative field, or have extension experience in economic analysis. The person should be strong in quantitative analysis and conversant in mathematical modeling, statistics and econometrics. A major rule of this person will be in building models for economic analysis with data processing.

The service to which this person will be attached will have a Northstar microcomputer, but will eventually have access to larger computers to be provided under the project. He/she should therefore be familar with micro-computers and languages such as Basic, Fortran or Pascal.

This person will also assist the DPAE in determining the short term technical assistance needed in the economic studies service and helping to write terms of reference.

The person must have an S3 level in French. Preference should be given to experience overseas.

Technical Assistance - Long term.

The following is a cost estimate of resident T.A. It is based on a family of four with two school age children in primary and secondary school. Assignment is for 3 years with a one month home leave in Year 2. First year is FY 1984.

	YR 1	YR 2	YR 3	YR 4
BASE salary	50,000	55,000	60,000	165,000
Dir. Benefits including W.C., S.Sec., insurance, etc. 40% of base	20,000	22,000	24,000	66,000
Allowances	5,500	3,000	5,500	14,000
Ship. of POV	(1,000)		(1,000)	
Ship/Store P & HHE	(2,500)	(1,000)	(2,500)	
Other	(2,000)	(2,000)	(2,000)	
Ed. for dependents at post	15,000	15,000	15,000	45,000
Travel				
Int'l, 1000 x 4	4,000		4,000	8,000
In country, 20 days/yr. x 50	1,000	1,000	1,000	3,000
U.S., predeparture, H.L., exit	1,000	600	1,000	2,600
H.L. RTP		8,000		8,000
Misc.	1,000	1,000	1,000	3,000
Total Dir. FX	97,500	105,600	111,500	314,60(
Housing (LC)	(18,000)	(18,000)	(18,000)	(54,00(
Mileage 4000 mi. x .50 (LC)	(2,000)	(2,000)	(2,000)	(6,00(
Total LC	20,000	20,000	20,000	60,00(
Total Dir. Costs	117,500	125,600	131,500	374,60
O.H. 50% of base	25,000	27,500	30,000	82,50
Total FX costs	122,500	133,000	14,500	397,10
Total est. costs	142,500	153,100	161,500	457,1(

FX 397,100 = 11030/mo.
L.C. 60,000 = 5000/quarter

Annual Ave cost $152,366.67

Est. $153,000 or $12,750/mo.

LONG TERM U.S. T.A.

000 U.S. $

	FX			LC		
	SSD	SE	TOTAL	SSD	SE	TOTAL
1983						
1984	33	33	66	5	5	10
1985	166	133	299	25	20	45
1986	266	133	399	40	20	60
1987	232	99	331	35	15	50
1988	99		99	15		15
1989						
U.S. $ 000			1,194			180

SHORT TERM T.A. FOR DPAE FOR BUDGET PURPOSES

SSD

FY	TRIPS	WEEKS
1983	2	8
1984	6	15
1985	7	19
1986	7	21
1987	4	10
1988	2	5
1989	4	10
1990	3	12
TOTAL	35	100

SHORT TERM T.A.

	S.P.	S.E.
1983	1 x 2 weeks	
1984	3 x 3 weeks 1 x 6 weeks	1 x 12 weeks
1985	3 x 4 weeks	
1986	3 x 4 weeks	continue to 1991

T.A. SHORT TERM

		Rate	Cal.	A Wk	B Trip	C Total
1.	Base Salary	at 240/day	X6	1440		
2.	Per Diem	50/day	X7	350		
3.	Travel Costs (1)	2000	R.T.		2000	
4.	Ins. Etc./Dir. Costs	15% of Base 33.75		236.25		
5.	In-Country Travel (2)					
6.	Secretarial (3)					
7.	Other (3)					
8.	Tot. Dir.			2026.25		
9.	Contractor's Overhead	80% of base 180	X6	1080		
10.	Total Costs/week			3106.25	2000	(4)
11.	Cost per Month			12,425.00		14,425.00

(1) International from anywhere in U.S. except Hawaii, Alaska, includes excess baggage.

(2) Train, plane, rental car when not provided by AID.

(3) Specify.

(4) A10 X weeks plus B10 equals C10.

