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**FINAL EVALUATIONS
OF
The Food Crops Research Project (655-0011)
The Watershed Development Project (655-0013)
& The PL 480 Title 206 Program
AND
DESIGN RECOMMENDATIONS FOR
A CONSOLIDATED PROJECT**

Prepared for:

**The U.S. Agency For International Development
Praia, Cape Verde**

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TABLE OF CONTENTS

Note: This single report covers several activities having complex interactions and different reporting requirements. To ease the reading, pages are numbered in a single series, and detailed tables of contents are provided for each major section as summarized below.

EXECUTIVE SUMMARY	p.i
PREFACE	p. 1
PART ONE: THE EVALUATIONS	
Section One: Food Crops Research Project	p. 7
Introduction	
I. Project Inputs	
II. INIA Research Activities	
III. Training and Collateral Activities	
IV. INIA's Collaboration with Other Agencies	
V. Various Other Recommendations	
Section Two: Watershed Development Project	p. 32
Introduction	
I. Project Inputs	
II. Soil and Water Conservation (Structural)	
III. Biological Erosion Control/Forestry -	
Findings & Recommendations	
IV. Rural Assistance Program	
V. Institutional Collaboration	
Section Three: The PL480 Section 206	p. 64
I. Program History	
II. Evaluations	
III. Findings	
IV. Conclusion	
PART TWO: DESIGN RECOMMENDATIONS FOR NEW PROJECT ..	
Section One: Introduction & Background	p. 83
Section Two: Change Themes & Precepts	
Section Three: The Sectors	
Section Four: Design - The Whole	
ANNEXES	p. 102

EXECUTIVE SUMMARY

TITLE: FINAL EVALUATIONS OF
The Food Crops Research Project (655-0011)
The Watershed Development Project (655-0013)
AN EVALUATION OF
The PL 480 Title 206 Program
DESIGN RECOMMENDATIONS FOR A CONSOLIDATED PROJECT
(For The Period FY91-FY95)

FOR: THE U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT,
PRAIA, CAPE VERDE

DATE: March 1990

PURPOSE OF THE PROJECTS

The purpose of the **Food Crop Research Project** is to support Government of Cape Verde development activities leading toward food self-sufficiency, rural employment and income, and improved nutrition.

The **Watershed Development Project** aims to stabilize the natural environment (in thirteen of the country's approximately 50 major watersheds), and to increase the potential for agricultural production.

Cape Verde's **PL480, Title II, Section 206 Program** is designed to help cover the country's food deficit and, at the same time, to diminish the need for food aid through conservation and other development activities funded by local currency proceeds from sale of imported PL480 commodities.

PURPOSE AND METHOD OF THE EVALUATION/DESIGN TASK

The evaluation was performed in order to provide information for project managers and policy makers to enable them to achieve greater efficiency and effectiveness in U.S. foreign aid programs. It also served the special purpose of "laying a basis for the design of a single [consolidated] successor project [to the three evaluated projects] to be authorized in 1990" for the period FY91-95 (from the Delivery Order Statement of Work).

The Team used a straightforward method of investigation and analysis in addressing some ninety-five questions asked by the Delivery Order: orientation during the first week, data collection during the next two weeks, and reporting and debriefing in the fourth week. It consulted some 200 documents, interviewed over 125 people responsible for, interested in, or beneficiaries of the three activities, and visited virtually all project offices and sites on Santiago. Several USAID employees assisted in data collection, and the Team was advised and accompanied at all times by Cape Verdean counterparts.

Each team member left a draft report with the Mission. The team leader prepared a consolidated and integrated report in Washington, with the help of telefaxed USAID comments. In the revision, detailed technical recommendations that appear in the three separate evaluations were accorded and synthesized in statements of broad directions recommended for the new project.

FINDINGS AND CONCLUSIONS

All three activities were well designed, competently managed, and effectively assisted by project technical advisors. Inputs to the projects in personnel, commodities, and training were provided at approximately the planned levels -- and in some cases, notably training, exceeding them.

The Food Crop Research Project focused its assistance (provided by AID directly for training and commodities, and through the University of Arizona for technical assistance) on the national agricultural research institute, known by its Portuguese initials, INIA. INIA was created in 1958 and, with project help, has made great strides toward becoming a mature agency capable of carrying out a broad research mandate that covers the entire complex of rural development. That includes improvement of all aspects of dryland and irrigated crop agriculture; social/economic considerations; and natural resource conservation technology. In addition, the institute has trained the project extension agents who organize the PL480-funded labor that carries out conservation works in the designated watersheds.

The project's specialized overseas training has produced a staff of researchers of good potential. Some trainees are still to return. Additional training is also required for a complete research staff.

INIA's research planning, strategy, and administration are rated as good by the Team's specialists. Research products have begun to flow, but there are still shortcomings in analysis, dissemination and utilization of the output. Field experiments and demonstrations are few, as yet, and INIA is only now at the point where it can begin to develop research applications with direct utility to conservation and agriculture. Nor is there an effective extension service in place to transmit such research to the users.

The Watershed Development Project is implemented by the Ministry of Rural Development's Directorate General of Soil Conservation, Forestry, and Rural Engineering (Portuguese initials DGCSFER), with A.I.D. commodities and training provided directly, and technical assistance provided through Sheladia Associates, Inc.

The project's physical achievements are impressive. Some 12,500 structures have been installed including contour furrow and rock walls, checkdams, embankment groins, catchment tanks, reservoirs, water conductors, etc. This output is about 155 percent of the Project Paper's planned target of 8,060. More than four million trees have been planted, with 286,000 person days of employment. In addition, some 600 members of communities in watersheds received instruction in tree planting, conservation, irrigation and public health.

The project is significantly behind schedule, however, in the production of the basic document to govern future annual workplans in each watershed and subbasin, called Phased Watershed Development Plans. The plans require specialized personnel, extensive data, and administrative planning, which have not yet been brought together. From a technical standpoint, moreover, the structures in place are not adequately maintained, nor are they well designed for durability in the function assigned to them--these deficiencies posing the danger of expensive breakdowns and loss of capital infrastructure. Finally, integrated watershed planning has not yet been adopted. That refers to science and data based design of all the structural and vegetative measures for a given basin such as would take account of their interaction and interdependence. This too is vital to a sound and enduring conservation program.

The PL480 Title II, Section 206 Program, administered directly, and well by the USAID and its Government counterpart, the Bilateral Division of the Ministry of Plan and Cooperation, has achieved its nominal purpose. Nearly 18,000 MT of corn, rice, vegetable oil, and beans with a total CIF value of \$32 million have been imported in response to a carefully calculated food requirement. Approximately \$25 million in local currency has been made available to watershed operations primarily for labor costs-- "generating" employment and income-- and the labor has been reasonably well utilized in labor-intensive work. At any given time in the non-agricultural season, some four to eight thousand men, women and children living in the watersheds are employed by the watershed development project and paid with PL480 counterpart. This number represents up to one half of the working population of the designated watersheds.

While the program's administration is good at the level of handling and accounting for the imports, problems and controversies remain: in the question of the amount of net sales proceeds made available to the watershed project which is diminished when sales are priced too low, for example; in the fact that the project's labor is sometimes paid with delays of several months; and in the sale of some imported corn to animal-feed processors. Finally, and most important in the broad perspective of the combined purpose of the three projects, the socially and technically difficult problem of labor mobilization for the conservation work has not been fully

resolved. Different organizing methods have been tried, in the goal of maximum farmer and community participation and benefit consistent with efficient execution of the engineering and forestry conservation work; but none is fully operational.

* * *

Research, conservation and agricultural production activities must be well coordinated and linked technically and institutionally. The collaboration should involve INIA, the DGCSFER, the Extension Directorate, and several other rural development agencies and donor activities. But it is still inadequate-- a deficiency, if an understandable one at this stage of the country's development capabilities, that the Team observed in all three evaluations.

On the U.S. or "project" side, the three programs are separately administered, as are the corresponding Cape Verdean agencies and programs. One issue the Team was directed to address was how to achieve coordination of Cape Verdean activities. Such coordination was assumed to follow from coordination of U.S. efforts in the consolidation of U.S. project administration, making the three projects one, under a single managing agent. Hence, the question became, how to achieve the U.S. consolidation - one that we discuss with certain reservations.

DESIGN RECOMMENDATIONS

The theme common to all the design recommendations is that the consolidated project can and should branch out in a number of ways from patterns established to date. This will allow it to build on past experiments and achievements and to address, finally, the cross-the board problems and benefits that define the project goal.

First, the goal itself is revised and renewed. Whereas the creation of the potential for increased agricultural output was identified as the ultimate aim in past goal statements, now the realization of the potential can begin.

Second, and to that end, INIA should move toward the application of research outputs to crop development and production systems, range management and livestock, and forestry.

Third, INIA must now expand its research program to include conservation measures in the watersheds and should intensify social/economic research on rural attitudes. Staff and facilities will need to be brought to full strength. Field experiments should be multiplied.

Fourth, watershed work now requires strengthened engineering and biological planning. Measurements and data collection should be greatly increased for the design of science based, integrated watershed management. Likewise, the Phased Watershed Development Plans should be completed as soon as feasible, as the basis for allocating time, effort and resources.

Together, the two planning initiatives would establish balance as between structural and vegetative conservation measures, between conservation and exploitation, and between public and community roles, and would lead to sound structural design and regularized maintenance.

Fifth, the extension function - the vital link between research and application, and probably the least developed of the major contributors to the common goal - will have to be strengthened. Large U.S. investment is not probable. Instead, we recommend a U.S.-funded consultancy to study and plan to the task, followed by concerted U.S. effort to enlist other-donor support in long term implementation.

Sixth, several institutions not heretofore considered as part of the "project" should be included in collaborative efforts necessary for project goal achievement-- the extension, agricultural development, and agrarian reform directorates of the Ministry, the water resources board, and others. Research results must be

widely shared among them, and mutually supporting operations must be worked out. (The project will give them leadership and coordinating guidance, not funding.)

Seventh, PL480 activities should also branch out. We identify important uses of local currency counterpart additional to payment of watershed labor. Most essential, probably, is funding of compensation of incentives for taking private land out of cultivation or grazing for experiments, demonstrations, and natural revegetation. Similarly, the list of imported commodities might well expand to include certain industrial raw materials that could indirectly relieve the country's food deficit by earning foreign exchange for commercial food imports and contribute simultaneously to economic development. Finally, labor mobilization systems must be analyzed carefully and realistically, with a view to a basic restructuring for the more demanding period ahead.

With respect to U.S. management of U.S. resources in the consolidated project, we believe a two-sided technical assistance effort is needed; one group for research and another for operations; however unified the management system may be at its top. We do not argue the question of using a private voluntary organization as the top managing agent because a decision was said to have already been made on it. We are puzzled by the choice, however, and unclear how the traditional strengths of PVOs would apply to this task.

Whatever the structure adopted for U.S. management, we think it especially important not to confuse the scope of U.S.-funded project interventions with the much broader range of responsibilities encompassed by the two assisted agencies (INIA and DGCSFER) and their collaborators-- which pursue many activities the project is concerned with only peripherally. Thus, the managing agent should avoid trying to produce the needed coordination of Cape Verdean contributions in ways that could distort the agencies' overall mandates and reduce their capacity to fulfill them.

PREFACE

PROJECT BACKGROUND

Part One of this report is a final evaluation of two U.S. Agency for International Development projects, the Food Crop Research Project and the Watershed Development Project, and an evaluation of the ongoing PL480 Title II, Section 206 Program. Part Two provides basic design concepts and recommendations for these activities to be reorganized and consolidated as a single project.

AID has assisted the Government of Cape Verde in agricultural research and watershed development since 1982, and has provided food aid under PL480 since 1977.

Agricultural Research

The aims of assistance to agricultural sector Cape Verde are to help develop a capacity to conduct adaptive research, and ultimately, to contribute through applied research to increased agricultural production.

With the country's independence in 1975 and withdrawal of Portuguese administrators, agricultural research activity dwindled to insignificance. A Center for Agrarian Studies was started in 1978, but with objectives limited by the tradition of the colonial administration's primary attention to plantation agriculture. By decree-law of 1985, the Center was given the broadened mandate of a full-fledged research institute -- the National Institute of Agricultural Research (INIA). INIA is a quasi-autonomous unit of the Ministry of Rural Development and Fisheries and is supervised by the Minister.

A principal deficiency from the beginning was lack of professionally qualified researchers on INIA's staff. The activity evaluated here, the Food Crop Research Project (FCRP), is creating a research cadre with U.S. and third country academic degree training. The project has also contributed and continues to contribute, through the University of Arizona, technical assistance for institutional development (in administrative management, documentation center services, and various technical disciplines). Commodities funded by the project include INIA's laboratory, equipment and supplies, vehicles, books and other library materials. Much of the Institute's physical plant was constructed by the project.

The Food Crop Research Project was authorized in August 1982 for five years, with total U.S. funding of \$3.7 million. The authorization was amended in May 1987 to increase funding by \$1 million to a total of \$4.7 million and to extend the assistance completion date

*What plans for
its sustainability?*

date to 30 June 1990. The Evaluation Team recommends further extension of the completion date to 31 December, 1990 for reasons explained in the FCRP evaluation.

Watershed Development

Cape Verde's landscape is dominated by large, steep, rocky and eroded watershed valleys where, perforce, agriculture is practiced. The purpose of assistance in this connection is to protect and develop soil and water resources and stabilize the ecology, and to increase the potential for agricultural production.

Through the Directorate of Soil Conservation, Forestry and Rural Engineering (Portuguese initials, DGCSFER) of the Ministry of Rural Development and Fisheries, the Government of Cape Verde has applied itself to watershed problems since the country's independence in 1975. AID began assisting the effort, both in the installation of physical conservation structures such as contour terraces and checkdams and in biological erosion control measures in 1982 with its Watershed Management Project. In May 1984, a five year successor activity, the Watershed Development Project (WDP), was authorized in the amount of \$5.6 million. Of the country's approximately fifty candidate watersheds, thirteen were selected for project attention, twelve on the main island, Santiago, and one on Santo Antão. Along with these appropriated dollar funds, PL480-generated local currency was made an integral part of the project and the labor required by watershed works was paid from that source.

The 1984 WDP authorization was amended in June 1988 with a \$2 million funding increase, for a total of \$7.6 million, and an extension of the activity completion date from 30 June 1990 to 31 December 1990. Nearly half of the total has gone to technical assistance in engineering and forestry. Construction materials and elements such as gabions and training account for most of the rest. The implementing and technical contractor is Sheladia, Inc.

Food for Development (PL 480 Title II, Section 206)

U.S. PL480 food aid was first provided to Cape Verde as an emergency program under Title II Section 201. The Title II, Section 206 Program evaluated here began with a June 1982 Transfer Authorization/Agreement (TA). The volume and CIF value of Section 206 TAs through FY 1989 are 118,000 metric tons and \$32 million, respectively. Some \$25 million worth of local currency for development was generated.

The purpose of the Program is, first, to help cover the country's food deficit. The secondary purpose, i.e., the derived opportunity, is the use of local currency proceeds from sale of the commodities for the creation of rural employment: under- and unemployed farmers, farm families, and others are hired for seasonal work in watershed development operations.

Why children?

Extension personnel of the project mobilize labor, designated as "community based work fronts," through contacts in the villages, or hire individuals directly for crews designated as "classical work fronts". Some three to eight thousand men, women and children are so employed at different periods of the non-farming season.

* * *

Part Two of the Report, Design of a New Project, takes as given prior AID decisions to consolidate the three evaluated activities and to delegate management of the consolidated project to a single contracted agent. The Evaluation/Design Team recognizes the value of these arrangements in lightening the burden of management falling directly on an understaffed AID office in Praia and in promoting greater coordination among the U.S. technical assistance teams that will assist the two entirely different Cape Verdean agencies (INIA and DGCSFER). The Team notes, however, that benefit to the U.S. in the unification of management of external assistance activities and personnel does not argue for a comparable consolidation or role-change of host agencies -- with their differentiated functions and mandates broader than the purely "project" aspect of the bilateral cooperation.

The purpose of the new project, as stated in the USAID's Annual Budget Submission for FY91, is not different on its face from that of its predecessors: to conserve and improve Cape Verde's fragile natural resources and to conduct agricultural research to increase agricultural production. Until now, however, there has been little attention to agricultural production. The Team urges vigorous action in that direction, putting the highest emphasis on the agricultural goal.

The ABS estimates five-year Development Assistance funding for the new project in an amount that averages annually some two-thirds of the total average annual funding of the two predecessor projects. PL480 contributions, omitted in the calculation, are likely to remain nearly constant during the period, availabilities permitting. The five-year total \$5 million DA plus some \$15 million CIF PL480 commodities seems to the Team a minimal U.S. contribution.

* * *

THE EVALUATION & DESIGN TASK

Objective. The objective of the task assigned to the Experience, Inc. team was to evaluate the three projects, "through an analysis of their activities and accomplishments," in order "to make detailed recommendations for future" AID assistance to them; and to emphasize improved coordination of the previously separate activities. (From the Delivery Order Statement of Work, attached as Annex A.)

It was originally planned that the Team would complete its design work well before a team from AID/REDSO/WCA began drafting the official design paper. This would have made the Team's fully considered conclusions available to the REDSO team. Schedules

did not permit this coordination. Instead, the Experience team left to the REDSO team, which arrived as the former was leaving, a preliminary draft "in substance" of its design views. An edited second draft was sent to the USAID and the REDSO in April, for their official comments and approval; the final report was delivered. The consequence of this scheduling is that AID's utilization of the Experience team's final design recommendations must come at later stages of project development, i.e., when an invitation for application or bid is prepared and when the selected management agency prepares its project work plans.

The Team and Its Methodology. The Team's agronomist and agricultural economist were concerned mainly with the research activity; the hydrologist and forester with watershed operations. Each specialist made technical recommendations. The Team Leader, an evaluation specialist, prepared the sections on PL480. He was responsible for the report overall, including conclusions and synthesizing recommendations, and for the rewriting and editing.

Members of the Team arrived in Praia together on January 6, 1990, and spent variously 21, 27, and 37 calendar days in-country. They studied some 125 documents (see bibliography, Annex D.) and interviewed more than 150 people: U.S., Cape Verdean, and other-donor officials; researchers, technicians, and administrators; extension agents, farmers, laborers, and other interested individuals. The Team visited nearly all the sites of all three activities on Santiago Island.

The Delivery Order asked some ninety-five probing questions. Some were matters of fact, some of analysis, and still others of best opinion, that is, professional judgement based on past experience and evaluation findings. Thus, comprehensive and detailed inquiry into all aspects of the three projects was required.

To organize the task the Team first ordered the questions, from general to specific, using its best initial impression as to the relative importance of the major topics. The phrasing of some of the issue questions implied prior conclusions, which the Team disregarded without necessarily disagreeing.

One week following arrival and USAID briefings the Team was introduced to the Cape Verdean Counterpart Team, at which time it was given a go-ahead to begin its work. Information collection and analysis spanned two weeks. Reports were prepared in the fourth week. A debriefing conference of concerned USAID and Government officials was held on 2 February. Rewriting and editing was done at Experience, Inc. offices in Washington during February and March.

Presentation. The three evaluations and the unified design recommendations, having considerable scope and complexity taken altogether, are presented below as two parts of a single Report. Part One consists of the somewhat independent evaluations of research, watershed operations, and PL480. Part Two, the design recommendations, treats the three elements as a unified whole.

The activities evaluated are of quite different types. Each is discussed in an editorial style appropriate to the different subjects and to the different disciplines of the investigating specialists. Some redundancies and reiterations are retained for readers interested in parts but not the whole of the Report. Detailed tables of contents are provided in order to ease the reader's task.

We are concerned about one consequence of the extremely short time allowed to the Team for its work in Cape Verde. That is, we had little opportunity to discuss conclusions and recommendations with Cape Verdean counterparts. We apologize to them for that, and urge the USAID to make the Report available to them and to bring their views to bear on further decision-making for the new project.

Finally, our perspective throughout in both evaluation and recommendations is long-term, for an effort going back fifteen years and continuing at least another fifteen, whatever the term of U.S. assistance to it.

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PART ONE:

THE EVALUATIONS

SECTION ONE: FOOD CROP RESEARCH PROJECT

TABLE OF CONTENTS

SECTION ONE - EVALUATION OF FOOD CROPS RESEARCH PROJECT	9
INTRODUCTION	9
I. PROJECT INPUTS	10
A. U.S. TECHNICAL ASSISTANCE (TA)	10
B. TRAINING	10
C. COMMODITIES	11
D. CONSTRUCTION	11
E. GOCV INPUTS	11
II. INIA RESEARCH ACTIVITIES	11
A. RESEARCH STRATEGY AND PLANNING	11
B. RESEARCH PRODUCTS	13
1. Dryland Crops	13
2. Irrigated Crops	14
3. Soil Science	15
4. Plant Protection	17
5. Climatology And Hydrology	18
6. Cropping Systems	19
7. Social Sciences	19
8. Forestry	21
9. Catalogue Of Natural Resources	22
10. Food Technology	22
11. Livestock Management	22
III. TRAINING AND COLLATERAL ACTIVITIES	23
A. TRAINING	23
B. LIBRARY/DOCUMENTATION CENTER	24
C. DATA ANALYSIS, COMPUTER USE, TRAINING AND REPAIR	25
D. CARTOGRAPHY AND GEOGRAPHIC INFORMATION	25
E. MAINTENANCE	26
F. MOTOR POOL	26

IV. INIA'S COLLABORATION WITH OTHER AGENCIES.	26
A. EXTENSION	27
B. COLLABORATION WITH THE DGCSFER AND OTHER AGENCIES	27
C. AGRHYMET	28
D. FAO	28
E. UNIVERSITIES	28
F. INTERNATIONAL AND OTHER RESEARCH CENTERS	28
G. USAID	28
H. LIVESTOCK	29
V. VARIOUS OTHER RECOMMENDATIONS	29
A. MID-TERM EVALUATION RECOMMENDATIONS	29
B. EXTENSION OF THE PACD, AND INITIATIVES PRIOR TO END OF PROJECT (DEC. 1990).	30
1. Extend the FCRP's PACD	30
2. Strengthening INIA Staff	31
3. Commodities	31
4. Technical assistance	31
5. Research Programs	31

SECTION ONE - EVALUATION OF FOOD CROPS RESEARCH PROJECT

INTRODUCTION

A.I.D.'s Cape Verde Food Crops Research Project 655-0011 (FCRP) assists the Government of Cape Verde (GOCV) to develop an adaptive research capacity. The Center for Agrarian Studies, founded in 1978 on the site of a colonial experiment station/boarding school, was subsequently reorganized as the semi-autonomous National Institute for Agricultural Research (Instituto Nacional de Investigação Agrária - INIA) 29 kilometers from Praia at São Jorge dos Orgãos. Since 1985, U.S. assistance has centered on INIA, an agency of the Ministry of Rural Development and Fisheries (known by the Portuguese initials MDRP).