BEST AVAILABLE COPY

SHORT TERM T.A. $

	SSD	SE	SP	TOTAL
1983	28,850			28,850
1984	58,594	39,275	62,806	160,675
1985	73,019	39,275	43,275	155,569
1986	79,231	39,275	43,275	161,781
1987	39,063	39,275		78,338
1988	19,532	39,275		58,807
1989	39,063	39,275		78,338
1990	43,275	39,275		82,550
1991		39,275		39,275
TOTAL	380,267	314,200	140,038	$834,865

DPAE ADDITIONAL STAFF REQUIREMENTS

SSD/SE/SP		84	85	86	87	88
4	Data Entry	1	1		1	1
2	Programmer/Analyst (Ph.D)		1		1	
2	Systems Managers (Ph.D)			1		1
2	MSc Statistics Remote Sensing	1	1			
1	Ph.D statistics Remote Sensing		1			
2	Ph.D Statistics Yield Modeling		1		1	
1	MSc Statistics Yield Modeling		1			
6	Ag. econ. Ph.D	2	2	2		
6	M. and Evaluation - Ph.D	2	2	2		
8	MSc M. and Evaluation		2	2	2	2
	Total - 34 -	6	12	7	5	4
000 U.S. $		110	110	110	110	110
			220	220	220	220
				128	128	128
					92	92
						74
Total 000 U.S. $		110	330	458	550	624

ANNEX X-10

PROCUREMENT PLAN FOR TECHNICAL ASSISTANCE

A.1. Long-Term

Over the 10 year life of the Project, approximately 237 person weeks of short-term technical assistance and 9 person years of long term technical assistance will be provided to the DPAE. It is anticipated that the range of technical skills required and their integration in the agricultural statistics development of the DPAE can only be provided by the USDA. Annexes X-9 and X-10 list the short-term and long-term technical personnel required and their anticipated participation dates. These technicians will be intricately involved with the selection of the sophisticated technical equipment to be financed by USAID under this project. USAID proposes that these technicians participate fully in the preparation of procurement specifications for this equipment, and its installation and use in Morocco. It is proposed therefore, that procurement of this equipment be accomplished through the procurement offices of USDA. The basis for utilization of services of USDA follows:

A.2. Short-Term

The implementation schedule (Annex VI) beginning with item no. 8 and going through items no. 17 should be done with a project implementation order for a PASA arrangement with the USDA, outside of the complete PASA arrangement that would be negotiated for the rest of the project. This would allow two short-term technicians to come out in late FY 1983 to review the systems and determine specifications for required equipment.

Discussion

1. The basis for the crop reporting system that is being developed in Morocco, which this project is supporting, is the Area Sampling Frame (ASF). ASF technology has been developed in the United States as a probability sampling technique, by the USDA. Although other institutions (notably Universities) have worked in conjunction with USDA on research which employed the ASF, no institution has the length and breadth of experience that the USDA has in building and maintaining the ASF.

2. In August of 1978 the USAID signed PASA (#Ag/TAB-1166-6-78) with the USDA, to implement Project #931-1166 "Remote Sensing for Resource Assessment". Under this PASA, USDA signed a MOU with the Kingdom of Morocco for the USDA's Economics, Statistics and Cooperative Service (ESCS) to provide technical assistance to Morocco to construct an ASF utilizing remote sensing and other available data. That project was intended to be the first phase of a multiphase project using satellite remote sensing for estimating agricultural production.

3. The first phase of USDA's project with the Kingdom of Morocco was judged successful and Morocco intends to expand the ASF to the entire country. Although satellite imagery for crop forecasting was not used in the first phase, this project will develop the capacity in Morocco to employ satellite imagery for remote sensing.

4. USDA has been involved in several research projects for the employment of satellite imagery for remote sensing and has the greatest experience in this field.

5. Measuring agricultural production and undertaking crop forecasting employ several other techniques including objective yield surveys and yield modeling. USDA has the most experience both operationally and in research of these techniques of all U.S. based institutions, if not world wide.

6. The overall program requires a wide range of skills including automatic data processing, remote sensing, ASF, yield modeling and digital processing in addition to agricultural economics and project management. These skills will be required over a 7-10 year period for a wide variety of training and support functions to the DPAE. It is doubted that any other institution can provide all of the skills required under this project component.

7. Technology is changing very rapidly in this field. Because of USDA's central involvement in research, development and utilization of this technology it will be in the best position to keep abreast of technological developments.

8. Short term training at USDA and other U.S. facilities may be necessary from time to time for DPAE technicians. The determination for the need for such training should be left to the contractor. USDA has relationships with all the facilities involved in crop estimation programs. Its access to these facilities is, therefore, assured.

9. Although some of the technical skills involved could be supplied from other sources such as Universities or in some cases the private sector, doing so would necessitate more than one contract for the project. This is highly undesirable for both the Moroccan Government and the USAID Mission. In the event the USDA cannot or prefers not to provide particular technical services, USDA should sub-contract for these services according to normal U.S. Government procedures. A recommended sub-contract proposal is appended for consideration in supplying services from a U.S. University.

10. Because of the technology involved and the commodities required it is proposed that technical specifications for such things as computer hardware and software, remote sensing equipment, objective yield laboratory equipment and aerial photography laboratory equipment be developed by the contractor and the contractor's technical assistance to the DPAE. It is also proposed that the procurement, shipment and installation be done by the contractor. USDA has both experience in and the facilities for doing such procurement. In addition the contractor will be asked to procure satellite imagery and computer compatable tapes from time to time throughout the life of the project.

11. Because of the reasons stated above, it is believed that the USDA has a predominant capability to provide the technical assistance and procurement responsibilities for the DPAE project. This is based on Handbook 12, section 1B.2 and controlling OMB circular A-76 for 108 months of project technical assistance and approximately 237 weeks of TDY.

B. The project contemplates a total of 22 long-term academic participants. It is envisioned that these students will be processed by S&T/IT through the use of a PIO/P, and in accordance with AID HB-10 regulations.

C. In accordance with the project's evaluation plan the mission will, through the issuance of a PIO/T to AID/W, procure the evaluation services of an appropriate indefinite quantity contractor (IQC).

B I B L I O G R A P H Y

1. Cable, Melissa, "Report on the Hectarage and Livestock Pilot Survey of Kenitra Province, Morocco." (Area Frame Construction Specialist, USDA, Remote Sensing for Agriculture Project Ag/DSB-1224-7178) Oct. 17, 1980

2. Eriksen, John H., "A Review of Selected Agricultural Policies in Morocco", Nov. 4, 1982.

3. FAO, Assistance a la Planification Agricole, Maroc, Rome, 1981.

4. Gleason, Chapman, et al, The Auxiliary Use of Landsat Data in Estimating Crop Acreages: Results of the 1975 Illinois Crop-Acreage Experiment., USDA, SRS, #SRS-21, Oct. 1977.

5. GOM, MARA, DPAE, SSD, "Rapport d'Activite de la Cellule Informatique" April, 1983.

6. Hanuschak, George A., Richard D. Allen, Integration of Landsat Data into the Crop Estimation Program of USDA's Statistical Reporting Service: 1972-1982, and William H. Wigton, USDA SRS Reseach Division, Washington July, 1982.

7. Hanuschak, George A., and Kathleen M. Morrisse, Pilot Study of the Potential Contributions of Landsat Data in the Construction of Area Sampling Frames, USDA, R & D Branch, SRS, Oct. 1977.

8. Hanuschak, George, et al, Obtaining Timely Crop Area Estimates Using Ground-gathered and Landsat Data, USDA, ESCS, Tech Bulletin No. 1609, Aug, 1979.

9. Harmon, David P., "Institutional Assessment Morocco Rainfed Agriculture Project" DID/PP November 12, 1982.

10. MARA/FAO, Plan Cerealier, Organisation de l'Information, (Devechi, Danna) 1983.

11. Project Grant AGreement Between the Kingdom of Morocco and the United States of America for Statistical Services, May 13, 1980.

12. Royaum Du Maroc, MARA, DPAE "Note de Presentation Pour l'Acquisition d'un System Informatique par la Direction de la Planification at des Affairs Economiques," June 1981.

13. Royaum Du Maroc, Prime Minister's Office, Projet de Plan de Development Economique et Social 1981-1985.

14. Sigmen, Richard, "Crop Area Estimates From Landsat and Ground Survey Data", ESCS/USDA, paper presented at Canadian Federal-Provincial Committee on Agricultural Statistics; March 11-12, Ottawa, Ontario, Mimeo.

15. Sleeper, J.A., Thomas Eighmy and M'Hamed Hanifi, "Dryland Agriculture Sub-Sector Strategy Morocco" Discussion Paper USAID/Morocco, Oct. 1981.

16. USDA, Catalog of Courses and Research Opportunities in Agriculture, 1983.

17. USAID, Country Development Strategy Statement (CDSS) FY 84, Annex 1, Agriculture Sector Strategy, and Agriculture Sector Strategy Paper Technical Appendices, January 1982.

18. USAID/Pakistan, Project Papar, "Data Collection and Analysis Project", design team, 1983.

19. USAID, PID, Rainfed Ag. Project 608-0170 (Draft and Approved Versions) 1982-83.

20. Wighton, William and Peter Bormann, A Guide to Area Sampling Frame Construction Utilizing Satellite Imagery, March 1978.