The full or eventual purpose of the activity is to contribute to increased agricultural productivity in both irrigated and rainfed areas through applied research. INIA's overriding problem was the lack of trained researchers. The FCRP is filling the gap with long and short-term training, and technical assistance until training is completed. The project also provides commodities and funding for construction of facilities.

This final evaluation of the project had the dual task of assessing the progress of the activity in achieving its purposes, and of making recommendations for U.S. supported agricultural research activities in the period FY1991-95, in a proposed new project. The team members principally responsible for this evaluation were the agronomist and the agricultural economist.

Project inputs of technical assistance, training, and commodities were measured against planned requirements. INIA's research output was quantified and evaluated. Coordination with the hydrologist and the forester on the Team, who had primary responsibility for evaluation of the Watershed Development Project, was maintained by personal contact and team meetings. Periodic meetings were held with USAID and host country counterparts and with employees of the implementing contractor, the University of Arizona.

Most INIA activities are on Santiago Island, where its headquarters is located. It has some activities and facilities on Fogo and Santo Antão islands, and some survey work (collection of genetic materials, etc.) has been carried out on other islands. For lack of time, the Team visited sites only on Santiago.

NOTE: The evaluations make frequent reference to "AGRHYMET", which stands for the agricultural/hydrologic/meteorologic data center in Niamey, Niger. The center serves all African countries that are linked to its systems, including Cape Verde.

I. PROJECT INPUTS

Project inputs are specified in the Project Paper (PP) and the PP Supplement in terms of: Person-months for technical assistance; degree programs for training; and cost, in foreign exchange and local currency, of commodities and construction. A detailed commodity list for the project extension was submitted to USAID in the first half of 1988. In general, technical assistance, construction and training objectives have been attained. Commodity import as specified in the project extension has not been completed.

A. U.S. TECHNICAL ASSISTANCE (TA)

The supplementary authorization of 1987 provided an increase of about 58 person months over original TA programmed in the Project Paper, for a total of about 175 person months. Although an exact accounting is not available in Cape Verde, the contractor believes that TA targets will be met or slightly exceeded by end of contract. An informal listing of TA to date showed that about 126 person months of long-term and 38 person months of short-term consultancies have been provided. The contractor expects to provide an additional 15 person months between now (February 1990) and end of project for a total of about 180 person months (Annex F.,1). It should be noted that the contractor has considerable latitude in activity planning and budget management, enabling it to respond flexibly to changes in project needs without a burdensome approval process.

B. TRAINING

The revised training plan in the Project Paper Amendment provides for training in the U.S. of two candidates at the Ph.D. level, nine at the M.S. level, and five short-term. The project has provided the two Ph.D.'s and two more are scheduled to return to Cape Verde in 1992. Nine candidates have returned with M.S. degrees. One B.S. degree not in the original plan was completed in 1989.

Four non-degree programs of 12 months each have been completed under the FCRP. In addition, over 15 person months of short-term training (less than three months each) have been accomplished and eight or nine more person months are anticipated before the end of the project. (See Annex F., 2. and 3.).

We conclude that the contractor has complied amply with the terms and intent of the contract with regard to training.

C. COMMODITIES

According to the Project Paper Amendment, \$404,000 were programmed for commodity support in the original PP and \$772,000 were added by the Amendment. Commodities provided under the original PP included vehicles, library materials, laboratory equipment, and construction material such as gabions. There have been delays in procurement due primarily to changes in USAID procurement procedures and a change of contractors for procurement of FCRP commodities. Procurement delays are also due to a hiatus in project management. Between October 1987 and January 1990, no USAID project manager was assigned to the FCRP. In the interim, the job was done by the USAID Representative and an AID/W official on occasional TDY visits. A consequence of this situation is that a commodity order submitted by the contractor in April, 1987 is still pending. There have been two-year delays in renewing journal subscriptions.

D. CONSTRUCTION

whose housing?

The \$200,000 budgeted for construction of housing in the PP was unchanged by the 1987 Amendment. Housing construction was completed on schedule, as noted in the mid-term evaluation. In addition to one triplex unit and a housing unit, landscaping and flood protection for housing units were accomplished.

E. GOCV INPUTS

The Government of Cape Verde has complied with agreements on provision of facilities, and professional and technical personnel, as the Team understands them (Table 4). On occasion, however, salary payments to lower-paid technical personnel and other employees have been delayed for up to two months.

II. INIA RESEARCH ACTIVITIES

A. RESEARCH STRATEGY AND PLANNING

INIA's research strategy and plans are set forth in a Portuguese document included in the Third National Development Plan and translated into English in 1989. (Annex N). The document has not been significantly amended. The FCRP has not contributed to the research planning process other than at the project design level.

Agriculture and related research is justified by Cape Verde's need for new approaches to improve utilization of soil and water resources, to intensify rainfed and irrigated crop production toward food self-sufficiency, to reinforce livestock activities, to increase the capabilities of INIA and other MDRP agencies, to protect the environment, and to accelerate dialogue with rural populations.

The research strategies are:

- To search for sustainable production systems based upon available soil and water resources through analysis of the factors leading to stability or degradation of the resource base, studies on soil erosion and fertility, water transport and storage, and by development of resource management systems.
- To intensify agricultural production through the use of adapted crop species and selections adapted to Cape Verde environments and to determine the cultural and management systems and pest control means for attaining greater productivity per units of land and water.
- To develop means for improving storage, marketing and use of agricultural products.
- To improve storage, distribution and use of water in traditional and alternative irrigation systems.
- To develop alternatives to traditional agriculture for semi-arid, arid and saline soils areas.
- To establish baseline data and periodic benchmarks of the socio-cultural-economic situation in rural Cape Verde in order to test changes, as they occur, resulting from interventions.
- To continue development of INIA and MDRP personnel.
- To expand linkages between INIA and institutions in other countries and with international agencies.
- To accelerate the exchange of information with rural people.
- To increase livestock productivity and animal products quality through better animal health and nutrition.
- To facilitate the exchange of research results and conclusions among researchers and with extensionists.

INIA's research planning is adequate for the time being but should be refined in connection with the new project. There has been little change in the original planning document which drew reasonable conclusions, but did so intuitively rather than analytically. The FCRP has had little input to the research planning process other than at the program and project design stage. As INIA matures and the demands for agricultural research increase, more systematic methodology for planning and establishing priorities will be required.

Assignment of priorities to research activities is proposed by the Scientific Council of INIA and authorized by the Coordinating Council. (See organization chart, Annex, F., 5. and 6.)

RECOMMENDATIONS

■ The Team believes that research planning could be strengthened by a more systematic consideration of the problems. Although INIA, through its Social Science Department, has worked to identify the problems of Cape Verdean agriculture and a great deal is known through conventional wisdom, little has been done to determine the "felt needs" of the farmers. At present, development work is largely confined to matters encompassed by available technology and resources and existing government policies and priorities. It will be more productive when farmers' needs are taken into consideration. This requires more intimate contact with them through an improved extension service. An extension service not only transfers technology but also provides feedback to planners and researchers regarding the farmers' problems and attitudes, helping to define research needs. Regular assessment of these concerns could result in more realistic priorities, more effective use of available research resources, and attraction of international assistance.

■ INIA should request that the FCRP provide the services of a short-term research planning specialist to work with national planners and INIA in the development of a systematic research plan. This plan would: define the objectives for agricultural research in the context of national policies; identify the constraints to agricultural production in Cape Verde; identify research needs to overcome the constraints; establish guidelines for interdisciplinary and interagency cooperation; prioritize research activities; and assist INIA and its Scientific Council in planning at the program and project level. Preparation for this planning activity could be initiated now, so that results would be available for the FY91-95 project.

Was this done?
↓

B. RESEARCH PRODUCTS

1. Dryland Crops

A good beginning has been made in the study of dryland crops, principally corn genotypes and several species of pulses, such as cowpeas, beans, and pigeon peas (Congo Beans). Many of the results have been published. Dryland crops are very important to Cape Verde, culturally and economically, although they often fail if there is little or no rainfall during the July-October main growing season. Many resources are used each year to plant corn, a cultural dietary imperative. Wholesale failures often occur throughout the country.

RECOMMENDATION

■ Maintain research on dryland crops at current levels. Consider training one investigator to Ph.D. level in crop ecology/management. Research should consider maize

genotypes, and pulse species and genotypes. Sorghums, millets and other species may be valuable for fodder or livestock grain feeds. Cultural practices leading to better growth of maize and pulses may be appropriate early researchable subjects. Topics such as water micro-catchment basins and weed matter soil incorporation, different populations and intercroppings of agricultural and agroforestry crops, crop rotations, and effects of inoculating leguminous crops may be appropriate in the near future.

2. Irrigated Crops

Although irrigated crops occupy a very small portion of Cape Verde's arable land, their importance and potential are great. It is appropriate that INIA has placed considerable emphasis on improving the diversity and productivity of irrigated crops, such as cassava, sweet and common potatoes, and many horticultural crops (lettuce, cabbage, onions, garlic, watermelon, strawberries, tomatoes, beans, beets, peppers, cabbage, Brussels sprouts, broccoli, red cabbage, carrots), and citrus and other fruits. Attention at first has been placed appropriately on obtaining and screening genotypes from domestic and overseas sources. This work is progressing and should be continued with the better materials on hand now and with new acquisitions. As trainees return from overseas, the scope of irrigation research should broaden to include additional crops, and to address questions regarding timing of establishment and growing season, plant population densities; weeding needs; frequency, quantity and quality of irrigation; fertilizer response; effect of preceding crops; and pest control considerations. It is obvious that it will take many years to answer those many complex but researchable problems.

It should be noted that some of the research has been published, that a number of papers have been submitted for publication with some in press, and that some plant materials (cassava, sweet potatoes, tomatoes) have emerged from this program of research ready for on-farm demonstrations and utilization. There have been several on-farm tests and plant material dissemination activities with a number of crops, including sweet and common potatoes, cassava, and some horticultural crops.

INIA has, as resources permitted, done field research not only at São Jorge headquarters but at several branch stations on Santiago and other islands, and in cooperation with private and/or state enterprises, such as the Agro-Industrial Enterprise at Santa Cruz. Several experiments (described in annual and quarterly reports) were done in collaboration with the enterprise and others were conducted by INIA on land provided by farmers or the MDRP.

Bananas and sugar cane have been added recently to the research program. Presumably, the importance of bananas for export justifies some research attention, particularly for pests and in rotation or intercropping schemes; the characterization of known cultivars is of marginal value. The cultural importance of sugar cane products and its ability to withstand infrequent irrigation may justify minimal resource expenditure in a research program with this crop.

In the past, a small research effort was made with several non-food crops, such as jojoba. At this time the program is inactive and we think it should remain so since Cape

Verde is unlikely in the near future to produce sufficient quantities to justify processing plants for most of these products. The international market for jojoba is now uncertain. Small efforts may be justified with native plants such as the purge nut for cottage-type industries.

RECOMMENDATIONS

- Continue research on irrigated crops at least at the same intensity as in the past. Insure sufficient support personnel, transportation, laboratory, operating funds, and facilities at field stations. Coordinate crops research with soil fertility, irrigation water quality and management, and pest control. Research should consider most species currently under study, and should not expand significantly until more trained personnel are available. Cultural practices, soil fertility, water quality, irrigation timing, land preparation, nitrogen sources (inorganic, rhizobial or manure) and optimum plant populations may be appropriate early researchable problems.
- Continue and expand the number of on-farm demonstrations for the better crop genotypes and cultural practices identified in research. Coordinate selection of farmers and on-farm demonstration site selection with local extension personnel. Ensure cooperation of farmers by regular visits and record keeping done by research and extension personnel together. (See also recommendations concerning irrigation under Soil Science, below.)

3. *Soil Science*

Soil Science is a many-faceted discipline of study leading to the use of soils for sustaining crops, storing water, and as engineering materials. The INIA departments of soil chemistry and fertility, in the laboratory and in the field, have begun activities which will increase after the return of overseas trainees. The laboratories appear to have the majority of the needed equipment, although some may be in need of upgrading (e.g., water distillation), some may require maintenance or replacement of essential parts, and some have suffered from lack of essential consumables of reagent quality (e.g. acetylene, propane). Soil physics laboratory equipment, essential in the measurement of water-related soil characteristics, similarly needs upgrading and maintenance. Systematic and intensified collection and analysis of soil samples should be a goal of the laboratories in the future.

The characterization of soils over the landscape is a necessary part of soil science. The Simonson survey of Picos and Ribeira Seca watersheds, done for the WDP project and to be used in developing phased watershed plans, is an excellent soil map according to the U.S. taxonomic system. Unfortunately, INIA was not involved in planning or conducting the study or in using its laboratories for analysis of samples.

RECOMMENDATIONS

- Interpretation and land use classification should be done as a normal follow-up of the Simonson maps. These land use classifications will be helpful in land and water management for these two watersheds.

- Of the many systems of soil classification and mapping in existence (the U.S., the FAO, and the French systems, among many), each has advantages and disadvantages, and all are mutually incompatible. If different systems are used in different areas of Cape Verde, it will be impossible to correlate information in the future. GOCV should choose the system of soil classification to be used in the future to inventory and interpret the soil resources of Cape Verde. This decision may be difficult since each donor is partial to the system with which it is familiar. This choice is especially critical with the advent of the new Geographic Information System (GIS), since it will accept soils information from only one classification system. Future soil surveys should include interpretations and show land-use capabilities, slopes, stoniness classes, depths to bedrock, and other characteristics that agriculturists, irrigation specialists, foresters and designers of soil erosion structures must know.
- Soil maps done at the scale of 1:12,500 appear justified to the Team for irrigated areas and for some of the more humid rainfed areas. In the drier rainfed areas, and particularly in the arid zones, 1:25,000, or 1:25,000 maps blown up to 1:12,500, should be sufficient for most land use mapping. Naturally, in specific instances, more detailed mapping may be needed; for example, 1:1000 mapping of small research watersheds, crops research fields, or in planning structures. With the advent of GIS at INIA, in addition to the existing computing facilities and associated trained personnel, soil mapping should be done so that the information can be mated easily to the GIS. The probability computations of the Rainfall Information System (RIS) developed in the WDP should be incorporated into the new GIS system in graphical output form to expand its capabilities if these aspects are not included in the software to be supplied by AGRHYMET.
- One of the major needs of Cape Verde is to assess the extent of soil erosion and water infiltration as they are affected by rainfall, ground cover and man-made structures. INIA's Soils Department, in cooperation with its Hydrology Department and in collaboration with specific persons and programs in appropriate associated agencies such as the DGCSFER and the Water Resources Board (Junta de Recursos Hidricos), should continue and expand the research started at the small study-watersheds of Pinha near São Domingos and Fontes. A few additional locations, perhaps near Tarrafal and Santa Cruz, should be used as personnel and material resources allow. All these research sub-basin watersheds should be instrumented to measure appropriate parameters of soil erosion, water movement, storage and use and the effect of ground cover and other human-controlled treatments. Each watershed selected for study should have a paired, instrumented, control watershed to permit measurement of change with and without interventions.
- As research information is obtained as to the effect of structures and ground cover on water infiltration and storage, research in irrigation water use to obtain maximum efficiency should be continued and expanded. In order for this program to reach a critical mass, it will be necessary to coordinate research results on water storage and availability in aquifers with that obtained by soil and crop scientists regarding crop needs, soil water holding capacities, and water distribution schemes.

- The Team observed that the traditional system of allocating irrigation water on a rotating, unlimited basis at sometimes infrequent intervals probably leads to wasteful use of a scarce resource. Research programs should be instituted to determine whether this is the case, and whether alternative methods, to be implemented later through legislative initiatives, might be preferable.
- Cooperative research must be instituted among units within INIA in order to assess the extent of soil erosion and water infiltration as they are affected by rainfall, ground cover and man-made structures. The soils, hydrology and irrigated crops units, as well as persons or groups in other agencies such as DGCSFER and the Water Board, need to establish mechanisms for communication and dissemination of mutually beneficial research results. This research should be an expansion of the research begun in small sub-basin study watersheds.
- Continue and expand research in irrigation water use for maximum efficiency. Coordinate this program with research on water infiltration and aquifer storage. Combine the efforts of hydrologists, irrigation specialists, soil and crop scientists. Consider means for modifying the traditional system of irrigation water allocation.
- The research in water harvesting from clouds at elevations above 700 meters with small-mesh plastic screens appears promising. Water harvesting research for both household and irrigation water production should be continued by the appropriate agency (presumably the Water Resources Board, but not INIA) and brought closer to practical action programs.

4. Plant Protection

INIA's Plant Protection Department has identified many of the pests prevalent in Cape Verde. The insect collection is well preserved and catalogued and should be maintained. Expanded collections of other pests, such as nematodes and weeds, would be valuable additions. The forthcoming illustrated publication on Cape Verde pests will be helpful to workers in the field.

Some major successes have occurred, specifically the effective biological control of several important pests. Similar control of millipedes in Santo Antão should occur as the biological control research on this pest proceeds. This kind of approach seems most appropriate to the island ecosystems of Cape Verde; it should be expanded to other pests as resources permit.

RECOMMENDATIONS

- Continue the successful biological control approach to pest management with additional species and releases as resources and personnel allow.

- The Team noted that many horticultural irrigated crops suffer from devastating attacks by diseases, insects, birds, foraging goats, among many. Low yields could be improved vastly with appropriate controls, coupled with recommended fertilizer applications and controlled irrigation. It would seem that the securing of permits for chemicals and the availability of the products, as well as information regarding proper usage, are problematical for most farmers. The issue should be addressed by the appropriate agencies in the GOCV.
- Continue and expand, as resources and personnel allow, the research with irrigated crops to identify factors limiting yields, including plant genotypes, cultural and irrigation practices and pest damage. GOCV should simplify the procedures for obtaining agricultural chemicals and explore methods for making them more readily available to farmers.

5. Climatology And Hydrology

The Department of Agroclimatology and Hydrology has well qualified personnel to be augmented soon with returnees from training overseas. Most of the presently trained persons studied agroclimatology, hydrology, meteorological instrument maintenance or computer use at AGRHYMET in Niamey, Niger. The network of three synoptic and 14 agroclimatological stations in the country, supplemented by almost 300 precipitation observation stations, provides good climatic measurement coverage for Cape Verde. In addition, during the rainy season, observers continuously monitor recording and manual instruments for climatic and flood data. All information is received at INIA for processing; it comes from the other islands daily by telecommunication, to be followed by hard copy later at regular intervals. In some cases, transportation difficulties cause delays in data gathering and communication. Data are processed regularly every ten days and disseminated locally and throughout the Sahel AGRHYMET network. Several publications have been produced on statistical probabilities of occurrences of climatic and hydrologic phenomena, and weekly or more frequent requests for data are answered by the department. Personnel have the capability to compute rainfall maximal occurrences from existing data bases. The Team commends the use of agroclimatological real-time data to predict grasshopper appearance for initiating integrated pest management (IPM) activities. The Team commends the department also for its program of recognition of outstanding performance by employees.

RECOMMENDATIONS

- Continue the excellent performance of the department of hydrology and agroclimatology in obtaining and disseminating current data, in building data bases of historical data, and in developing statistical probabilities models. Continue to collaborate with persons who need this information, and publicize the availability of data to other professionals and agencies. Strengthen collaborative links with watershed activities in DGCSFER.

- Additional trained observers and vehicles are needed to expand the number of hydrologic stations during the rainy season. Some additional or replacement pressure gauges are needed.

6. *Cropping Systems*

INIA has not initiated a program of cropping systems research. It is well on the way to having a base of individual crop data (varietal, fertilizer/water response information, etc.) which should pave the way for a sound program to explore the interactions of various crops in systems of intercropping, rotation, etc. At present, however, INIA lacks researchers for the job.

RECOMMENDATION

- With the return of those in training, a program of cropping systems research should be designed and implemented using an interdisciplinary approach. Of particular importance are the interrelations among cassava, sweet potatoes, horticultural crops, and short-season leguminous crops in irrigated agriculture, and corn, tree and range plants, and pulses inoculated with effective strains of rhizobium in dryland agriculture.

7. *Social Sciences*

INIA has a significant data base from its field work which includes:

- Surveys on Santiago, Santo Antão and São Nicolão to characterize agriculture in terms of tenure, type (dry/irrigated) household demography, off-farm employment and capital resources (including livestock).
- Surveys of agricultural production techniques, costs of production, input requirements, yields, cultural practices and the cropping calendar, household expenditures and consumption patterns. Crop budgets were prepared on this basis.
- Study of representative farm systems. Over 40 farms representing about 12 farm types were observed over time to determine crop mix and other characteristics. This work provided comparative data on the economic situation of various farm sizes and types and constituted the major effort in constraint identification. This was useful in identifying research needs, establishing research priorities, and for the design of a framework within which the effects of subsequent interventions can be analyzed.
- Household surveys conducted as a baseline measure to be used in evaluating effects of interventions.

The Social Science Department of INIA held seminars with INIA research personnel and with other GOCV organizations on the results of surveys. The Department's activities were reported in several publications. (See Annex D, Bibliography.)

The Social Science Department cooperated with other INIA researchers in efforts to determine optimum irrigation schedules, using survey results. They also cooperated with researchers from FAO in a study of the economics of traditional versus modern on-farm storage of potatoes.

INIA crop budgets were used by the Rural Credit Program to determine guidelines for profitability and creditworthiness; by the Directorate of Agrarian Reform to evaluate the economic performance of cooperative farms; and by the Directorate of Agricultural Development to evaluate price supports for potatoes and onions.

The Social Science Department informed INIA researchers of the need for heat resistant varieties of tomatoes. Varietal testing and selection is underway. INIA has a proposal for economic evaluation of biological control of millipedes in Santo Antão.

As mentioned elsewhere in this document, much remains to be done toward formalizing the process of research planning and prioritization. Social Science research results will play a key role in this process when it is put into operation.

In general, the resources of the Social Science Department are adequate for work on Santiago. Additional transportation will be necessary for extensive investigations on other islands.

The inputs of FCRP to the Social Science Department of INIA were about 36 person-months of technical assistance (Langworthy-18, Belknap-12, Finan-5 and Wade-1), with an additional two or three months expected between now and end-of-project. Training was provided for Raul Varela (M.S. Anthropology) and Elisio Rodrigues (1 year - Social Science). The candidate programmed for an M.S. in Agriculture Economics was not accepted at the University of Arizona and this may leave a gap in the department in the future.

The data regarding production systems appear adequate at this time but should be updated according to future requirements. Timeliness of analysis was assured by processing data at the University of Arizona. There may have been some delay in dissemination of publications as they were routed from Arizona to USAID to INIA to users in the earlier stages of the project. A more direct route through the INIA library should be possible under integrated project management, to be discussed in Part Two of this report.

The Team believes that the current mechanisms for integrating the Social Science Department with other INIA departments (seminars, publications and joint activities) will be adequate and more efficient as the institution matures. Integration of research efforts by INIA leadership, the FCRP research advisor, and through the Scientific and Coordinating Councils has been a conscious and largely effective effort, considering the limited human and financial resources available in the early stages of the project.

INIA has not yet developed a formal research review procedure although it is assumed that the Social Science Department will be an active participant in this activity. Social Science participation is planned for the review of sweet potato and cassava research.

Very little on-farm research has been undertaken at INIA. In the future, all on-farm research planning should consider the data collecting requirements for cultural practices and other sociocultural characterization as well as data requirements for economic evaluation of results. This requires input from the Social Science Department during the planning stage.

Currently, the Social Science Department has one researcher, two trained enumerators, and a driver. The Team foresees the need for a researcher trained at least to the M.S. level in Agricultural Economics, and at least one data entry person. To further institutionalize the role of the Social Science Department it will be necessary to bring its personnel up to full strength, and to involve it to a greater extent in INIA research programs through joint planning and collaboration with other researchers.

RECOMMENDATION

- INIA should take a long-term view of staffing for the Social Science Department, including a Ph.D., preferably in Agricultural Economics, for the department head. This is desirable because of the importance of research design in both social science research and interdisciplinary research. Interim technical assistance will be needed.

8. Forestry

One watershed activity is the use of trees for soil stabilization. Recently, WDP and DGCSFER personnel have conducted limited comparative forestry studies which have yielded preliminary information about species adaptation. The Henry Doubleday Research Association has supported research in this area with work culminating in a recent report. Since INIA has the mandate for national research in agriculture and natural resources, and has hosted the Henry Doubleday Research Association program on Prosopis, it seems appropriate that forestry research be conducted by INIA with collaboration from qualified and interested persons from other agencies.

RECOMMENDATION

- INIA should fill the vacant position in forestry as soon as qualified personnel is available. A Cape Verdean should be trained at the M.S. level or higher in dryland silviculture and agroforestry. During the training period, the services of a qualified silviculturist should be obtained on a long-term basis to initiate a comprehensive research program. Cooperative research with DGCSFER is essential.

9. *Catalogue Of Natural Resources*

The Division of Botany in INIA's Department of Natural Resources supports a number of activities, such as the herbarium of Cape Verde specimens and the botanical garden; the collection of reproductive materials from Cape Verde plants for international exchanges; the consideration of plans for parks and reserves, and the characterization of medicinal and aromatic plants. These activities are commendable and should be maintained. The excellent agroecological maps of Santiago and Fogo islands will be accompanied later by those in preparation for other islands. This information can be used for planning purposes by the returning trainee in range management, and will be useful for watershed development and other activities.

RECOMMENDATION

- Digitize and computerize the existing information on natural resources, including the agroclimatological maps, so that it can be readily usable.

10. *Food Technology*

Although INIA has a Department of Food Technology in its organization chart, the department has been inactive for some time. Research in storage of food crop products is needed to accompany the adoption of new crops by farmers. Of lesser immediate need is the development of preservation methods for food products at the home and cottage industry levels.

RECOMMENDATION

- INIA should staff the Department of Food Technology and provide the necessary technical help, laboratory, and operating expenses. The INIA research program in food crop storage (potatoes) should be coordinated with those of other donors working in Cape Verde.

11. *Livestock Management*

The 1985 decree-law that created INIA calls for it to do research on livestock management and diseases. An animal pathology laboratory is under construction at the São Jorge INIA headquarters and remains to be completed, instrumented, and manned. (The Team had no detailed information on what research, if any, in animal management and nutrition is conducted by the MDRP's Directorate of Livestock, the Center for Livestock Development, and/or other agencies).

RECOMMENDATIONS

- Research in range management should be collaborative with that in cattle and goat management and nutrition. Range laws may be needed to allow for better animal production and to safeguard soil resources at high elevations and in the ribeiras.

The slope above and behind the central buildings at INIA in São Jorge, from which livestock and human activities have been excluded for several years, strikingly illustrates the regenerative capacities of the landscape to protect the soil and eventually become productive again. Exclosures to control goat and human access, particularly on the upper slopes, should be a beginning step in the research program on range management and to illustrate the improvements that can result from range control. Adaptation and management of genotypes of endemic and possibly exotic species and cultivars should be investigated at different elevations and on diverse aspects and slopes. Collaboration with livestock (cattle and particularly goats) specialists will be essential. As information is obtained and disseminated, consultations leading to legislative initiatives and action programs may be necessary to insure that Cape Verde begins resolving its major range utilization and management problems.

III. TRAINING AND COLLATERAL ACTIVITIES

A. TRAINING

The Rural Development Training Service started in the 1950s and moved to at São Jorge in 1987. Technical two-year training courses are offered periodically by the Service's Training Center to persons who have had nine previous years of schooling and have received scholarships to become technical professionals and medium level technicians. Preference is given to rural people and females, with quotas for each island. A new two-year training course is scheduled for the end of January 1990, although financing is uncertain at this time. Short-term training is offered upon request by various agencies and projects and as financing permits. The Service, with the cooperation of other agencies and ministries, maintains a systematic record of potential trainees and their needs and qualifications. Teaching materials are kept on file from previous courses. The Center has room and board facilities for about 80 students, and it is estimated that the Center is running at about 60% capacity. FAO has been a major donor to the activity.

The adult literacy program includes also nutrition, sex education, hygiene, health/sanitation, first aid, sewing, fruiticulture/horticulture, and small animals. Spain supports this activity.

RECOMMENDATION

■ The USAID should explore with the GOCV the advisability of using PL480 funds to finance food and maintenance for students at the Training Center in support of ongoing training activities. Current cost is 12,000 escudos/month/student of which 10,000 are for room and board. In addition, INIA should plan now for undertaking its expanded responsibility of training significant numbers of extension agents, as will be required of it by the FY91-95 project.

B. LIBRARY/DOCUMENTATION CENTER

The Library/Documentation Center (Serviço de Documentação e Divulgação de Dados) maintains the library current for the use of research and other personnel; disseminates research information; and serves as the local AGRIS representative. Two staff are assigned to these tasks, Sr. Joaquim Morais and a new helper in need of training. A mid-level technician, who will need library training, is scheduled to join the library in early 1990.

The library was established properly and was originally adequate, with regard to quantity and quality of monographs and serials, and equipment. After the mid-project change in procurement procedures, however, most subscriptions to serials lapsed and orders for monographs were not processed. Consequently, the latest available issues of most serials are over two years old. (Some issues have been ordered by the University of Arizona on an emergency basis and a few have begun arriving.) No monographs have been ordered for over two years. On the other hand, the librarian appears qualified to develop document lists to meet the expressed needs of research personnel.

The librarian has developed his own system for cataloguing holdings (which are almost entirely in English and of American origin) that is a modification of the FAO alphabetical system. This system, which incorporates author, title, and subject sections, is simple and is likely to be sufficient for the foreseeable future and size of the library. However, we noted some delays due to insufficient personnel in cataloguing new acquisitions that were displayed and available to users. The microfiches, and other holdings too small to place on shelves, also need to be catalogued. There is an appropriate check-out system in place, by both material and user.

The Service has done a commendable job in publishing research information provided by investigators. The editorship of the publication *Investigação Agraria* is an exacting and time-demanding activity. The publication which lists on-going research activities, brought up-to-date periodically, is well worthwhile. The computerized data base on research publications and bibliographies on Cape Verde subjects is incomplete and should be kept current.

RECOMMENDATIONS

- The librarian should be given clear guidelines and procedures for timely and regular ordering of monographs and serials. He should also be advised of the yearly budget within which he can prioritize and order acquisitions. A reliable procurement system should be worked out. Past performance of AID, the University of Arizona, and the American Overseas Book Co. has been disappointing.
- The library should obtain appropriate and current monographs and serials in languages other than English, particularly French. Publications of the United Nations should be obtained regularly. AID, other donors, and the GOCV should be called upon to support acquisitions that are essential for an adequate research library.

- The library, perhaps in collaboration with the Training Service, should develop a series of information publications. These publications would interpret research information for technology transfer. Authors of each article in *Investigação Agraria* should be collaborators in this effort. Other topics appropriate to this series should be included as information becomes available and its dissemination is required.

C. DATA ANALYSIS, COMPUTER USE, TRAINING AND REPAIR

Personnel in this group are well trained and efficient, and most equipment is operational. INIA has appropriate software, such as LOTUS, IBM/AT, MSUSTAT, WORD, SYMPHONY, and a number of data bases. Personnel can instruct each other in the use of available software packages.

With the advent of GIS at INIA, in addition to the existing computing facilities and associated trained personnel, we question the need for many additional out-of-country training sessions in computer use, particularly for learning about standard packages which have detailed and user-friendly manuals and menus. Occasionally, special additional training in software use or hardware repair may be justifiable at Niamey and other locations.

RECOMMENDATION

- INIA should acquire additional state-of-the-art programs for word processing, spreadsheets, data base management, statistics packages and graphics. Most training for INIA personnel in the use of these packages should be done in-house by INIA computer specialists. A recent model of a desktop computer with 60 or more megabytes of hard disk storage may be desirable for some of the graphics and data analysis problems.

D. CARTOGRAPHY AND GEOGRAPHIC INFORMATION

At the time of this final evaluation, the Cartographic Service of INIA was inactive, for lack of personnel. The Service holds a complete uncatalogued set, in multiple copies, of Portuguese military topographic maps of all the islands, at a scale of 1:25,000 with 10-meter contour lines. In addition, it has excellent agro-ecological maps of Santiago and Fogo islands prepared in Portugal, to be followed by those of other islands. These are a valuable asset in the map inventory. (See also B.2.c., above concerning soil mapping needs.)

The WDP sub-contracted the installation of a Geographic Information System (GIS). The software may have been state-of-the-art some years ago, but this is no longer the case. It is not user-friendly. According to Sr. Horacio da Silva Soares, Director of AGRHYMET, the upcoming GIS system from AGRHYMET, to be installed soon at INIA, will be available to all who show a real need, regardless of agency affiliation. AGRHYMET will train Cape Verdeans in the use of GIS. If local people want a specific application they can be trained at Niamey, or locally, to initiate their own procedures and

develop specialized data bases. The WDP also has a Rainfall Information System (RIS). It may be possible to merge this RIS with the new GIS system to expand its capabilities.

E. MAINTENANCE

Personnel were trained in the U.S. and at AGRHYMET in the maintenance and repair of laboratory and computer equipment. Spare parts and consumable supplies often have been delayed in procurement, sometimes for up to two years.

RECOMMENDATION

- Initiate a formal written plan for the periodic maintenance of each laboratory apparatus and computer. Maintain an inventory of supplies and spare parts, updated on a monthly or quarterly basis. Establish a regular procurement schedule to insure uninterrupted functioning of equipment to the extent possible.

F. MOTOR POOL

The vehicles at INIA, provided from different sources at different times, are as much as six years old. Although Cape Verde cobblestone roads are good, agricultural research vehicles often must go offroad and can wear out rapidly. INIA personnel must have transportation to fulfill their duties on research locations and at on-farm demonstration activities. These activities will increase in the future.

RECOMMENDATION

- Each vehicle should have a thorough lubrication and engine maintenance check every six months. Sufficient spare parts should be on hand at all times to permit timely repairs. A priority list should be developed for the acquisition of additional vehicles to support the activities of newly-filled positions and to support the expansion of activities. A system to insure equitable access to vehicles needed for research activities should be developed.

IV. INIA'S COLLABORATION WITH OTHER AGENCIES.

The Team was impressed by the participatory decision-making process common in Cape Verde. Coordinating committees made up of officials at the highest level support the principle of collaborative action and members of agencies are encouraged to cooperate. Without such support, cooperation could not exist. For collaboration to thrive in fact, however, it is necessary that the technical and professional personnel discuss among themselves the needs for research, the specific objectives of specific endeavors, the

division of labor, on a fair basis, and the proper share of rewards and rights to publish, before the project is initiated. The cheapest input commodity to a successful research program is ink, to plan action at the beginning and to ascribe proper credit to all contributors at the end.

A. EXTENSION

The Directorate of Rural Extension is a young agency. Its original cadre of thirty agents, trained at INIA's training center, has been depleted over the last two years, losing agents to better paying jobs or to positions with better work conditions. Activities and programs are decentralized. Although this may be desirable for cultural and communication reasons, it limits the ability of the service to have a unified and informed technological presence. There are no extension specialists. The agency has allowed some donors to conduct their own research programs using extension personnel and facilities. Some farmers have made disparaging remarks about the competence of extension agents. The extension service has a morale problem.

RECOMMENDATION

■ INIA has the mandate to do research, which is therefore not required of the Extension Service. INIA should initiate and conduct on-farm demonstrations with the collaboration of local extension agents. INIA should continue to train extension agents, and should develop regular programs for in-service training of extension agents. Outstanding agents should be considered for additional training to become extension specialists. The morale problem should be addressed in a constructive manner at the earliest opportunity with an appropriate support and incentive program. With respect to further development of the extension function, we are proposing, in Part Two below, a major effort commensurate with the new emphasis on the application of research results to agriculture during the next 5 - 15 years.

B. COLLABORATION WITH THE DGCSFER (MANAGER OF THE WATERSHED PROJECT) AND OTHER AGENCIES

It is clear that the GOCV understands the need for many agencies to collaborate so that joint efforts will produce more results than could the sum of separate and sometimes competing efforts. The Coordinating Council of INIA proclaims a policy of cooperation among INIA departments and between INIA and other agencies, especially the DGCSFER and the Water Resources Board. Informal and personal links do exist but more must be done.

RECOMMENDATION

- Institutionalize collaboration at the scientist-engineer-professional level with officially sanctioned groups concerned with a specific subject matter. Examples of such topics that will require a joint effort: research on soil erosion, sedimentation, water-retaining structures and effects of ground cover; research on tree and bush species adaptation and their effect on soil erosion and agroforestry productivity; research on water infiltration, soil water storage, and irrigation water use.

C. AGRHYMET

The Team is happy to note the active and positive relationships which exist between INIA and AGRHYMET, and supports the desire of both organizations to continue joint operational, research, and training activities. We also note the substantial support of AGRHYMET given by AID, NOAA and the Coast and Geodetic Survey.

D. FAO

As far as the Team could ascertain during its short visit, relationships between FAO and INIA appear to be strong in some areas such as integrated pest management and in cassava and horticultural crops genotype comparisons. The relationship appears tenuous or minimal in other areas.

E. UNIVERSITIES

INIA has strong links with the University of Arizona, fostered through the leadership of Dr. Victoria Marcarian, through other staff members of that university, and through the Cape Verdean trainees who studied at Tucson. In addition, through other joint research, consulting, and training programs, links exist with a number of other institutions. (See Annex F., 2 and 3.)

F. INTERNATIONAL AND OTHER RESEARCH CENTERS

International research centers have been used appropriately by INIA for training (AGRHYMET), joint research efforts (EMBRAPA), and as sources of germplasm and information (IITA, ICRISAT, CIAT).

G. USAID

A significant problem for the implementing contractor was the intermittent nature of project management due to staff vacancies in USAID. Project documentation was delayed. Some orders for equipment, spare parts and library materials have not yet been filled. While there have been frequent meetings with USAID, and the contractor has filed detailed quarterly and annual reports, communication has been inadequate. Perhaps

detailed quarterly and annual reports should be preceded by a one-page summary listing succinctly the project's accomplishments and the problems needing resolution.

H. LIVESTOCK

(The need for collaboration among agencies concerned with livestock is discussed at II. B., 11. above.)

V. VARIOUS OTHER RECOMMENDATIONS

A. MID-TERM EVALUATION RECOMMENDATIONS

The 1987 Mid-term Evaluation of the Food Crops Research Project made a number of recommendations which served in effect as an updated project paper. Most of them were followed, some were redefined. We comment on the recommendations and add some of our own, in the following.

1. The recommended socio-economic surveys were completed. The data has been summarized, interpreted and published.

2. INIA recognizes the need for additional research in dryland agriculture and its implementation has started. Although sorghum is used successfully in other countries of the Sahel, it is not an important crop in Cape Verde. This is due to its absence from the local culture, and also to its susceptibility to diseases, pests, and bird damage. Nonetheless, the recommended research was done on several trials, with poor results. Research with other dryland crops has continued and been intensified, and several publications have resulted. In any case, it appears to us that an appropriate balance exists between the research efforts devoted to rainfed and to irrigated crops.

3. We agree with the earlier evaluation on the objectives of research, but its suggestion to carry it out in large teams of eight to twelve scientists ignored the reality of scarce professional resources at INIA.

4. It is true as asserted that research must be initiated and actions taken to safeguard the steep fragile, highly eroded, watershed uplands. Range management research will begin addressing the problem when trained personnel and the necessary legislation are in place.

5. It is clear that INIA and DGCSFER functions are closely related but differentiated: INIA focuses on agronomy; DGCSFER installs soil and water conservation structures and reestablishes ground cover to increase food-producing capacities on both marginal rainfed land and in irrigated areas. Rural Development officials are committed to the principle of coordination and collaboration among agencies dealing with interconnected problems such as these. A number of projects discussed in this report

under subject matter headings have been carried out jointly by INIA and DGCSFER, but collaboration will require substantially more effort in the future.

Projects that foresee the need for collaborative work should plan for it more carefully. The responsibilities and commitments of each agency and position should be identified in jointly-developed documents. In the implementation phase, as we have said above under IV.B., cooperation can be fostered by subject matter seminars and continuing work groups (such as a group concerned with pod production from trees that involve foresters, livestock specialists and agronomists). Researchers, engineers, agriculturists and extension workers should discuss problems and research needs in both ad hoc and formalized situations.

6. We agree it is desirable to design research projects with specific donors in mind. INIA has a detailed and ambitious listing of research needs and priorities, and has identified the major agricultural problems, the potential returns from solving them, and their relationship to national goals. It is sometimes difficult to reconcile research strategies based on these considerations with the interests and objectives of donors who have their own priorities. Nevertheless, Cape Verde must make the effort to define its research needs in relation to donor interests, and must guide donors to the highest priorities.

7. Training of INIA personnel sponsored by the FCRP and other donors has been an obvious success. It should be remembered, however, that a newly-graduated research Ph.D. needs on-the-job seasoning to become an experienced research leader, and that those trained at the master's level need additional guidance and experience before maturing as researchers. Newly-trained personnel need supervision of experienced colleagues in the pursuit of agreed-upon research objectives. Means must be found to evaluate performance, and to reward those who perform well. Incentives should be linked to merit and productivity rather than to length of service only.

8. The need to integrate socio-economic research information with the development of research programs is well understood. The socio-economic research program was started later than the others, but recent publications have summarized most of the information available on Cape Verdean agricultural systems and farming budgets. A Ph.D. in Agricultural Economics is needed.

B. EXTENSION OF THE PACD, AND INITIATIVES PRIOR TO END OF PROJECT (DEC. 1990).

1. Extend the FCRP's PACD

The evaluation Team recommends extension of the project's Project Activity Completion Date from 30 June 1990 to 31 December 1990.

INIA's work is ongoing, of course, and under present plans so is U.S. project assistance to it. The PACD of the watershed project has already been extended to the

end of this calendar year. In order to avoid a hiatus in FCRP activities, and to insure that the two projects are considered on an equal footing in plans for their consolidation in the new FY91-95 project, the PACD for FCRP should coincide with that of the WDP.

No additional funding is required by this action.

2. *Strengthening INIA Staff*

- a. Fill vacant positions in the following: irrigation water use and management; forestry; and food/crop harvest/technology. Provide necessary technical help, laboratory facilities, transportation, and operating funds. *BUT, how to put on a sustainable footing?*
- b. Appoint technical field observers for agroclimatology and hydrology
- c. Identify qualified candidates for training

3. *Commodities*

Obtain lists of equipment and supply requirements from persons directly involved in project activities. Improve procurement procedures.

4. *Technical assistance*

With extension of the activity completion date, it will be important that the contractor's team leader continue with the uncompleted task of institution building.

Short-term consultants have been valuable in the FCRP, having had achievable and clearly defined tasks and having provided on-the-job-training for Cape Verdean counterparts. INIA and the University of Arizona should work together to identify needs and candidates for short-term technical assistance during the life of the present project and all other technical assistance needs in the new project. This will help the managers of the consolidated project to make a prompt start.

5. *Research Programs*

In broad terms, INIA should continue existing programs-- in the period remaining for the FCRP, and after that in the new project-- in both biological and socio-economic research, summarizing the data and disseminating the information. It should also prepare to conduct wideranging research in hydrology and other aspects of soil and water conservation. Special attention should be given to the development of long-term research-project planning.

SECTION TWO: EVALUATION OF THE WATERSHED DEVELOPMENT PROJECT

TABLE OF CONTENTS

SECTION TWO: EVALUATION OF THE WATERSHED DEVELOPMENT PROJECT	33
INTRODUCTION	33
I. PROJECT INPUTS	34
A. TECHNICAL ASSISTANCE	34
B. TRAINING	36
C. COMMODITIES	36
D. GOCV INPUTS	37
II. SOIL AND WATER CONSERVATION (STRUCTURAL)	37
A. FINDINGS AND PRECEPTS	37
1. Design and Construction Methods	39
2. Maintenance Program	39
3. Impact Assessment Of Control Measures	40
4. Water Resources Development	40
5. Technical Integration	41
B. RECOMMENDATIONS	41
1. Guiding Principle	41
2. Watershed Development Planning	42
3. Design Data Needs	42
4. Research Needs	43
5. Measurement and Analysis	43
6. Hydrologist/Researcher	44
7. Technical Assistance, Cooperation, and Training	45
8. Design and Construction Methods	45
9. Maintenance	46
10. Water Resources Development	47
III. BIOLOGICAL EROSION CONTROL/FORESTRY - FINDINGS & RECOMMENDATIONS	48
A. LOCATION AND DISTRIBUTION OF PROJECT ACTIVITIES	48
B. FORESTRY PRIORITIES AND SITE SELECTION	49
C. FALLOW LANDS AND INCENTIVES	51
D. ENERGY FROM BIOMASS AND OTHER SOURCES	51
E. SPECIES, SEEDS, AND PLANTING TECHNIQUES	52

	33
F. DATA MANAGEMENT AND PLANNING	54
G. ALLOCATION OF FUNCTIONS AMONG AGENCIES	56
H. TRAINING	56
I. CONCLUSIONS	57
IV. RURAL ASSISTANCE PROGRAM	58
A. COMMUNITY-BASED WORK FRONTS	58
B. EXTENSION AND COMMUNITY DEVELOPMENT	59
C. STAFFING AND TRAINING	60
D. INSTITUTIONAL FUTURE	61
E. CONCLUSION	61
V. INSTITUTIONAL COLLABORATION	62

SECTION TWO: EVALUATION OF THE WATERSHED DEVELOPMENT PROJECT

INTRODUCTION

The Watershed Development Project (655-0013) develops and protects the soil and water resources of the project-designated watersheds by providing erosion control, soil moisture conservation, flood control, and water resources development. The project is operated by the Directorate of Soil Conservation, Forestry and Rural Engineering (Portuguese initials DGCSFER) of the Ministry of Rural Development and Fisheries (MDRP), with the technical assistance of Sheladia Associates.

The objective of this evaluation is to assess the performance of the implementing agencies and the progress of the project in relation to its goals; and, to make recommendations for the design of a follow-on project.

The evaluation was carried out principally by the community forester and the hydrologist and guided by questions in the Statement of Work, which they summarized as follows:

- Review the Government of Cape Verde (GOCV) plan for watershed development, AID-sponsored watershed development work, and that of other donors
- Examine project performance as to: technical aspects; community involvement and extension; selection and training of personnel; and relationships with other agencies
- Identify needs for research in watershed engineering, hydrologic processes, and forestry, and explore options for conducting the research and sharing results
- Explore means for increasing professional collaboration among institutions involved in watershed work and rural development generally.
- ✓ ■ Assess the attitudes and interests of local populations towards soil and water conservation measures being used
- Formulate recommendations for a combined watershed development/food crops research project toward:
 - 1) improving the quality and suitability of technical assistance, training and research, and of extension work in the watersheds

- 2) increased coordination of watershed development efforts with applied agricultural research
- 3) greater coordination and efficiency in U.S. management of the resources provided to the combined project

Field observations, examination of data and information available within the WDP provided by USAID, the DGCSFER and the technical assistance contractor, discussions with USAID and GOCV officials, and interviews with beneficiaries and project personnel, provided the basis for analysis. Eleven of the thirteen project-designated watersheds were visited.

I. PROJECT INPUTS

A. TECHNICAL ASSISTANCE

Under the terms of the original contract, Sheladia Associates, Inc. the implementing and technical assistance contractor, was to fill long-term positions as follows:

Watershed Management Specialist/Team Leader	3 years = 36 months
Community Development/Extensionist	2 years = 24 months
Agricultural Engineer	1 year = 12 months
Sylvo-Pastoralist	1 year = <u>12</u> months
TOTAL	84 months

(A sub-contractor, Oregon State University, was responsible for supplying the engineer.)

For the period following the project amendment and extension, the prime contractor, was required to continue long-term assistance as follows (project-life total in parenthesis):

Team leader/Hydrologist	18 months
Forester	<u>18</u> months
TOTAL	36 months (120 months)

Upon the departure of the Team Leader/Hydrologist, it was decided to add a construction engineer to the team for the remainder of the project. Actual and scheduled (through LOP) long-term assistance provided by Sheladia totals 130% of requirement, as follows:

<u>Person/Function</u>	<u>Period</u>	<u>Months</u>
Robert Pierce, hydrologist and Team Leader	January 1986 - January 1989	36
Paul Theisen, forester	January 1986 - September 1990	51
Team Leader	January 1989 - September 1990	
James Webster, engineer	January 1986 - July 1986	6
Nick Nikitas, engineer	April 1987 - October 1989	30
Thomas Gardiner, extension specialist	January 1986 - July 1987	18
Jose Vera Cruz, civil engineer	June 1989 - September 1990	<u>15</u>
	TOTAL	156

Sheladia was required by the original contract to provide 36 months of short-term consultancy augmented by the amendment to a total of 48 months. To date, it has provided some 40 months of short-term assistance (170 weeks) through subcontracts with individuals and two institutions, and home office support. Nineteen technical and managerial topics were involved. (See details in Annex G., 4.)

Throughout the life of the project, the field team has suffered from the intermittent vacancies in the long-term positions of hydrologist and civil engineer. Delays in contract finalization of the project extension left both positions vacant from January until the end of June 1989. The position of civil engineer is now filled capably by Mr. Vera Cruz.

Many of the short-term consultants worked on two specific activities. The first was an effort to collect data and materials in order to create a set of aerial photographs, a rainfall information system, and a geographic information system undertaken by a series of specialists from Oregon State. Of these, only the rainfall information system has reached a usable stage. Many of the other consultants, most hired by Sheladia Associates, Inc., were collecting information to be used in future watershed development planning. Work was continuing in this area at the time of this evaluation.

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many water flow control structures. The gabions arrived in port in January 1990, and were cleared through customs on February 2, 1990. This forced changes in both construction of new structures and maintenance of existing ones. Delays in purchase of vehicles, tires, and parts have impeded efforts to provide frequent field visits to project sites by MDRP and WDP technicians.

The reasons for the delays are complex and cannot be attributed to any one cause. However, two particular circumstances did contribute. First, just as plans were being drawn up for the WDP extension the procurement process was changed. The Host Country contract was replaced by an AID direct contract. There was then delay between signature of the project extension and selection of a procurement agent. Second, due to vacancy in the USAID/Praia ADO position, the USAID was slow to act. The commodity procurement problem can be associated primarily with AID problems.

Since project extension in January 1989, Sheladia Associates, Inc. has been directly responsible for order and purchase of small parts and office supplies. Although time-consuming, this system has permitted fairly rapid procurement of important items.

D. GOCV INPUTS

The GOCV supplied the labor force (paid by PL480 sales proceeds) and the majority of ~~technical and management personnel~~ for project activities. The Evaluation Team gives a generally positive assessment of the quality and number of personnel made available. The GOCV also supplied adequate office space and furnishings to WDP staff. The DGCSFER has performed well in responding to short term in-country training requirements identified by WDP technicians. Finally, it supplied vehicles and POL, as available, throughout the project life.

II. SOIL AND WATER CONSERVATION (STRUCTURAL)

A. FINDINGS AND PRECEPTS

Erosion control involves the application of structural and non-structural (vegetative) control measures to halt erosion and sediment transport. Soil moisture conservation entails application of structural and non-structural means of retaining precipitation on the land and reducing evaporation losses from the soil surface. Flood control consists of the application of structural means to prevent overflow on upstream areas and reduce peak flow in downstream areas during and after heavy storms. Water resources development involves the collection, storage and utilization of surface and ground water resources.

A substantial accomplishment has been made in constructing soil and water conservation structures within the thirteen project-designated watersheds. The various types of structures built in the project area can be differentiated by size, purpose, material, and construction methods. They were constructed with one or more of the following

purposes, to: 1) increase water retention at the point of runoff generation, 2) increase infiltration, 3) decrease erosion and sediment transport, 4) reduce flow velocity, 5) trap sediment, 6) provide flood control, 7) provide water storage, and 8) install water conduction works (canals and pipes) for irrigation and domestic water supply. Annex G., 3. briefly describes the various types of soil and water conservation structures according to their purpose.

Completed soil and water conservation works exceed Project Paper targets to date for most structures (See Annex G., 1., d.), as follows:

- Rock-stabilized structures or contour rock walls (muretos) have been constructed on contour lines and back filled by earth to control erosion and increase water infiltration. Treatment of hillslopes with rock-stabilizing structures on the project areas has reached 114 percent of the Project Paper target.
- Dikes (average size of over 100 m³), check dams (average size of 40 - 100 m³), and gully plugs (average size up to 40 m³) have been constructed in major channel beds and tributaries to attenuate the peak flows and provide channel stabilization. Construction of dikes, check dams, and gully plugs is close to project targets with 92.5 percent completed to date.
- Embankment groins and longitudinal walls have been constructed with rock-filled gabion cages. Their main purpose is to protect farmland, irrigation systems, roadways, and to control and spread storm water runoff in major stream channels. Construction of embankment groins and longitudinal walls amounts to 213 percent of the project goal, to date.
- Catchment check dams have been constructed in major channel beds. Their main purpose is to "catch" subsurface flow and make it available for agriculture and domestic use. Sizes and designs vary according to topographic, geologic, hydrologic, and sedimentologic characteristics of the particular construction sites. Construction of catchment check dams is close to the project target (85 percent completed to date), with the prospect of full completion by the end of the year.
- Reservoirs are large surface stone and masonry tanks constructed at high elevations to permit water flow by gravity. Their main purpose is to store water for irrigation and domestic use. Construction of reservoirs to date has far exceeded project goals, at 125 percent of target.
- Water conduction works are canals and PVC pipes used to carry water from catchment sites or storage reservoirs to some downstream point of interest. Construction of water conduction works is approaching project targets with 65 percent completion to date.

Despite the project's success in comfortably exceeding targets in numbers of structures, there are other aspects to consider during the final WDP phase and future activities including especially: design and construction methods; maintenance programs;

impact assessment of control measures; water resources development; integration of conservation activities; and research needs. These aspects are discussed in the following sections. (Recommendations on these and related matters begin at II.B., below.)

1. Design and Construction Methods

Our inspections and reviews indicated that a straightforward, conservative design has been used in most of the structures. However, failures of some masonry and rock work structures have occurred. In general, a hydraulic structure may fail as a result of poor design, improper construction methods, or lack of structure maintenance, but it is difficult to assign cause without appropriate data.

Poor design may result from an improper method of estimating the design storm, and lead to inadequate width and height of the check dam weir; or from lack of attention to stability analysis (sliding resistance, structure overturning, and bearing stresses) producing foundations that are not deep enough that lack scour protection (apron) at the base and lack scour and end-cutting protection at abutments. Inadequate materials (use of small rocks for building the dam body when gabions would be preferable-- see example of the salt-intrusion dam at the outlet of Ribeira do Cumba-- may also cause construction problems.

Contour rock walls have been the preferred structural approach to water and sediment control on hillslopes. Although rock walls are a traditional form of water and sediment control in Cape Verde, they do not appear to be efficient. Our impression is that the dislodgement and movement of rocks, naturally distributed on the soil surface, increase the susceptibility of soil to erosion by exposing the soil surface to direct raindrop impact, by increasing the soil erodibility and exposing soil surface to rilling processes, and by decreasing soil moisture retention. The efficiency of contour rock walls can be increased when associated with contour furrows (banquetas) and reinforced with a vegetative cover. The distance between banquetas (and rock walls) should be determined on the basis of hydrologic parameters, slope, type of vegetative cover, and soil properties.

2. Maintenance Program

Lack of maintenance is the most critical issue in structure failure. Even when the best possible design has been developed and the structure is built properly according to a well executed plan, maintenance measures are always necessary for the structure to function properly. Inadequate maintenance (mainly of conservation works on hillslopes and in some streambed structures) was observed in all the project-designated watersheds. Preventive maintenance of check dams and contour rock walls (mainly) has been a continuing problem. A high percentage of them need urgent repair. In the event of an exceptional flood, considerable damage may occur unless they receive the required repair and maintenance work in time.

The Rural Engineering Division of DGCSFER initiated a maintenance program of major damaged check dams in 1989. The work plan followed this strategy: 1) protection of unstable foundations in the downstream face of check dams and gully plugs with heavy

rock aprons, 2) raising of dike wings, 3) reconstruction of damaged spillways, 4) construction of proper embedment of the structures in the shore, and 5) use of mortared rock and gabions on damaged walls. However, shortage of technical personnel has delayed the implementation of this plan.

3. Impact Assessment Of Control Measures

The environmental impacts of a soil and water conservation program may be evaluated at different stages in the progress of the project. At early stages, an effort should be made to evaluate the efficiency of the project proposed soil and water conservation measures as compared with other possible alternatives. At the later stages, results of the implanted soil and water conservation measures should be compared with the results expected from earlier analysis.

The evaluation conducted at the earlier stages of the project is an applied research exercise and should be developed by a watershed research-oriented team. This early evaluation should identify feasible conservation alternatives and avoid waste of time and money on inefficient or non-feasible control measures. As the research progresses in identifying feasible and efficient control alternatives, less effort is required to define appropriate measures.

The evaluation conducted at the late stages of the project has the purpose of monitoring the project's overall efficiency and feeding back experiences developed in the earlier evaluations. This process can be conducted at any time after project implementation for efficiency evaluation and maintenance purposes.

Unfortunately, there is at present no experimental data that would permit application of this evaluation approach. The lack of appropriate data is particularly felt with respect to the effects of conservation measures on erosion control, groundwater recharge, and peak flow attenuation. At present, we can make only a rather arbitrary assessment--without scientific basis. (See first paragraph under B.1, below.)

4. Water Resources Development

Although the WDP was not designed originally to be an irrigation project, several important irrigation structures were constructed, including catchment dams, reservoirs, wells, canals, and pipes. The result was an increase in agricultural production associated with increase of water supply (permanent irrigation), and expansion of cropland and soil moisture conservation due to deposited sediment behind check dams (temporary irrigation).

As the WDP approaches completion, some important questions related to water resources development need to be addressed. Soil and water conservation works stabilize the natural environment; however, increased agricultural production cannot be attained without concurrent efforts to improve crop management systems and use irrigation correctly.

5. Technical Integration

The various soil and water conservation activities in the watersheds can only attain their purpose if carried out as an integrated whole, with both technical and social aspects considered.

Integrated conservation is a multi-disciplinary undertaking that is undermined by overemphasis on a single discipline or activity. "Integrated" action does not necessarily mean a "top-down" approach (conservation works executed in a sequence proceeding from the top of the watershed to its valley bottoms). What it requires is that all actions be part of an ordered, and integrated plan. Conservation works developed on the valley bottoms aim to provide flood control, create new cropland, and develop water resources. Activities on upland areas aim to halt soil erosion and promote ecosystem stability, including protection of downstream river channels, conservation works, and agricultural or residential areas.

Although the social character of a program of soil and water conservation varies from one watershed to the next, certain features are common to almost every socially integrated approach, especially in developing countries. They include a high priority to the stabilization of subsistence agriculture and the implementation of soil and water conservation measures; use of labor intensive methods (where feasible) for land development to provide immediate income for the people affected; rewards to those who apply conservation measures on their own land; active extension services; and an aggressive maintenance program.

In most developing countries, a program of technically and socially integrated activities is the way to: coordinate the use of limited funds and manpower; mobilize the rural population; and increase agricultural production while protecting the natural environment. We believe this principle applies to Cape Verde.

B. RECOMMENDATIONS

1. Guiding Principle

Lacking the data for it, quantitative assessment of the impact of the WDP soil and water conservation measures on erosion control, flood mitigation, soil moisture retention, and agricultural production is impossible. The project has nevertheless advanced toward its goals, but the consolidated follow-on project must strengthen watershed-oriented applied hydrologic research and adopt the integrated approach to watershed development (as opposed to a focus on any particular activity or discipline). Integration of activities in the WDP will yield greater developmental benefit, and the integration can be achieved with a clearly defined watershed planning and management program.

As noted earlier, project works have not been chosen according to an integrated plan. The dominant construction trends centered around a given discipline or activity: greater emphasis on large structures in the earlier project stages, for example, and greater

emphasis on vegetative control later. A lack of integration of structural and non-structural (vegetative) measures is a potential cause of structural failure. DGCSFER and the technical advisors should develop a plan of activities to coordinate soil and water conservation with equal emphasis on non-structural vegetative conservation measures, on the uppermost slopes, and structural control works, on valley bottoms.

2. Watershed Development Planning

Given the project's concern with the natural resource base, the subdivision of a watershed for the purpose of analysis and planning must be based on its physical characteristics, mainly its drainage features (which can create minor difficulties with different administrative subdivisions). Sub-basins should be defined in terms of the area draining into a stream channel. The DGCSFER should:

- Plan integrated technical actions on the basis of the agro-ecological conditions of each sub-basin, preserving permanent natural vegetation on slopes over 45 percent and restrict goat and human access to these areas, and limiting cultivation to perennial crops on slopes between 30 and 45 percent in the uppermost humid areas.
- Preserve permanent natural vegetation on slopes over 30 percent and apply vegetative control measures explicitly associated with structural control measures ("muretos" and "banquetas") in the middle and upper sub-humid areas, limiting cultivation to plateaus and contour-treated slopes up to 30 percent.
- Restore natural vegetation cover and limit cultivation to slopes less than 30 percent in the lower arid and semi-arid areas.
- Provide flood control, expand cropland, and develop surface and groundwater resources for irrigation and domestic water supply in the river channels.
- Give highest priority to stabilizing a rural economy based on rainfed agriculture.

3. Design Data Needs

Lack of hydrologic and sedimentation data is the most critical design problem, causing some of the hydraulic structures to be designed in an unnecessarily conservative manner. We re-iterate that hydrologic data gathering and analysis are the key to establishing design criteria and evaluating structure performance. Uncertainties in determining the magnitude of the storm design event with a given return period may result in a poor (over- or under-) design approach. In such a case, the design will be somewhat intuitive and its quality will depend on the professional experience and personal judgement of the structure designer. Therefore, serious efforts should be made to organize and sustain institutional cooperation in planning and carrying out the needed data gathering, analysis, and distribution in the project-designated watersheds.

4. Research Needs

The importance of integrated soil and water conservation in Cape Verde again points to the need for a substantial effort in applied hydrologic research. The results of this research would allow the prediction of the impacts with a certain precision and reinforce the justification of the conservation works.

In the matter of environmental impact assessment, there has been little or no monitoring or quantification of the effects of watershed activities on natural resource stabilization and increase of agricultural production. Hydrologic data gathering and applied research are needed, in this case to develop an assessment technology for impact evaluation of the conservation measures.

INIA, in collaboration with DGCSFER, should also undertake:

- flood studies to provide design information and criteria for flood control structures
- erosion studies to evaluate effects of soil loss on soil productivity
- water yield studies to estimate reservoir capacity and use
- sediment transport studies to evaluate performance and useful life of sediment detention structures; and it should
- continue inventory of the watershed resources potential in each sub-basin with respect to possibilities for their sustained utilization.

5. Measurement and Analysis

Following is a list of recommended watershed-oriented hydrologic measurement and analysis initiatives in support of integrated soil and water conservation.

- a. Install at least two stream gauges (one at the watershed outlet and another at the outlet of a major tributary) in each of the watersheds.
- b. Select two small (2-4 ha.), hydrologically homogeneous experimental watersheds for hydrologic studies. Maintain one watershed in its "natural condition" and treat the other with the structural and non-structural water and sediment control measures currently practiced in the project-designated watersheds. Measure rainfall, temperature, evaporation, evapotranspiration, infiltration, runoff, and sediment on both watersheds. Calibrate a water balance equation using data from both watersheds.
- c. Install several experimental plots (standard USLE plots), at different locations within the project-designated watersheds to measure runoff and sediment. (Such plots have been established in the Fontes watershed.) Subject plots to different treatments (each treatment with two repetitions) for water and sediment control.

- d. Develop a stochastic rainfall simulation model using available rainfall data for Santiago Island incorporating changes on rainfall amounts (depths) associated with spatial variability and elevation. Calibrate the SCS runoff method (CN - Curve Number method) using rainfall and runoff plot data. The application of alternative approaches to estimate peak flows should be investigated. (In particular it is recommended to investigate the suitability of the Aguiar method which has been widely used with success in the semi-arid tropics of Brazil.) Results from these methods should be compared with the rational formula, the currently used estimation technique, and with measured peak flows for different vegetative cover, topography, and catchment geometry.
- e. Perform a statistical analysis of the model results and select the rainfall-runoff model which gives the best runoff estimates as a potential model for predicting storm runoff in Cape Verde.
- f. Calibrate the USLE using rainfall and sediment plot data.
- g. Investigate the feasibility of other erosion and sediment transport models (i.e., MUSLE, Yang, etc.) using rainfall, runoff, and sediment data.
- h. Test the models in a larger hydrologic scale using data from experimental watersheds. Explain variation on model results associated with hydrologic scale problems.
- i. Test the models on project-designated watersheds and recommend rainfall, runoff, and sediment yield prediction models for use on the Cape Verde Islands.

6. *Hydrologist/Researcher*

Integrated planning will depend to a large extent on an experienced hydrologist. This expert should provide guidance for the installation of a data gathering system and data processing program for each project-designated watershed. He should help define hydrologic analysis techniques for ungauged watersheds, as well as techniques for impact evaluation of watershed changes (conservation measures). He should advise on methodologies for hydrologic and engineering evaluation of structure performance, and, finally, on developing a plan for integrated action in watershed development. Clearly, this advisor must have an accurate understanding of the several specialties involved, and be able to synthesize them (hydrology, hydraulics, channel morphology, agronomy, forestry, economics, and sociology).

7. Technical Assistance, Cooperation, and Training

As already noted, the project has had insufficient technical assistance in watershed hydrology engineering. According to MDRP personnel, most of the dams constructed in the period prior to 1980 were without it during the design and construction phases. There was also a lack of technical assistance during the periods September 1986 to April 1987 and June 1988 to May 1989. Inadequate design procedures and technical guidance are identified as major reasons for deterioration of dams constructed during those periods. The project is also somewhat isolated from similar activities elsewhere. And it has certain outstanding training requirements.

We urge those concerned to:

- a. Recognize the critical need for a hydrologist, to analyze hydrologic data and help the engineer with structure design. Construction costs are excessively high, implying a need for careful design and sound construction methods.
- b. Recognize the need for information-sharing among MDRP supervisors, and for periodic meetings among technicians working in watershed programs sponsored by different donors, with the purpose of sharing experiences.
- c. Provide long-term training on three primary specialties: dryland hydrology, watershed engineering, and erosion and sediment transport, and to provide periodic (twice a year), re-training for controllers and foremen.

8. Design and Construction Methods

In planning structures for soil and water conservation, the engineering aspect of the construction of earthen, masonry, and concrete works is only one component of a broader scope of considerations that must precede design and construction. Specific sites and types of conservation works should be selected as part of an integrated planning process developed in collaboration with forestry, agricultural, and hydrology experts, local authorities, and spokesmen for local populations. It is necessary to:

- Develop a detailed plan of soil and water conservation activities for each sub-basin specifying the structural and non- structural (vegetative) measures to be implemented, and the location, type, and dimension of conservation structures according to the hydrologic, geological, geomorphological, hydraulic, and agricultural characteristics of each sub-basin.
- Obtain sketches of longitudinal profile of the streambed and cross sections at each proposed structure location.
- Conduct field tests for designing foundations. The study of the relationship between structure foundations and embankment stability work should be conducted by agencies capable of doing the drilling and the necessary geotechnical evaluations.

At present, these studies are done by the DGCSFER, which is not fully equipped for the job.

- Determine the return period of the storm flow design.
- Determine the T-year precipitation event based on statistical analysis of available rainfall data.
- Use the SCS (curve number) method (see 5., above) to estimate the T-year flood based on local hydrologic soil properties, land use, and management conditions. For important structures in the principal streams, an effort should be made to determine the peak flow on the basis of the hydraulic properties of the stream and (observed) flood stages.
- Determine width and height of spillways.
- Estimate sediment inflow rates. Rough estimates of sediment inflow rates may be performed based on measurements of sediment deposition behind existing structures.
- Perform careful stability analysis (sliding resistance, structure overturning, and bearing stresses) following suggestions for structural analysis of hydraulic structures offered by Fred Wilson (1988).
- Prepare a detailed drawing of the structures.
- Specify design and construction details and estimated cost of structures.
- Get DGCSFER engineers more involved in planning and design. At present they are concerned mainly with construction.

NOTE: Rocks for constructing contour rock walls should be taken from the closest streambed, never from the areas which the rock walls are supposed to protect. In the absence of a close streambed or other feasible source of rocks, construction of rock walls should be discouraged.

9. Maintenance

While the project has exceeded targets in the number of structures installed in the watersheds, a large number of them need immediate maintenance. Engineers, coordinators and controllers should develop a regular maintenance program with periodic (once a year) visits to installed control structures (mainly large check dams). We also recommend:

- a. Immediate action to repair all damaged structures before their partial or complete failure.

- b. Reconstruction of the salt-intrusion dam at the outlet of Ribeira do Cumba with gabions and a stilling basin; and construction of three more check dams upstream from the dam (spaced about 150 meter from each other) to reduce the impact of sediment loaded streamflow.
- c. Initiation of vegetative treatment of the upstream contributing areas for greater protection of the valley bottom structures.
- d. Completion of soil and water conservation works under construction.
- e. Completion of water catchment works and water distribution systems.

10. Water Resources Development

A successful irrigation project downstream from a check dam in Ribeira Cumba shows the need for developing a program to evaluate the water resources potential of the project watersheds with the objective of improving water utilization and increasing agricultural production. To that end, the project should:

- a. Conduct studies to estimate the water resources (surface and ground water) potential of the project watersheds with the objective of increasing water supply for temporary and permanent irrigation activities and domestic use.
- b. Develop studies to improve efficiency of water use in irrigated fields, including estimation of crop coefficients for Cape Verde conditions, evaluation of water application efficiency, improvement of irrigation schedules, and evaluation of alternative irrigation systems.
- c. To promote further development of artificial recharge, construct small reservoirs in headwater areas and construct subsurface dams through alluvial streambeds which could considerably increase water supply for irrigation and domestic use.

III. BIOLOGICAL EROSION CONTROL/FORESTRY - FINDINGS & RECOMMENDATIONS

NOTE: Findings and recommendations are combined, in that order, in each of the eight topics discussed in the following.

A. LOCATION AND DISTRIBUTION OF PROJECT ACTIVITIES

The generally favorable evaluation of the Watershed Management Project No. 655-0006 encouraged USAID/Praia in planning for this successor project (Watershed Development) to expand activities from four watersheds to thirteen, including Tarrafal Monte Trigo, on Santo Antão. The project goals remained generally the same, but an additional implicit goal was to create employment for the rural population in the watershed works, with money generated by the PL 480 Title II, Section 206 Food Aid Program.

WDP has been successful in expanding its scope of activities. (See Annex G., 1., which lists the 13 watersheds and the forestry works done, and the labor employed in them.) In addition to providing employment throughout a substantial part of Santiago, other project benefits, i.e., trees for fuelwood, soil and water conservation structures, distribution of Congo bean seed (*Cajanus cajan*), etc., have been available to a significant part of the population.

The negative side of such an ambitious expansion of activities is the dispersal of management resources and the burdening of DGCSFER and Forestry Division capacities in general. This limits the complexity of tasks that can be undertaken.

A proposed solution to the management and supervision problem is to concentrate resources in small areas, or "model watersheds", for research purposes. In our view, experimental watersheds may be essential for needed hydrologic and soil erosion research but they are only indirectly useful in attaining the goals of the WDP. INIA is mandated to conduct hydrologic research. It should initiate a research program to compliment, rather than substitute for, WDP operations.

Another approach is to create a "model" watershed for demonstration and, hopefully, replication. But in order to demonstrate, one must have viewers. It is unlikely that many Cape Verdeans would be able to travel the necessary distance. Furthermore, models lack the participatory element necessary to induce adoption of concepts and practices, however satisfying they might be from a professional standpoint, to the technicians involved.

An example of concentrated management was viewed at Ribeira Sao Jaoa Baptiste where UNSO has been developing watersheds for over a decade. A focused effort there has produced visible successes in structural improvements and biological control. Unlike the WDP, the UNSO project has not emphasized community involvement and may thus be unsuccessful in promoting sound resource management among the neighboring population.

The Evaluation Team believes that the benefits of distributing employment and erosion control activities over a larger land area outweigh some loss of management control over the operations.

Tarrafal Monte Trigo watershed on Santo Antão is a special case. The effort and time needed to reach the site precluded our visiting it, as has been the case with other teams and officials, so that it probably receives inadequate guidance. Given a strong Dutch development program on Santo Antão, a marginal U.S. effort there strikes the Team as an inefficient use of resources as is the use of Tarrafal Monte Trigo for experimentation in resource or project management: what is applicable on Santo Antão may not be on Santiago.

RECOMMENDATIONS

- Maintain the current range of activities on Santiago but phase out USAID supported watershed development work on Santo Antão. Rather than decreasing the project's scope on Santiago, efforts to increase community involvement may bear fruit in promoting and expanding soil and water conservation activity and output.

B. FORESTRY PRIORITIES AND SITE SELECTION

DGCSFER officials and the technical assistance Team Leader made clear that production of fuelwood is a high priority in project watersheds. Over 80% of the population of Cape Verde obtain energy for cooking by burning wood or charcoal. The World Bank (1989) estimates that even with current rates of tree planting, fuelwood production will continue to fall significantly short of needs. Lacking a ready fuel source, rural populations resort to removing vegetation from steep slopes or burning crop residues.

In these circumstances, the desire to pursue self-sufficiency in fuelwood is natural and is reflected in WDP site selections. Tree planting at fairly high density has been concentrated in areas not suitable for agriculture, such as seashores, ridges, rocky outcrops, and arid zones. Plantations are protected from animals by guards for two years after planting, and this often results in strong recovery of native grasses and shrubs. In terms of fuelwood and forage production, WDP has been successful.

In contrast, the project has not been able to make significant progress in stabilization of cultivated lands. That is not to say there has not been an effort in agroforestry. At some project sites trees have been successfully integrated with banquetas (contour furrows) or muretos (rock wall terraces). However, on most cultivated land there are insufficient structural and biological measures in place to impede water flow and soil loss. While farmers sometimes accept and appreciate tree planting in their fields, only low densities have been tolerated. Ten meter distances between furrows and 5 to 10 meters between trees (100 to 200 trees per hectare) are common. Without structural improvements, light tree density cannot prevent severe erosion during heavy rains. The permanent installation of structural improvements (reinforced contour furrows or rock wall

terraces) is impeded by farmer resistance, damage by grazing animals, and the expense in time and materials to build them.

The Team expects significant farmer resistance to an agroforestry program. Given the tenuous financial status and small land holdings of Cape Verdean farmers, the apparent risks of change would not be easily accepted. However, only through acceptance and voluntary cooperation by the agricultural community can this program be successful. Demonstration, education, technical support, and financial incentives are the necessary steps to convince farmers that increased soil retention and water infiltration, improved soil fertility, a ready supply of fuelwood and non-energy tree products, and eventually, increased agricultural production, are the result of better cultural practices.

RECOMMENDATIONS

■ To make an impact in soil and water conservation, the Forestry Division must make cultivated lands the target of a determined agroforestry effort. Certain steps must be taken. An office within the Forestry Division concerned only with agroforestry activities should be established. One or two foresters should be sent to study agroforestry at selected universities. Research is needed to develop workable agroforestry systems and to find tree and shrub species that are acceptable and valuable to farmers. In-country training in agroforestry and community forestry for Rural Assistance Program extensionists and MDRP forestry agents is highly recommended.

■ Develop a cooperative program of research with INIA to determine tree species and agroforestry systems most suited to Cape Verde's climatic zones and cultural practices. A market survey of tree products to help in species selection and promotion should be included.

■ Establish agroforestry demonstration plots in each project watershed through agreements with progressive farmers. These can be sources of information on changes in water runoff, sediment yield, and crop yields.

■ Train extensionists to present visual and interactive programs to community groups to promote agroforestry.

■ Encourage farmers to adopt proposed improvements, perhaps offering free seedlings, free labor, land exchange, and/or cash subsidies. Payment could be contingent on tree survival and maintenance of terraces or other structures.

■ Remove from cultivation upper watershed areas of greater than 45% slope. The recently published Cape Verde Forestry Law calls for protection of such fragile, erodible areas, but the law needs to be backed up with institutional determination and innovation. Small enclosures set up by INIA and the Forestry Division have demonstrated that recovery of damaged land is possible even without grass reseeding and that recovery is quicker after tree planting. Once these lands return to ecological equilibrium, forage and fuelwood collection and controlled grazing can be permitted at predetermined intensities.

Why?

good

✓

Whose land is it?

C. FALLOW LANDS AND INCENTIVES

These recommendations do not imply that farmers should be forced to accept recovery measures. A farmer prevented from cultivating even unproductive land needs compensation equal to what a good harvest might provide. A successful program in the U.S. pays farmers to leave land fallow or to engage in non-exploitive land-use such as planting trees or forage crops. Were resources made available to compensate farmers who remove steep land from cultivation and plant trees, payments might be based on ability to keep the trees alive and goats and cattle off. The capabilities and resources of rural assistance extension agents need to be expanded to promote sensible cultural practices.

RECOMMENDATIONS

■ A rural education program on the environmental hazards of cultivating or overgrazing steep slopes would prepare farmers for removing certain land from cultivation. Money incentives are needed, and bonus payments might be made to those who also plant and protect trees. After a zone is stabilized, an arrangement with the farmer could be made to allow limited and prescribed wood cutting and grazing. (We are recommending creation of an incentives fund for this and similar purposes in agriculture.)

D. ENERGY FROM BIOMASS AND OTHER SOURCES

As noted earlier, fuelwood production has been a priority with the WDP and the Ministry's Forestry Division. Despite some pessimistic estimates, there seems to be significant progress in this regard. Prices of cut wood remain fairly low (about 6 escudos per kilogram) and fuelwood cutting permits are reasonably priced. In addition, one does not see signs of heavy illegal cutting and the techniques of pruning and pollarding seem acceptable. Furthermore, there are quite a few young plantations of mostly *Prosopis* that will be available in the future. To take advantage of the investment made in fuelwood plantations, plans must now be formulated for harvesting, transporting, and marketing the wood.

In arid or deforested areas there is often an understandable hesitancy to cut trees. However, in this case there are strong reasons for short rotation harvests. *Prosopis* coppices voraciously; once a root system is established it is almost impossible to kill. In addition, growth rates for stump sprouts normally far exceed those of mature trees. The Forestry Division should systemize a harvesting program to maximize fuelwood production and to explore mechanisms for contracting the work and marketing the product.

Given the documented deficit in fuelwood production in Cape Verde, alternatives, including kerosene and bottled gas stoves, are being considered. A World Bank study (1989) determined that of wood, charcoal, kerosene, and gas, kerosene use was the least costly in terms of national economic inputs. A national distribution system for kerosene

and kerosene stoves at full economic cost price levels, with the goal of decreasing tree cutting and the use of wood for fuel, was suggested.

While well intentioned, national promotion of kerosene is inappropriate, particularly in rural areas. The World Bank report was based on economic cost considerations alone and gave only passing attention to personal preference or traditional cooking methods. The same report indicates that kerosene is not growing in popularity. Whatever the calculated economic costs, a farmer can easily obtain free fuelwood. A Cape Verdean official expressed opposition to promotion of kerosene. Wood is a domestic product; kerosene is imported and consumes limited foreign exchange.

RECOMMENDATIONS

- Study the potential for opening up to private sector bid the harvest, transport, and sale of wood from state-owned fuelwood plantations. A per hectare stumpage fee could require cutting to determined specifications, brush cleanup, and the subsequent thinning of stump sprouts.
- Facilitate supply of alternative fuels particularly in urban areas, but allow market to determine prices. At the same time, limit the transport of wood into urban areas to create incentive for use of other fuels. Increase dissemination of improved cookstoves in rural areas to increase fuelwood use efficiencies.

E. SPECIES, SEEDS, AND PLANTING TECHNIQUES

Historically, tree planting activities in Cape Verde have centered on two species, *Prosopis juliflora* and *Parkinsonia aculeata*. The former is known for the quality of its fuelwood and the latter for forage production. The risks inherent to monocultures has made diversification advisable. Given its limited research capabilities, the WDP has done well in expanding the number of species grown and outplanted. *Acacia holocercia*, an Australian native, has proven well adapted in most climatic zones in Cape Verde and accounts for about 30% of trees planted. Other species used and their relative importance in reforestation work can be found in WDP annual reports.

Despite this movement in a positive direction, there is much improvement yet to be made. The three species noted above account for over 85% of trees planted by the Forestry Division, due to public preference and known success. Insufficient effort has been made to identify and promote other species which may also possess desirable qualities and produce valuable energy and non-energy products. Little attention has been given to the need to protect and multiply seed stock of trees and shrubs native to Cape Verde.

The WDP, however, is not a research project and cannot be expected to develop capabilities and contribute time and resources to forestry research. To a limited extent, the team forester has done species comparisons for adaptation to specific environments but his efforts can not be described as statistically sound or exhaustive. A forestry researcher

sponsored by the Henry Doubleday Research Association and in residence at INIA has contributed to studies deemed important by the WDP, but this has been on a part-time basis. There is clearly a need for a focused research effort by a qualified institution to address a variety of topics including field testing of many tree species and provenances throughout the geographic range of forestry activities. Annex G., 2. lists several topics which we feel should be targeted for a research effort.

A hindrance to sound selection of tree species and varieties is the non-systematic way in which seed is collected. Generally it is done by undersupervised field crews who have not been trained to pay close attention to tree phenotype. Naturally, seed collectors are inclined to harvest from those trees that are easiest to reach and this favors shorter, slower growing individuals

Tree planting techniques used by the WDP are adequate and suitable, given environmental conditions and the skill level of work crews. In general, planting sites are prepared with caldeiras in steep areas, with contour furrows on less severe slopes, or with simple pits on relatively flat areas. A 60 x 60 x 60 cm hole is pre dug and backfilled well before the planting date. In July or August, after a significant rain, planting crews (always women and children) are mobilized, seedlings are sometimes trucked but usually carried to planting sites, and seedlings are quickly planted at a rate of up to 100 per person per day.

There have been instances of low seedling survival, but it is apparent that this is caused mainly by insufficient rainfall after planting rather than poor planting technique. In the sometimes harsh environments targeted for reforestation, seedling survival is never assured. The Forestry Division is well aware of these problems and, we are told, it is planning to establish a seed bank.

Although less expensive than most other systems, the plastic sacks used here and elsewhere in the developing world can be used only once and require much time and effort to fill and transport. There is suspicion that they also cause root deformation that increases mortality and retards growth. There are systems developed ("Super Cell" seedling tubes by Stuewe and Sons, in Seattle, for instance) that are suited to dry areas and may encourage better root development.

However, we do not strongly advocate introducing a new container system here at this time. There is still much debate in the matter of root formation and its effect on tree growth. WDP managers have explained that the limiting factor in number of trees planted per year is not the quantity of seedlings produced or transport problems but the number of sites that can be prepared with the available labor force.

RECOMMENDATIONS

- The Forestry Division of DGCSFER should work out a cooperative agreement with INIA to develop a comprehensive forestry research program responding to needs identified by MDRP natural resource managers.

- The DGCSFER should continue to diversify the species chosen for plantations on public lands. Special consideration should be given to species native to Cape Verde.
- The WDP must encourage the Forestry Division to establish and monitor a program for the collection and multiplication of seeds from trees showing the most favorable characteristics (i.e., thornless, fast growing, upright form, productive seeders).
- In the developed research plan for forestry, there should be a study of seedling mortality and growth rates using several alternate container types, and an examination of the economic tradeoffs of switching systems on a national scale. Due to the warm, dry climate of Cape Verde and the lack of refrigerated storage and transport equipment, bare-root seedling production seems ill advised.

F. DATA MANAGEMENT AND PLANNING

During the recent months WDP staff, including the current Team Leader and many short-term consultants, have been putting increased effort into improving data management and planning. From a situation early in the life of the project where basic data such as a number of trees grown or planted was unreported and unknown, WDP now collects and maintains fairly specific information on all field activities. A consultant on site during this evaluation was continuing efforts to streamline both data collection procedures and methods for loading, analyzing, and displaying the data collected. We feel that the WDP is making good progress in this area and will leave behind a system of great value to the DGCSFER.

With possession of 1:25,000 and 1:12,500 topographic maps (from old Portuguese military maps) and 1:25,000 land-use classification maps (from a survey done by the French in 1978), WDP seems to have what is needed for global and operational planning. These all seem to be the proper scale and level of detail for their tasks. A valuable addition (one that has been promised but not delivered) would be an accurate set of aerial photographs for structure inventory, estimation of tree cover, planning, and comparison of land condition with older photographs. The contractor, through Oregon State, has made two rudimentary attempts to accomplish this that did not yield a usable product.

The WDP has not been successful in developing a workable Geographic Information System (GIS) for use in DGCSFER planning. The system installed by Oregon State University has not been useful and it would take much additional effort and expense to make it a functional part of the planning process. The OSU system is not user-friendly and does not make use of the up-to-date software sold commercially at reasonable prices that facilitate data-base loading and manipulation. Even if a functional GIS were installed, the WDP/DGCSFER staff is currently inadequate in numbers and training to run the system.

Granted, a workable GIS system would be helpful in assimilating data from disparate sources for creating watershed plans. But the potential benefits to the

DGCSFER are not worth the additional expense in first installing and then managing such a system. AGRHYMET has planned the installation of a state-of-the-art GIS at INIA and insists that the use of the system will be available to all.

A proposed project output and the target of much WDP effort is methodology definition for the creation of Phased Watershed Development Plans (PWDP). The purpose of the plans is to establish a long-term timetable to optimize investment levels for DGCSFER interventions in project watersheds. These will be based on all measurable biophysical and socio-economic criteria using data collected both by project and non-project personnel. Through the work of an OSU consultant and negotiation with many GOCV officials, a methodology has been devised for the collection and analysis of data and the definition of a suitable work sequence.

The work to-date has shown positive, albeit slow-moving, progress in development of PWDPs. The proposed methodology seems to be suitable to project objectives, and the draft plan produced for the Ribeira Picos (Egli, 1989) illustrates that the job can be done successfully. There has been some feedback indicating that these plans should be more operational in nature (for direct use in creating yearly work plans) but that has never been their purpose. They are specifically suited to establishing global priorities -- an important role given the non-scientific nature of past watershed planning. Unfortunately, the contractor and DGCSFER are behind schedule in developing PWDPs and renewed efforts should be made to complete the task.

RECOMMENDATIONS

- Hire a professional contractor to produce a comprehensive set of aerial photos for the island of Santiago. This should be done before the end of project, with shooting advised for May or June, 1990.
- Despite past difficulties in cooperation, we recommend that DGCSFER reach agreement with INIA and AGRHYMET for the necessary adaptation and use of their GIS. A selected DGCSFER staff member should be sent to Niamey to participate in an AGRHYMET training program in operation and application of their system.
- DGCSFER should make completion of PWDP a high priority. When completed, these plans should be the overriding authority for the division of resources and activities within specific watersheds.

G. ALLOCATION OF FUNCTIONS AMONG AGENCIES

Early in the evaluation the Team had difficulty distinguishing which staff members, pieces of equipment, and activities were part of the U.S. project and which belonged to the Ministry. The difficulty is a positive reflection of the smooth integration of project actions into the GOCV institutional framework. Most Forestry Division activities have been supported to some degree by the WDP, but the GOCV staff obviously feel independent and self-directed. While this is in part due to contractual arrangements (e.g., equipment purchased by the project becomes MDRP property upon arrival in Cape Verde), credit is also due to the current Team Leader for his low-key management style and good rapport with DGCSFER colleagues. We feel that the basis has been established for the smooth transfer of responsibilities of WDP technical advisors to DGCSGER personnel.

Professional ties between the DGCSFER and other GOCV offices and bilateral projects are not as close. Exchanges of experience and information between GOCV agencies, between islands and regions of Cape Verde, and between internationally funded projects, are vital. Often, it is through personal contact at conferences or seminars that institutional ties can be developed on matters of common interest.

RECOMMENDATION

- The WDP, with support of MDRP, should organize and facilitate yearly workshops and conferences encouraging the participation of all national and international staff working in watershed management, forestry, and watershed engineering.

H. TRAINING

In addition to WDP training inputs shown above, the project has conducted short-term in-country training programs throughout its term. Table ? in the Annex summarizes programs to date and illustrates the variety of topics considered.

The evaluation team is partially satisfied with the attitude and performance of the contractor and the DGCSFER training director with regard to training. The contractor's Team Leader is enthusiastic about the yearly training programs and regularly participates himself. The programs are practical in nature and allow hands-on experience. Some training exercises are repeated periodically to reinforce or reinstall learned skills. It was apparent in visits to nurseries and field activities that many skills have been passed on to workers and supervisors.

Not surprisingly, there is also evidence that some skills are not being retained by all trainees. In one instance, a foreman who participated in several trainings did not recognize that his crew was aligning caldeiras (crescent-shaped catchments) improperly. It was clear from his reaction that, besides forgetting a technique, he did not understand the concept. The same problem appeared in another location where "contour" furrows were being dug

at a slope of up to 5%. Even if the employee had forgotten the proper way of finding the contour or the level used was of poor construction, it should be easily recognizable that the result was incorrect. It may be advisable in the future to verify that trainees are absorbing concepts and not just repeating physical actions.

There is no significant program for review and expansion of skills for mid-level technicians. This gap in the WDP/DGCSFER training program should be corrected. For many of them, technical training consisted of two years of study at INIA which included forestry and rural engineering classes as well as math, chemistry, languages, and other topics. Even if well conceived and taught, a two year-program would not allow much more than introductory consideration of subject matter. As these agents often provide the only reliable quality control for field work, it is advisable that their skills be upgraded through yearly workshops and that technical courses be required.

RECOMMENDATIONS

- A training specialist should be contracted to review all project training with the goals of creating programs to fill voids and to integrate all activities into an annual training schedule. A product of this contract will be a manual including course outlines and training materials.
- Yearly training programs should be attended by all DGCSFER technical agents stressing review of skills and expansion of capabilities.

I. CONCLUSIONS

The Team concludes that the contractor and DGCSFER have done a serious professional job in forestry work. The project is reasonably close to targets, in number of trees planted and hectares of land treated with vegetative control measures. Progress has been made in creating a manageable system of data collection and watershed planning, with efforts to institutionalize it.

There is work to be done to complete certain other forestry activities. Specific topical recommendations have been made in the body of the Report. Part Two (design) provides a broader treatment of our recommendations as to guiding concepts and technical measures.

IV. RURAL ASSISTANCE PROGRAM

NOTE: See also and attached paper that views RAP, labor mobilization, extension, and community development as an interconnected whole (Annex L.).

Developed in 1983 under the guidance of the Watershed Management Project, the Rural Assistance Program (RAP) is a successful and important part of DGCSFER activity. It is a project creation rather than an ordinary government agency. It is engaged to a limited extent in agricultural (and other) extension work, alongside a directorate of extension, also in the Ministry of Rural Development. To date, its most important work has been as the WDP's contact with communities for the organization of and technical support to the Community Based Work Fronts (CBWFs), a mechanism of labor mobilization introduced with the WDP. RAP also assists the National Cooperative Institute in establishing a savings and credit program. We assess four areas: management of Community-Based Work Fronts; extension and community development, staffing and training of RAP personnel; and RAP's institutional relationship to other offices in DGCSFER and other national agencies. (The text of each of the four topics includes recommendations, immediately following discussion of topic findings.)

A. COMMUNITY-BASED WORK FRONTS

For reasons explained in project and independent documents, Community-Based Work Fronts (CBWF) were established for conservation work in the communities where the workers live. RAP works through elected governing boards to choose workers, select work sites, and oversee activities. Generally, CBWF's were to work on activities and sites of immediate interest to the members. There is evidence that when working near home, CBWF's are more productive than "classical" work fronts (CWF). Those we saw in the field seemed more animated than CWF crews. CBWFs appear to help in promoting community input to the development process.

The way CBWFs are used is reason for concern, however. We saw one CBWF working outside its community at an activity that would give it no direct benefit. The crew chief explained that these people needed the work. The CBWF was being managed as if it were a CWF. Members of CBWFs expect regular employment during the non-farming season even if the work done is not near the community. This dilemma tends to undermine the principles that have made CBWFs successful.

We also heard the complaint that as membership in CBWFs increases, too few workers remain for work appropriate to CWFs. Currently, 25% of WDP's labor force is in CBWFs. Without an adequate labor force adaptable to different kinds of work, MDRP will not be able to undertake well planned, integrated watershed management. The challenge is in how to preserve CBWFs when the major tasks near their communities have been completed.

Two solutions have been offered. Lewis (1987-see bibliography) envisioned a day when the CBWFs would evolve into "pre-cooperatives" with enough financial independence to pay extensionists and maintain conservation structures. The CBWFs, he says, are the germs of a movement in public conscience and common purpose wherein, for example, irrigating farmers would help plant trees and dryland farmers help build irrigation canals. Together, these neighbors would achieve a kind of "watershed management enlightenment" whereby structures are built and slopes reforested without supervision or salary. This is not a likely scenario.

Alternatively, Gardiner (see bibliography) proposes that as CBWFs complete work locally they can become contractors to the government (often through projects such as WDP) for jobs in more isolated parts of the watershed. This approach solves two problems: members of CBWFs would maintain a stable income during a greater part of the year, and the project would have a more flexible labor force to do jobs dictated by watershed development plans.

RECOMMENDATIONS

- Continue the CBWF system as an alternative to classical work fronts. Encourage interaction with MDRP field technicians to coordinate CBWF activities with integrated watershed development plans.
- Explore Gardiner's idea of contracting with CBWFs or other labor groups to work on WDP activities in the more remote watershed areas.
- Review the entire labor mobilization question when an interagency study team can be established.

B. EXTENSION AND COMMUNITY DEVELOPMENT

Through its cadre of rural extensionists, RAP has been involved in extending a variety of information and skills to rural communities. Of note, they have helped construct numerous improved cookstoves for which recipients express satisfaction. RAP has also managed village nurseries and distributed tree seedlings, instructed people in proper tree planting and care, distributed Congo bean seed, and provided advice on health and nutrition matters. Another important activity is the self-help program in which communities provide labor and RAP provides equipment and supervision to perform a task. This deserves emphasis and effort in the future. Many jobs that CBWFs have done in the past might be more properly done through self-help.

Interaction exists between RAP and the National Institute of Cooperatives (INC). INC manages a program which encourages family savings in rural communities and is assisted in its promotion by RAP extensionists. Despite the limited income of its clients, the INC program hopes to build a base of credit and financial security for small farmers.

The RAP's community development work is a valuable part of the WDP program and should be strengthened. The long-term benefits of soil and water conservation are not readily visible to the rural populace, but RAP actions bring certain immediate and tangible benefits.

RECOMMENDATION

- Continue and expand the efforts of RAP in community development. Increase training of extensionists, strengthen and increase the frequency of technical support provided to extensionists, and better equip field staff in training materials and health care supplies.

C. STAFFING AND TRAINING

We found RAP employees at all levels to be serious, interested and competent. Headquarters leadership is well educated and experienced and relates well to the field staff, but it is limited in number, with oversight responsibility for a diverse and widespread program. Additional management personnel is needed to support field staff, to develop new programs, and improve existing ones.

Extensionists gain acceptability from being natives of the communities they serve, a factor in their success. The drawback, however, is that native extensionists often do not have secondary education and may not be able to offer innovative approaches to community development. This makes quality training on a regular basis of prime importance. Annex G., 1., (c) shows the range of training programs that have been offered through RAP but also shows that since 1987 training has not been a priority, a fact limiting RAP's productivity.

A credit to RAP is its effort to recruit and employ women. About half of the extensionists currently are female. It is reported that they are as effective and active as the males. Given the preponderance of female heads of households in Cape Verde, this can't but have a significant positive effect on the relationship between the WDP and the rural communities. With the exception of a few women in management level positions, these extensionists are the only representatives of their sex in the DGCSFER.

RECOMMENDATIONS

- Add a training position to the RAP staff. The training specialist should establish a yearly program to enhance appropriate skills.
- Maintain current emphasis on women as RAP extensionists. An effort also should be made to recruit women to fill mid-level technician positions in the headquarters offices.

D. INSTITUTIONAL FUTURE

Several alternatives have been considered for the future of the Rural Assistance Program. The RAP could: a) be absorbed by the Extension Directorate b) become an independent organization collaborating with the National Cooperative Institute, and supported by the community, c) attain Division status as part of the DGCSFER, specializing in community development, rather than agricultural extension, d) remain as an externally funded component of a future watershed development project.

The idea of collaboration with the Cooperatives has little merit, given that it premises an availability of funds from community sources that does not exist. The Team believes that RAP can maintain its momentum in innovative work, for a time, by continuing in its present status as an arm of the DGCSFER. RAP does have problems in that relationship that should be addressed in the short term. The Directorate's technical people see RAP as mobilizing labor (through the CBWFs) in competition with recruitment through the classical fronts that are more adapted to and useful to engineers in many watershed works projects. A feeling exists- we do not know how general it is- that community development, one of RAP's concerns, and watershed development works, the concern of the engineering people of DGCSFER, are not part of the same plan.

In the long run, two distinct agencies working on the same matter (extension), as premised in an indefinite continuation of the status quo, is not viable. We are recommending a major development effort for the Extension Directorate. When it grows and diversifies, it will find a way to make good use of RAP personnel and their exploratory innovations -- whether in agricultural extension or a range of less technical community development activities.

RECOMMENDATION

- Continue RAP funding with more clearly defined tasks and goals in the new project. Its role in community development should increase as its role in managing CBWFs, that is, watershed works, decreases. Meanwhile, plan ahead for the program's absorption by the Extension Directorate.

E. CONCLUSION

RAP has been valuable as the Watershed project (if not the DGCSFER itself) attempts to develop the human resources, along with the natural resources, of the project area. In addition to organizing and managing Community Based Work Fronts, RAP has had some success in extending appropriate skills and materials to rural communities. We found RAP staff to be competent but overextended, and unable to give adequate supervision to field activities. The extensionists have developed good relationships in their communities but they would benefit from additional and periodic training.

V. INSTITUTIONAL COLLABORATION

Cape Verde shares a problem all countries face to one degree or another, the difficulty of overcoming the bureaucratic isolation of major agencies. This is unfortunate in a country of limited resources. A result is that projects such as WDP have tried to diversify their own activities beyond planned scope in order to create services that other agencies might better provide to it. While being mainly charged with soil and water conservation, WDP on behalf of the DGCSFER has been drawn into irrigation development, forestry research, cartography, meteorology, hydrologic monitoring, and computer modeling. Many of these tasks should be performed for the DGCSFER by appropriate agencies.

The GOCV established INIA as the country's primary research institution, but the WDP has not yet had significant research support from INIA. INIA is not yet developed in the skills and programs necessary to conduct applied research on watershed-based soil and water conservation, nor does it have adequate funds for it. In addition, the project's research needs were never clearly established and communicated to INIA.

Similarly, while the Water Resources Board (JRH) has the mandate and capability to pursue the development of groundwater resources for irrigation, coordinated effort between the DGCSFER and the JRH has not occurred, and irrigation development continues piecemeal.

RECOMMENDATION

- At the outset of the new project, cooperative agreements with other Cape Verdean agencies should be arranged, with clear definition of cooperative interaction. Activities that are outside the natural scope of watershed development should be assigned to other organizations.

SECTION THREE: FOOD AID

TABLE OF CONTENTS

SECTION THREE: FOOD AID	65
I. PROGRAM HISTORY	65
A. AGREEMENTS, MAGNITUDES, AND TYPES OF ASSISTANCE	65
1. Emergency Aid	65
2. PL 480 Title II, Section 206	65
B. BASIC PURPOSE, AND EVOLUTION IN USES, OF 206 LOCAL CURRENCY	67
II. EVALUATIONS	68
A. PRIOR EVALUATIONS	68
B. THE PRESENT EVALUATION	69
1. Introduction	69
2. Statement of Work Questions Reorganized	69
3. Method	69
III. FINDINGS	70
A. GOCV OPERATIONS AND ACCOUNTING	70
1. Physical Operations	70
2. Accounting for Sales Proceeds	70
3. Financial Operations	70
4. Pooled Deposits, Irregular Deliveries (and Late Payments)	71
B. USAID REPORTING REQUIREMENTS AND OTHER TA TERMS	72
1. Reporting	72
2. Self-Help Measures	73
3. Allowable Costs	75
4. Animal Feed	75
5. Ultimate Purposes of Aid	76
6. Compliance With Overall Terms of Agreements ...	76
C. PROGRAM MANAGEMENT: USAID AND GOCV ...	77
D. LEVEL OF AID: FITNESS TO NEEDS	77
1. Calculation of Food Needs	77
2. The U.S. Contribution in Covering the Deficit	78
3. Requirements for PL 480 LC Counterpart	78
E. SUCCESS IN COMBINING PL 480 LABOR WITH THE WORKS PROJECT	78
1. The Utility of PL 480 Labor to the Engineer	78
2. Advantages and Disadvantages of PL 480-Funded Labor: CBWFs and Other Systems	79
IV. CONCLUSION	81
A. ASSESSMENT	81
B. RECOMMENDATIONS	81

SECTION THREE: FOOD AID

I. PROGRAM HISTORY

A. AGREEMENTS, MAGNITUDES, AND TYPES OF ASSISTANCE

1. *Emergency Aid*

The United States has helped the Government of Cape Verde to cover its food deficit since 1977. ^{1/} Initially (1977-82), and again in 1984 and 1986, this was done as emergency aid under U.S. Public Law 480, Title II, Section 201, to meet "famine or other urgent or extraordinary relief requirements...".

Normally, commodities furnished under this provision of the law are imported for direct distribution to consumers in no less than 50 percent of the total, the receiving government being authorized to sell the remaining commodities and use the proceeds for activities aimed at reducing the need for food aid and effects of drought and famine. With U.S. agreement, the GOCV departed from this practice, selling up to one hundred percent. It argued that free food creates a welfare mentality, and that the generated local currency would pay wages for development works to the most needy.

The accomplishments of the six year emergency program were the distribution of mostly corn and including rice and vegetable oil with a total value including transport of \$23.2 million, and the alleviation of food and nutritional deficiencies among vulnerable groups. In FY 1984, emergency aid amounted to 2000 MT of Pinto Beans worth \$1.2 million; and in FY 86, 2000 MT of Pinto Beans and Navy Beans worth \$1.1 million. In addition, the generated local currency went to wages for labor on a variety of public works.

2. *PL 480 Title II, Section 206*

Once the immediate (1977-82) problems of Cape Verde's food emergency had been contained, it became possible to structure food aid in longer range terms according to Section 206 and certain provisions of Sections 201. These specify mechanisms of Government sale of the imported commodities which are provided as a grant by the U.S. to the consuming public and the setting aside of all the proceeds of sale, less certain operational costs, for activities leading to a reduced food deficit and to economic development.

^{1/} A 1982 GOCV memo indicates there was a total of about 5,000 MT of U.S. PL 480 food aid in 1975 and 1976, with a total value of \$1.8 million. We could not confirm this information at USAID.

In 1982, the first "Transfer Authorization" or TA, an order to the CCC under Section 206 was signed by the two governments. With this bilateral agreement the GOCV undertook a number of obligations. Shipments received and sold under the 1982 TA/agreement amounted to 45,000 MT of bulk corn valued CIF at \$ 13.8 million (\$4.6 per year). Some 390 million escudos were made available to the GOCV agencies for employment and development activities. This and succeeding Section 206 agreements are summarized in the following table:

Table : Section 206 TA's to Date 2/

<u>Date of Agreement and FY's covered</u>	<u>Commodities, MTs (000) & CIF value \$000,000</u>	<u>Local Currency Generated Escudos 000,000</u>
TA No-569-XXXX- 0000-2606 June 1, 1982 FY 82-84	45 MT/ \$13.8	CVE 390
TA No-659-XXX- 0000-5608 March 26, 1986 FY 1985-88	60 MT / \$14.8	CVE 756
TA No-655-XXX- 0000-9611 April 9, 1989 FY 1989	12.9 MT / \$3.5	CVE 242
TOTAL	117.9 MT / \$32.1	CVE 1,388

In addition, an FY 90 TA has been proposed by the USAID for authorization, negotiation and signature in the next few months. It would provide 16,917 MT of No. 2 Corn (CIF \$3 million) with the generation of CVE 152,253,000. It is anticipated that emergency aid will also be requested (5000 MT of Corn) because of the poor 1989/90 harvest.

2/ The numbers quoted are illustrative, not authoritative. We were given several unreconcilable sets of figures.

B. BASIC PURPOSE, AND EVOLUTION IN USES, OF 206 LOCAL CURRENCY

From the beginning of this continuum of Section 206 agreements, the program purpose apart from meeting the food deficit, has been to provide work, compensated by sales proceeds, for seasonally and structurally unemployed or underemployed people, mainly in rural areas.

While the creation of employment or income is an end in itself and the principal purpose of the local currency program now and for the foreseeable future, the employed worker's labor has become the means to a second purpose: constructive developmental works.

The Watershed Management Project (authorized in May, 1979), and other USAID projects in agriculture, undertook a variety of activities in rural areas to which the 206 Program contributes local currency. In addition to labor, it funded office supplies, structures, transportation, salaries of non-government project personnel, and locally purchased imported commodities such as POL and vehicles. The programming, budgeting and accounting for 206 expenditures were not tied systematically to needs of those projects. The money was managed in a way that responded mainly to the purpose of providing employment. The laborers worked in a role at best corollary to, rather than as an integral part of, the projects. Hence, a close operational link between projects and PL 480 had still to be established.

This was begun with the original project's follow-on activity, the Watershed Development Project (WDP), authorized for four years beginning in May 1984. This was later amended to extend project life through December 1990. The connection that was then made between an AID appropriated-fund project and the PL 480 Section 206 program was one of the first of its kind anywhere under existing and predecessor legislation.

The PL 480 local currency resource, although it was already covered by one bilateral agreement (the TA), was made an integral part of another, the appropriated dollar WDP Project Agreement. Work plans and activities are formulated in relation to projections of PL 480 local currency availabilities. These projections are based on an assessment of food needs, PL 480 imports, and net generation of escudos. The specific uses of 206 local currency are now as strictly confined to developmental activities as are the dollars granted to the project.

Thus, dollars and escudos, each from a different source, are constructively combined in a single activity. We note here for later reference that the difference in original purposes of providing the different funds -- mainly food and employment, for 206; straight development for appropriated dollars funds -- creates an inescapable but not necessarily negative tension within the project.

II. EVALUATIONS

A. PRIOR EVALUATIONS

1. An evaluation of the Section 206 Program, then in operation for nearly two years, was conducted in October, 1983. It touched on administrative, policy, and self-help matters such as the pricing of corn sales at a level approaching its world market price. Many of these issues recur in later years and have been of interest recently.

The most significant proposal in the 1983 evaluation was to integrate the labor availability created by the 206 program with the need for labor in the forthcoming Watershed Development Project be authorized in 1984. This would distinguish the new project from its predecessor, Watershed Management. The linkage has been progressively refined, and it will obtain in our recommendations for the Watershed and Applied Research Project for FY 91-95.

2. Prior to the 1983 evaluation, an AID/Washington official, John Davison, reviewed the financial procedures used in the GOCV's management of PL 480 accounting in a memorandum of April, 1983. The memorandum proposed a "special account" to be used by the National Development Fund, the agency that receives local currency counterpart generated by all international food aid programs. This recommendation was followed. The memorandum also illuminated the entire system by which food aid is handled, accounting is done, and reports are made. We have relied on its insights and on the pragmatic recommendations it makes, most of which are in operation today.

3. The second evaluation per se of the program was included in the December 1987 evaluation of the Watershed Development Project. The food aid section was prepared by a REDSO/WCA specialist in the matter, and it too is drawn on in the formulation of our own conclusions about the management and achievements of the program.

4. A more recent examination of the program was reported in May 1988. It was prepared by the Sahel Regional Financial Management Project and provides a comprehensive and detailed understanding of financial management and reporting systems in current use. It reconfirmed the redundancy that exists in USAID requirements for GOCV reporting noted by Mr. Davison; and, like him, found no significant deficiencies in the GOCV's financial and accounting procedures for the program.

B. THE PRESENT EVALUATION

1. Introduction

While the Teams's investigations of the two dollar-funded projects constitute final evaluations, this review of PL 480 is not final but an update of others and a progress report on an ongoing program. It is also a response to narrowly targeted Statement of Work questions that focus on "problem" areas.

The Statement of Work questions are of two sorts; those concerning management matters and, those concerning the use of counterpart funds and labor mobilization.

Labor in the project is a complex matter. No judgements can be reached on the balance of advantages and disadvantages of various means by which labor is mobilized for project use, and on the communities' benefits or losses from different arrangements, without consideration of the little-studied history, attitudes and practices of the rural culture. All this would have to be analyzed in the context of national economic and social policy and government capabilities at different levels. We did not try to resolve labor questions, but discuss them in both parts of the Report, and analyze them in Annex L.

2. Statement of Work Questions Reorganized

In order to address these questions as an organized whole, they have been put in sequence to constitute an outline. While these questions relate to matters that have been viewed at one time or another as issues or problems, some of them have already been solved. The resolution has not always been communicated or fully understood outside Praia, however, and this Report tries to establish that understanding.

3. Method

The team member assigned to PL 480 evaluation interviewed the responsible officials and operating staff of the agencies concerned: the Ministry of Plan and Cooperation; Empresa Publica de Abastecimentos (EMPA), the autonomous government corporation responsible for the reception and distribution of all imported food commodities, whether donated or commercially procured; National Development Fund (NDF), which receives and disburses local currency generated by food aid; the planners for and users of local currency proceeds at the Ministry of Rural Development and Fisheries, the Ministry of Commerce, the official responsible for calculations leading to setting of the sale price of imported food commodities; Ministry of Finance officials; and the AID Representative and two other USAID staff who together monitor and manage the program on the part of the U.S. In Washington, the evaluator was briefed on several concerns about the program in AID/W, and debriefed upon return. Prior to leaving Praia, he discussed labor mobilization at length with the Secretary of State of the Ministry of Rural Development, who has an overall responsibility for all project elements.

Interview questions were aimed at discerning frictions or misunderstandings, and the problems perceived by one agency in reference to others, particularly as between the two governments. Relevant documents were reviewed including reports, accounts, TA's, budgets, USAID documentation of proposals for annual or multi-year programs, correspondence between governments and between USAID Praia and AID/W, special studies, minutes of conferences, and the evaluations). These sources, together with site visits to nearly all of EMPA's operations, to the local currency user organizations, and to work sites in the field, provided material for the following summary observations.

III. FINDINGS

A. GOCV OPERATIONS AND ACCOUNTING

1. *Physical Operations*

Ship unloading is monitored by EMPA with on-board inspections. Fumigation is occasionally ordered. General quality is recorded. EMPA directs and handles unloading and transfer of commodities to its warehouses and silos. EMPA's laboratory responsible for quality control, an orderly, well-equipped installation with qualified staff, provides analyses as needed, and, when appropriate, advises on the disposal of contaminated or spoiled commodities. The warehouses give a similar impression of order, organization, and proper management. Inventory and stock movement records appear technically adequate, up to date, and accessible, and are properly used in control of warehousing operations. We perceive no problems with silo operations, in which equipment is in working order and management seems competent. Apart from the loading and movement of trucks in Praia following sales to retail dealers, we did not witness physical distribution operations, but heard of no serious problems even in transshipment to other islands.

In these matters, we support findings of previous evaluators or inspectors commending EMPA's work, and confirm that it has not deteriorated since last observed.

2. *Accounting for Sales Proceeds*

No deficiencies of significance exist in the financial accounting for sales proceeds. No charge to this effect was heard. Previous evaluations reached the same conclusion.

3. *Financial Operations*

There have been chokepoints in the past, and some still exist, in the allocation of sales proceeds to operating agencies, and the movement of voucher information upward from the field through the Ministry of Rural Development and Fisheries, which commits funds, and thence to the Ministry of Finance for disbursement. These delays affect labor payment primarily. Over the past year or so, late worker payment has aroused serious concern in both governments and it is a great hardship for the workers. While payments were reported to be up to date as of December 1989, the problem could recur. A possible

insurance against that is a GOCV promise that it will find means to finance timely payments (make "advances" from reprogrammed or borrowed sources), pending replenishment of NDF reserves from sales proceeds. ^{3/} The promise does not necessarily solve the problem, however, and it could create others-- if, for example, the Government incurs unwise debt to make the advances or underfunds some other program of high priority.

4. Pooled Deposits, Irregular Deliveries (and Late Payments)

Surrounding the late payment question is the related one of a pooled NDF account supplied by proceeds from sales of all donors' food aid. A sub account is maintained for each donor. Donors have complained about pooling, each hoping its own account would be fully funded for on-time payment of labor in its "own" works project. Each has a somewhat different case to make. But overall and from the standpoint of all the workers in all the projects, there can be no argument that the GOCV's pooling procedure is the logical and correct one. Ship arrivals are irregular, which is the primary cause at any given time of differential deficiencies in any given donor's subaccount, and even in the NDF's total pooled reserve. Were there no pooling, the damage to any given donor's project could be severe. As it is, the damage is averaged out, somewhat reducing the negative effect on workers.

In this assessment, once again, we do not differ with earlier evaluators. Nor do we differ with the analysis of cause: irregular shipment calls-forward and, in consequence, irregular ship arrivals, commodity sales, and deposits of receipts. There are several reasons for irregular calls-forward. Late information on domestic food production is a factor. The GOCV's food aid requests may be delayed. Negotiations of aid agreements take time.

Despite their own share of responsibility, the donors tend to put the burden of solving the late worker payment problem on the GOCV alone. Doing so, they have some reason for reassurance in the present stance of GOCV, i.e., that it recognizes its share of responsibility and that it intends to mitigate negative effects by providing short-term financing to tide over NDF deficit balances. The GOCV is also conscious of deficiencies in its vouchering and disbursement procedure. It has not yet found the means of solution, but is working to arrange for it.

^{3/} Section VIII. D. of the FY89 TA reads: "If at any time an advance of funds against PL 480 commodity sales is required to make timely payments for watershed development work, the GOCV will make available sufficient funds to cover authorized project expenditures."

B. USAID REPORTING REQUIREMENTS AND OTHER TA TERMS

1. Reporting

Different GOCV agencies provide USAID with four basic types of information:

- EMPA's Outturn Survey Report, an arrival accounting for values and quantities of commodities received, EMPA costs, and net deposits to the NDF of proceeds from sales.
- NDF revenues and disbursements relative to the U.S. food and works programs.
- The counterpart spending agency's (DGCSFER) semi-annual report on its physical and financial operations and plans, i.e., the utilization of PL 480 local currency. One purpose of the report on works-planned is to accord the projected costs with projected fund availability from PL 480 operations.
- A semi-annual and an annual report on behalf of the GOCV prepared by the Ministry of Plan & Cooperation, Bilateral Aid Division, recapitulating all phases of PL 480 and project information. These two reports are similar in format but have a somewhat different overview perspective.

Reporting, within the GOCV and by it to USAID, is not entirely without problems. For example, the NDF has been pressured to report to USAID and the Ministry of Plan and Cooperation on agreed schedules but has not always received on time the information on which the reports are based, from the Rural Development Ministry. Such delays seem more an irritant to those hoping to be prompt in producing reports, however, than a "real" problem affecting the efficiency of the operations or the achievement of their purposes. Moreover, the "burden" of providing such information, is not perceived by the responsible GOCV officials we interviewed as excessive. This came as a surprise, after briefings on AID/W's doubts both as to the capacity of the GOCV to meet the requirement because of limited staff resources and the capacity of the USAID to translate the reporting into effective management with its small staff. The present low-key attitude of the interviewed officials perhaps reflects progress over the last year or more to rationalize and simplify the reporting, and also augmented staff resources.

It is an irony that the evaluators were told several times that the U.S. and other donors put a strain on understaffed GOCV agencies of a different kind: the burden of frequent donor evaluations. This topic was raised by the Deputy Minister of Plan and Cooperation at a day-long (November 10, 1989) all-donor conference on food. We were aware of the special scheduling arrangements high officials cordially made to accommodate our interviews. But we were not prepared for the lack of depth in staff support they had at their disposal for their primary tasks -- both the substance and the reporting on it.

This observation does not alter our conclusion that the reporting requirement is a reasonable one, and that the GOCV is capable of meeting it.

2. *Self-Help Measures*

TA terms include, apart from reporting, accounting and operational matters, several requirements in "self-help" (Self-Help Measures - SHM). In the current (FY 89) TA they are:

a. A study of food consumption, nutrition, income, health, and potable water supplies, and the impact of price changes among selected vulnerable groups. This long-awaited undertaking would provide an important background frame-of-reference for future food aid decisions, and also for other social and economic programs of the government.

While the study was made a contractual condition of the PL 480 Program, it could as well have been the subject of a separate, ordinary project agreement. The specialized intergovernmental planning for it, the mobilization of personnel and resources to conduct it, and its implementation schedule, are not comfortably related to the processes of managing the distribution of food. Making this significant study a condition of the TA was inadvisable because it distracts the GOCV from its central TA obligations, which are to distribute the food correctly and to spend the generated local currency constructively in the WDP. The procedure might better have been, or be in the future, to disaggregate such corollary activities from the food aid package and operate them as distinct entities under appropriate funding and agencies.

The study is reported to be underway, with the reported prospect of its completion by December 1990, a revised deadline set by the FY 89 TA.

b. Phased Watershed Development Plans (PWDP)

This SHM calls for preparation of more detailed, place-specific plans than were originally called for, or prepared, for work in the watersheds. It contemplates also the generation of a resources database to assist in the preparation of short and long-range PWDPs. As the FY89 and draft FY90 TAs put it, each phased plan will shape project implementation so as to "bridge the gap between a public works project geared to employing those most in need and one where investments are made to maximize the natural resources potential..." [for agricultural production] "in the development of each watershed." "Bridging" this "gap" is the crucial challenge in the joining of the public works project to PL 480 labor, as already noted.

Preparatory work on this vital aspect of planning is underway. The current TA required that draft PWDPs for six watersheds be completed by the end of 1989, and six more by the end of 1990. The draft FY90 TA moves the first deadline to June 1990 and leaves the second unchanged. We believe the original deadline was unrealistic, or simply hopeful. Preparation of the plans is complex.

The terms governing this activity are appropriately included in the amended WDP Project Paper itself (some of the work on it is dollar funded) as well as in the parallel TA agreement. Work on it is moving along at a pace that is not surprisingly slow, given the great new challenge it presents as to technical, personnel, data, and equipment requirements. Once the means for producing the plans are fully in place, the pace will presumably pick up. While writing the second draft of the Report in Washington, the Team Leader learned that USAID has requested that one of the short-term technical assistants who has advised the project before, a watershed development specialist, return in the last months of 1990 to help prepare six, at least, of the PWDPs, with a December 1990 target. Illustrating the difficulty of assembling the necessary expertise, however, is the fact that the project's Cape Verdean computer specialist, who would collaborate with the watershed specialist, may have left the project by that time.

These plans are essential, to a successful consolidated follow-on project, as explained in WDP sections above (I. 1.,e. and II B. 7) and below (Part Two), which stress "integrated" development. For that reason, no aspect of any of the three projects has a higher priority for both U.S. and GOCV officials and technicians than speeding up the PWDP process.

c. Timely Worker Payments

Above, this subject was viewed as a normal problem-solving task. With the FY89 TA SHM, it becomes a contractual commitment increasing pressure on the GOCV to solve it.

This has the advantage of framing and highlighting the problem with performance deadlines. But stipulations of this sort are not necessarily more effective in achieving a result than use of another procedure mentioned in the TA: negotiations through the food aid Interagency Coordinating Committee, and other coordinating interactions between governments. The Committee structure here seems vital and is in active use. It is therefore somewhat gratuitous for us to recommend that it be strengthened.

The GOCV points to one cause of late worker payments -- delays and weaknesses in its own processes by which the obligation is eventually discharged by payment (citing lack of sophistication in moving the paper work and lack of staff to do it); irregular ship arrivals is another. Solution of the former is up to the GOCV. Responsibility for the latter rests mainly on the donors. Each side is pressing on the other and that should continue. GOCV financing of occasional NDF deficits should be a last resort.

d. Pricing of EMPA Sales

The FY 89 TA agreement calls for a study of sale-pricing and food aid policy. The draft FY 90 TA lays out more explicitly than before how the U.S. expects the GOCV to reach the traditional goal of sale prices at or near world market prices (WMP) for the commodity in question. Price surveys are required, as are GOCV notification of survey results and prior notification of proposed pricing changes.

Mission staff are working at this writing, together with the Ministry of Commerce official charged with developing price data, on planning the remaining work necessary to fulfill these TA terms. Much of it has already been done. Taken together with a reaffirmation by the GOCV of its established *policy* to reach WMPs, these initiatives seem to us adequate, and likely to achieve the results desired.

3. *Allowable Costs*

The TAs have all stipulated that only "allowable" EMPA costs may be deducted from the amount of sales proceeds it deposits with NDF for development purposes. It is also a standard that this net amount be not inferior to the local currency equivalent of the FAS/FOB cost.

In past years and until intense and clarifying negotiations during 1989, there has been some confusion and misunderstanding in the matter. On one aspect of it, payment of customs, the governing U.S. document omitted a clear stipulation (as noted by Davis, among others). Nor had the term "allowable" been defined.

If the GOCV reduced NDF deposits and increased EMPA's own revenue because of these misunderstandings, it was never a question of intent to distort the policy nor of lack of cooperation. Having heard all sides of virtually all the allowable cost issues we conclude that the hard work in recent months of clarifying standards and re-evaluating costs has borne fruit. For example, some 41 million escudos were recently reimbursed to the NDF that had been due on account of customs and other costs that EMPA had retained; a more precise determination of costs allowable has been achieved; and reciprocal communication as to what is expected by USAID and what is being done by the GOCV has developed.

4. *Animal Feed*

The fact that some PL 480 imports of No. 2 corn have gone to processors for preparation and sale as animal feed has raised questions. Corn going directly to commercial animal feed processors accounts for some 10% of total commercial corn sales.

There are two ways of analyzing the practice. Arguing *against* such use: 1) It was not explicitly "intended." 2) It deprives the population of direct consumption of the corn. 3) Meat is an inefficient use of corn in providing net food value (as opposed to the corn itself). Arguing *for* it: 1) There are a number of different "intentions" both in the law and in precedent making permissible and in some situations desirable this use of the corn. It is not contrary to the letter or spirit of PL 480, nor to Section 206. While it is not explicitly provided for, it does not violate terms of the TAs in Cape Verde. 2) Sales of Sections 201 and 206 food under the policy that has obtained in Cape Verde since the start of these programs have not been confined, even here, to vulnerable groups nor to the poor -- they go toward making up for a national food deficit irrespective of who buys. 3) Cape Verdeans, like all developing-nation populations, aspire to and demand improvement in the quality of the dinner-table, a fact that cannot be ignored politically. 4) The livestock

industry is economically valuable, if small, and should not be left to die out. 5) What is lost in "efficiency" is gained in quality-of-life and in diversity of economic activity.

5. Ultimate Purposes of Aid

In matters of pricing, allowable costs, self-help, animal feed, and the uses to which a country puts the donated food resource, the purpose for which the U.S. provides foreign aid should be remembered: to assist the host country to develop and improve life. An overly narrow insistence on literal and unilateral interpretations of various laws, regulations and agreements should be avoided if the larger meaning of the law, and the general spirit and purpose of the agreements, are to be served.

The donors' desire to maximize NDF deposits, which would minimize the Government's regular budget share of local currency deriving from food aid sales, raises questions about sovereignty and respect. All the escudos are owned by the GOCV. The corollary question, as to the wisest utilization of the funds within the agreed *purpose* of development, is not always an obvious matter. Opposite decisions can be reached, *both* falling within a strict interpretation of narrow regulations. One of the reasons for late payment of workers is the weakness, for lack of funds, of administrative mechanisms for speeding the payments. The delay derogates the "developmental purpose." Is it then necessarily correct to maximize NDF deposits, that is, to increase total revenues under the partial control of donors, at the expense of revenues going to the government alone in its function as manager of the country as a whole? It is the GOCV's *ordinary* budget that must fund the administrative improvements necessary to speed payment of workers funded by the development budget. With a global view of how to reach the joint development goal, the significance of the allowable cost calculation and its relation to ordinary budget revenue, would appear in a different light. Customs, represents some one-half of the tax base for government operations. The implications of reducing that resource and of the enormous political and administrative problem of changing the government's source of revenue are considerable.

6. Compliance With Overall Terms of Agreements

With this perspective, we attempt to make a balanced assessment of GOCV "compliance" with PL 480 agreements and U.S. requirements. The Government is making a genuine effort to respect the terms of agreement. It is working hard to make its actions conform to details of agreement. And it has made the changes, adjustments, and reimbursements asked of it. In short, on a reasonable or relative standard, Cape Verde's compliance performance is superior.

C. PROGRAM MANAGEMENT: USAID AND GOCV

The central point of oversight of the PL 480 program in the GOCV, and the office which produces periodic reports summarizing all other reports, is the Bilateral Division of the Ministry of Plan & Cooperation. In the USAID, it is the responsibility of a staff member who, until recently, also had responsibility for the Watershed Development Project.

USAID's situation on staff resources for management of the PL 480 program and other responsibilities improved markedly, even prior to the arrival January 24th of a new General Development Officer. On the GOCV side, the Ministry was able to acquire the services of a capable new staff member for oversight and coordination of PL 480 work twelve months ago. The USAID likewise appointed a capable individual to a new position of assistant to the principal, concerned exclusively with PL 480, some 18 months ago.

These developments made possible a period of intensive work under good leadership by both parties that has brought PL 480 management to an adequate level of competence and product. As noted above, a number of troublesome problems have been resolved. Records, files and reports have been put in order. Equally important, explanation and communication of these developments to AID/W and REDSO/WCA has begun to have the effect of a better understanding of the actual status of program management. While some problems called to our attention in Washington had already been cleared up, as we found in Praia, we hope and believe this lag will not persist in the future.

D. LEVEL OF AID: FITNESS TO NEEDS

1. Calculation of Food Needs

The total U.S. food aid package derives, of course, from calculation of the food deficit. The USAID has brought increasingly expert staff resources to this exacting task. Two staff members have had training in the U.S. in the methodology and data management involved. The information available in Cape Verde on which to base the calculation has increased over time, with studies and statistics developed by different agencies and donors. The most recent assessments have been done carefully and professionally, as far as we could determine.

2. The U.S. Contribution in Covering the Deficit

How much the U.S. and other donors will contribute to meeting the country's food needs is a matter of negotiation and decision, not calculation. While we did not explore it, we heard of no reason to question the process of negotiation nor the soundness of the final U.S. decisions.

3. Requirements for PL 480 LC Counterpart

Among the elements which contribute to a decision as to the level of aid in a given year are the funding needs of activities to which income-generating employment is made available. This implies ambivalence. On one hand is the principle that the level of food aid is determined exclusively by food need; on the other, the momentum of work in the dollar-funded activities. This cannot help but have a bearing on the level of aid approved.

There seems to us nothing seriously wrong in this, if indeed it has occurred. A sound development purpose would be furthered and certainly the food would go to a country barely meeting its food needs. The works project budget seems to be more often *limited* by PL 480 local currency availability than a cause for *increasing* it. Limitation of the number of watersheds in the project's plan to only thirteen (there are some 50 sites that might have been selected) was in part a recognition of how much local currency would be available. Each year the DGCSFER receives its overall WDP budget ceiling after USAID and the NDF calculate what PL 480 will generate.

Thus, a balance or equilibrium is somehow reached. As far as we were able to probe the decision-making process, we were satisfied that the level of food aid was properly arrived at, and that it is in a reasonable proportion to the need for food and the need for local currency at the present level of project activity. The fact that a sizeable package of emergency aid may be requested in the proposed FY 90 program at least postpones any imminent project funding shortage in the near term.

E. SUCCESS IN COMBINING PL 480 LABOR WITH THE WORKS PROJECT

1. The Utility of PL 480 Labor to the Engineer

It is a professionally oriented attitude that "engineers," that is, those in charge of getting a given physical watershed installation in place, will find both employment-generating schemes and the labor-intensive method of production somewhat constraining. Both are basic characteristics of the labor-mobilization system in use in the Cape Verde WDP.

We doubt, however, that there could have been a *better* way in past years for the GOCV and the U.S. to have mobilized the labor, given that an immediate social purpose, in addition to a technical and long-range physical purpose, was to be addressed in the joining of the programs. We find that the integration of the two programs and the management and monitoring of them as one whole (with two aims) has become more and more sophisticated and efficient. The very existence of a common dollar/escudo budget, which began to take shape only in 1985, is an indicator. Assessment more thoroughgoing than ours is necessary to judge precisely the utility at all the different sites of the present labor arrangement, or to improve it; and it would have to look into far-reaching corollary questions. These include: the benefits to communities of "community based work fronts" as a system of labor mobilization measured against the system's sometimes negative effect on integrated physical watershed development since the particular works chosen for construction must take account of community benefit; the extent to which communities can or do respond to the opportunity of the project's labor demand to develop a common-purpose attitude such as would be necessary in optimum agricultural development. Other questions are: What are the Community Based Work Fronts truly doing? What is their real relation to communities? How do they relate to community resident "Commissario"? and to cooperatives? Who really decides where and what work the CBWFs will do? Where do such decisions leave the "engineer," with *his* project targets and workplans? Are CBWFs a viable and enduring social/economic innovation in rural Cape Verde? In what ways do they differ from "classical" workfronts - in observable practice as opposed to design hypotheses plus limited models/trials?

Such questions are difficult but inescapable. We touch briefly on them in the following.

2. Advantages and Disadvantages of PL 480-Funded Labor: CBWFs and Other Systems

As evident in A. and B., above, it is a consequence in part of the funding source for labor on the watershed project that the labor has been paid with delays.

Whether or not this problem is on the way to a solution, past performance was irregular and at times seriously disruptive to the project. Those responsible for the works agree that, worker morale and labor productivity suffer, lack of pay causes some workers to seize any other possible source of income and that this competition actually creates labor *shortages*, whether because of reduced numbers of laborers or of the reduced volume of their output.

When paid, labor mobilized via the CBWFs and working near home is reported to be more productive than that of classical fronts. The policy of the project is to extend community fronts as far and as quickly as feasible. At higher levels, the government is considering a modification that would introduce entrepreneurship into the recruitment and oversight of community work crews. And it also sees continuing place for the classical work fronts.

W. S. ?

The labor-intensive method, which to date has been taken as a given with PL 480 funding, determines to some extent what work will be done. While equipment is not generally appropriate in the works required in watershed development, some of it is and there, the method hinders production.

The CBWF localization of works and labor, that is, the feature of the CBWF system that requires work to be done near the community from which the labor is recruited and prevents it from following the engineer as he moves the worksite, limits the engineer. He prefers to stay with a work crew that has gained experience in one place and bring it along to the next. Similarly, he prefers to select crews in the first place on the basis of skill and willingness to work hard at any site.

While the community-based workers do respond to the opportunity to improve their own or their community's property, their period of employment is limited to the time needed to do it. When that work is done they are out of a job, at least if the CBWF concept is applied. Alternatively, in order to keep the pay coming, they stretch out the work, becoming inefficient.

Most project works including afforestation and water control have only long-range and/or natural resources-protection benefits; a far lesser part has current benefit to farming and agricultural output. This fact limits the role and the morale of CBWFs in the short term. But as project emphasis shifts to agriculture, as recommended in Part Two, the system may have renewed vitality.

The higher paid classical-front system of mobilizing labor seems, then, to have some advantage over the CBWF system for present years. Even in the short term, further examination and development of both systems, and possible improvement coming with compromise between the two systems, must be pursued. The same would be said of the choice between PL 480 as a labor funding source and some other were any other conceivable in the near term future.

The labor-intensive method implied, or at least assumed, by PL 480 funding and by the CBWF principle itself is perhaps more apt to the vital work of *maintaining* the constructions now in place than to the original work installing them.

Finally, we do not assume in our considerations of a future project that PL 480 funding is more appropriate to watershed works than to any other. That is, we advise a balanced use of this resource wherever it is vital to employ the unemployed and useful in the overall purpose of development -- such as, for example, in certain labor-intensive tasks associated with the research function, or in connection with the great need to strengthen the connecting link between research and production, that is, extension.

IV. CONCLUSION

A. ASSESSMENT

The findings above lead to the assessment that the PL 480 program in Cape Verde rates well, from the standpoint both of how it is run and what it has achieved. It advances the USAID's rural development strategy, which is to link food aid with labor intensive soil and water conservation activities aimed at increasing the potential for agriculture production. It has simultaneously provided rural employment, which is its separate purpose, and furthered Soil & Water Conservation efforts which is the watershed project's initial purpose. Its accomplishment in these activities is impressive to anyone who has toured the project valleys and seen the thousands of conservation installations in place. The program has covered the food deficit equitably and efficiently and has contributed in significant volume to constructive rural development.

With respect to management and policy issues, we recognize problems that have been identified over the years but we have also noted progress in both these areas. The dedicated work of the U.S. and Cape Verdean managers has improved administration of the program, tightened its link to the works project, and increased the level of communication and coordination among the concerned officials of the Ministry of Plan, USAID, EMPA, NDF, the Ministry of Rural Development, and the DGCSFER. This has reduced "issue" problems to a manageable few; pricing, late worker payment, for example; and changed the atmosphere in which they are being dealt with from unilateral insistence on agreement compliance to willing collaboration on problems seen to be mutual.

The principal remaining problem is not in management at the Praia level nor in "compliance" but in the labor system, that is, the relation of the projects to communities and the future of rural development action. The CBWFs have reached an impasse limiting their future development unless restructuring is successful. That concerns the watershed project more directly than the PL 480 program, obviously, and it will be resolved in a context far broader than that project or the future consolidated project: evolving public policy, additional research on rural society, and research and development in the technical matters of labor mobilization and labor efficiency in rural development works.

B. RECOMMENDATIONS

Our recommendations group around:

- Ways to increase understanding of the labor/community stake in watershed development, to increase their contribution to the works while enhancing their own benefit.
- Alternative uses of the PL480 generated local currency. We are suggesting appropriate uses connected with INIA's mandate that are no less necessary and no less beneficial to the unemployed than the present exclusive utilization in watershed

works; and also, use of the LC in incentive programs relating to land exclosures and on-farm experimentation.

- A continued concentration on management, communication and coordination, in order to sustain the management standard that has now been achieved. It is also possible that standards reached as a result of emergencies or "catchup" efforts will change once the special circumstances no longer obtain.

We conclude with a negative recommendation concerning certain performance requirements placed on the GOCV as conditions of continuing the program -- that it complete on some arbitrary schedule pricing analyses, policy or structural reforms, disposal of the late worker payments problem, or other perhaps desirable measures currently being considered as conditions precedent. It is not always wise and sometimes counterproductive to use leverage. Most if not all problems connected with the program in Cape Verde lend themselves to U.S. leadership, advice, encouragement, and negotiation.

83-

PART TWO:

DESIGN RECOMMENDATIONS FOR NEW PROJECT

TABLE OF CONTENTS

SECTION ONE: INTRODUCTION & BACKGROUND	85
I. THE PREDECESSOR PROJECTS	85
II. EVOLVING AIMS	86
III. CONSOLIDATION OF U.S. PROJECT INPUT: MANAGEMENT	86
IV. A PROPITIOUS TIME FOR NEW DIRECTIONS	87
SECTION TWO: CHANGE THEMES & PRECEPTS	88
I. A LONG-TERM ENTERPRISE	88
II. SHIFT OF EMPHASIS: CREATING CONDITIONS FOR INCREASED AGRICULTURAL PRODUCTION	88
III. SHIFT TO INTEGRATED WATERSHED PLANNING & WORKS	89
IV. WIDER RANGE OF PARTICIPANTS, AND INCREASED COLLABORATION	89
V. PROJECT SCOPE VS. SCOPE OF RELATED GOCV ACTIVITIES	90
VI. LABOR, COMMUNITIES, SOCIAL AIMS, AND COMPREHENSIVE RURAL DEVELOPMENT	90
SECTION THREE: THE SECTORS	92
I. FOCUS OF RESEARCH AND WATERSHED OPERATIONS .	92
A. PLANNING PURPOSES	92
B. INTERACTION	92
C. DATA	92
D. RESEARCH OUTREACH	93
E. EXTENSION	93
F. LABOR	93
II. CHANGES IN PL 480	93
SECTION FOUR - DESIGN: THE WHOLE	96
I. GOALS REDEFINED	96
II. WATERSHED WORKS AND AGRICULTURAL POTENTIALS	97
III. PROJECT ELEMENTS	97
A. RESEARCH	97
B. WATERSHED DEVELOPMENT	98
C. PL 480 PROGRAM	98
D. LABOR MOBILIZATION	98
IV. LINKAGE, INTERACTION, AND EXTENSION	99
V. OTHER DONOR PARTICIPATION	100
VI. U.S. MANAGEMENT OF ITS PROJECT ASSISTANCE	100

SECTION ONE: INTRODUCTION & BACKGROUND

I. THE PREDECESSOR PROJECTS

The range of the design task here is the sum of the evaluated activities: agricultural research, watershed development operations, and PL 480 as a food aid program and also as a source of local currency funding for the operations. Over their life to date, the U.S. has provided some \$12 million for the two projects, and \$57 million in food aid.

PL 480 food aid, with its local currency program component, began in 1977. It was initially somewhat independent of the two projects. Some of its escudos went to watershed work, but in a loosely programmed way, and some went to other activities altogether. Beginning in 1984, this money was allocated exclusively to watershed development, to pay for labor in soil and water conservation and reforestation works, and also administrative costs and supplies. Four to eight thousand workers are employed by the project at any given time during the non-farming season. This is virtually the only labor in the operations. It is mobilized and organized in a variety of ways that pose questions of management, of efficiency, of relationship to rural communities, and of social policy.

U.S. assistance to conservation and reforestation in major watersheds began with the Watershed Management project, in 1982. The Watershed Development project of 1984 continued that activity and combined it with PL 480 local currency availabilities.

The purpose of these and other watershed operations dating back to Cape Verde's independence in 1975 has been to protect and develop soil and water resources and to achieve ecological balance with a hoped for eventual benefit for agriculture. The U.S. project contributed to work in four watersheds originally, and now in thirteen -- twelve on the principal island, Santiago, and one on Santo Antão. The conditions of work in the watersheds are extraordinarily rigorous. Slopes in the valleys range to well above 50 percent. The steep volcanic topography is highly eroded. Intense downpours alternate seasonally with periods of no rain, with distribution unfavorable to agricultural production.

Watershed activities are directed by the Ministry of Rural Development's Directorate of Soil Conservation, Forestry, and Rural Engineering (DGCSFER). Our evaluation rates the Ministry and the Directorate highly. Under an AID contract, Sheladia, Inc. has provided technical assistance. USAID has provided commodities and training.

U.S. assistance to agricultural research dates from September 1982. Its aim was to help develop an adaptive research capacity, originally at the pre-existing but rudimentary Center for Agrarian Studies established in 1978. This facility was reorganized in 1985 as the National Institute for Agricultural Research -- in Portuguese, Instituto Nacional de Investigao Agrario, INIA.

The project addressed the shortage of trained researchers with a training program; and it provided technical assistance through a Title XII Agreement with the University of Arizona to help develop appropriate research activities and promote "institutional development." The U.S. also provided equipment. The purpose over these years and for the future was and is to lay a research foundation for eventually stimulating agricultural development, with research applications both to ongoing watershed conservation and forestry work and to agriculture directly in the longer term.

Both projects have achieved a great deal. INIA, while still in the early stage of its long-term development, is set on a sound path of growth that will further mature and accelerate with the return of trainees and with broadening and improvement in its research program and strategies such as recommended in this Report. Work on the thirteen watersheds includes thousands of articulated soil and water conservation structures and well over two million tree plantations.

II. EVOLVING AIMS

The WDP experience demonstrates the feasibility of protection of watershed resources. Likewise, the capacity of INIA to produce research results applicable to both agriculture and conservation can now be foreseen. This means that watershed efforts, which in the past have gone almost exclusively to the narrow and unvarying but necessary and far-flung works of afforestation and construction of certain structures; (checkdams, contour rockwall terraces, reservoirs, and the like), can begin to diversify.

Agricultural production has always figured in AID statements of project goal, but in fact it has had almost no attention or funding. Also underemphasized is the science and data based planning for the watersheds that is necessary for technically sound integration of the interconnected works involved. Nor, finally, has there been focus on developing the technical and institutional linkages that are necessary if research results are to be conveyed through extension to join with other measures and inputs to eventually find application in agriculture and lead to increase in agricultural productivity and production. New directions on these three matters are at the center of design for a new project.

III. CONSOLIDATION OF U.S. PROJECT INPUT: MANAGEMENT

For well over two years, the extension beyond 1990 of the three related project elements has been planned as a single consolidated project.

USAID Praia's staff is disproportionately small relative to its program. There was only one USDH for some two years, until mid-January when a second came aboard as General Development Officer. The PL 480 program needed active management in this period; the dollar projects have not been especially demanding of time lately, but the Mission still had procurement and participant training tasks not passed on by contract to the technical assistance teams; and it is organizing a new project. With respect to management if not overall policy direction for project, AID/W especially is persuaded that

the USAID should delegate responsibility to the private sector. That is item one of present planning. The second is that the projects should be amalgamated, a proposition implying that a private managing agent would itself be unable to manage two projects -- or else, that the reasons for consolidation go beyond the stated matter of USAID's managing resources. Third, it has been offered to this Team as a given from the start that the manager should be a PVO. The reasons for the second and third proposals are not at all clear, nor have they been officially stated, so far as we know.

After analysis of our own, we find some advantages in there being a sole manager; some also in the projects being combined, and merits as well in a PVO taking on the job. There are provisos, however, as to how to realize benefits from the arrangement. In Part Four we stipulate what *any* arrangement must produce for the activities and what it must not do -- taking account of Cape Verdean policies and operations in the activities we assist. It is important as background understanding that a realistic differentiation be made, in theory, practice, and administration, between the U.S. "project" and the Government's activities, that the consolidation of the one should not, by sheer institutional weight or managerial technique and enthusiasm, produce great pressure for the amalgamation of the other - the GOCV agencies involved - nor distort their appropriate mandates. That condition met, there is potential benefit from the closer relationship the consolidation would foster among the U.S. advisors: that they would better be able to provide leadership toward greater collaboration and technical/procedural interaction among the several agencies playing roles in the new project.

IV. A PROPITIOUS TIME FOR NEW DIRECTIONS

This is a favorable juncture for re-thinking the basic character of the activities, the interactions among them that will be increasingly necessary as they mature, and the goals they can reasonably seek in both long and short term. Current project activities will be ending in December, 1990 for Watershed Development, and December also for Food Crop Research if our recommendation to extend that project's PACD is accepted (otherwise, in June 1990). These evaluations and recommendations will soon be distributed and the official design by the PID team will be on record, so that concrete plans can be worked out with the Government soon enough to avoid a hiatus at the end of the year.

Many Ministry and DGCSFER officials share the view we are urging that watershed targets should be raised after fifteen years of virtually the same set of work products. Likewise, INIA officials believe as we do that research capability is near the stage when it can branch out and bear directly on field operations. Finally, there is some consensus already among GOCV and U.S. officials and this Team that the main connecting link between research and its application, i.e., extension, should receive concentrated attention.

SECTION TWO: CHANGING THEMES & PRECEPTS

While the time is propitious for new directions, the changes sought must be articulated and debated and the necessary actions planned. Following are considerations we think should guide the process.

I. A LONG-TERM ENTERPRISE

The environmental and the agricultural production aims of the project will require a steady effort over many years. The terrain, the condition of the land, and the extent of past degradation require careful and coordinated work over wide areas in order for any lasting improvement to take place. Even optimal development would not create a "land of plenty" but only a better balance between the ecology, production resources, and population. This points not to enormous investment but to continuing effort. The work of the last fifteen years indicated feasibility, the next fifteen years should show that what was feasible was done.

II. SHIFT OF EMPHASIS: CREATING CONDITIONS FOR INCREASED AGRICULTURAL PRODUCTION

The INIA project to date has worked mainly to develop research capabilities, which, however, are not yet applied systematically to agricultural production. Similarly, watershed work has addressed conservation, including afforestation for that purpose, as opposed to works with the direct result of increased productive capacity.

The center of our recommendations for the FY 91-95 period and beyond is the shift that can begin to take place, at INIA, to seek research applications in agriculture, and in the field operations, adopting a broadened range of activities using research to make possible a gradually increasing flow of benefits to farmers and communities; whether in agriculture, livestock, or economic forestry; from the land and water. Section Four, II., below, is a comprehensive statement of the necessary works in the watersheds and their relation to agricultural potential.

III. SHIFT TO INTEGRATED WATERSHED PLANNING & WORKS

The WDP evaluation found that to date the works in any given watershed have been planned, designed, and located somewhat randomly -- that is, in reflection of the professional orientation of the person in charge of a particular program, for example, or a CBWF's preference, or of a short- versus long-range aim.

Integrated technical planning is a necessity for the new project. From the engineering standpoint, the works will not do the hoped for job, nor last, unless they bear a science-based relation to each other. The hydrologic research by INIA spelled out in the Evaluations is required. Biological measures of conservation and agricultural initiatives must also be factored in. Integration means that people, affected differently by different types of plans, must make an input to the plans, by consideration of socio/economic factors. Comprehensive plans include administrative and financial measures. Overall, the successive annual work plans for each watershed, taking account of all technical, social and administrative elements, will be the Phased Watershed Development Plans identified in PL 480 and project agreements, and their production must be accelerated if new goals are to be pursued.

IV. WIDER RANGE OF PARTICIPANTS, AND INCREASED COLLABORATION

Redefined purposes and the several input streams required to plan, integrate, and carry them out, dictate a broadened scope of watershed works; contributions of several agencies, not the INIA and the DGCSFER alone; and intensified professional interaction and collaboration among specialists and between institutions.

This theme is spelled out below. While the DGCSFER would continue as the coordinating agency responsible for the physical works, a strengthened, enlarged and revitalized extension directorate would be an indispensable participant in the joint activity, even though it is not part of the project's scope of action and support. We are recommending that the U.S. provide only initial technical assistance for planning the development of the directorate, and that other donors provide long-term assistance. Similarly, the contributions of the directorate of Fomento Agrario (agricultural development), hitherto quite isolated from watershed development, should be coordinated with project activities. The same is true of all the hydrological, agricultural, and engineering expertise available in Cape Verde or in the technical assistance offered by other donors. Integrated management of the watersheds, and the linkage between research and production potential, call for a comprehensive view of the elements involved and coordination of their contributions.

V. PROJECT SCOPE VS. SCOPE OF RELATED GOCV ACTIVITIES

We underline the differentiation already made between the "project" and the broader activities of the government that relate to the project and its goal. Our design recommendations for the consolidated U.S. project add up to a decrease in total U.S. activity as against current levels. However, the project and its expertise and leadership are thought of as being at the coordinating center of a variety of government and private activities that *will* increase and that taken all together would make project goal achievement possible, or, absence of which would make the project work of the last and the next fifteen years futile. The project cannot be understood or administered without recognition of the disparate scope of involvement of the two governments.

VI. LABOR, COMMUNITIES, SOCIAL AIMS, AND COMPREHENSIVE RURAL DEVELOPMENT

Governmental and other leadership in Cape Verde has pursued a policy of public participation in the work of national development and the sharing in its benefits. That policy led to the integration of local currency resources generated by PL 480 Programs and watershed works. The activities find their labor supply among the rural unemployed who receive PL480-generated income and whose communities help decide the nature and creation of work.

Over the years since Independence the government has sought a fair and effective formula for labor mobilization. There is a rough correspondence between the "classical work fronts" and the old system of labor levy; likewise, the "reconverted fronts," called Community Based Work Fronts in project terminology, bear a resemblance to a perhaps older tradition in which a community helps individuals, successively, in tasks they cannot perform alone.

In the watershed project, advantages and disadvantages have been found in both systems of labor mobilization. They are being analyzed from the standpoint of the interest of the engineer wanting work done, and, the sometimes conflicting interests of the individual and community wanting benefit to themselves--the latter rather than the former often determining the kind of work that is actually done.

Currently several concepts are under scrutiny as the right system for the particular conditions found in given places. One of them is the "enterprise" approach, a contractual arrangement with a natural community leader who is willing to take on the task defined by technical and planning authorities for a given compensation, and to carry it out with whatever labor mobilization system he finds feasible and efficient. This has the merit of efficiency, perhaps, but farmer and community benefits from the program could be slighted.

The labor issue arises again and again in the Report. But it is an unresolved problem on which we make no definitive recommendations other than that the new project should be alert to the developments in the matter and flexible enough to adapt to modified formulations that may prove out. The project should also contribute to study and experiment in the matter as it has done in the past with the Gardiner report (see bibliography).

SECTION THREE: THE SECTORS

I. FOCUS OF RESEARCH AND WATERSHED OPERATIONS

The new project needs a strategic focus relating directly to its goal in order to avoid making a wish-list that goes beyond practical need or the capacities of the agencies. We propose the following new directions. They are chosen advisedly and allow ample time for accomplishment. As the work progresses, knowledge and capabilities will accumulate and develop to accelerate further progress. The strategy has six elements:

A. *PLANNING PURPOSES*

- The socially and technically integrated approach to planning, selection, and execution of all the watershed interventions; structural, vegetative, and human. This is the science-based aspect of planning that parallels operations-based planning in:
- Coordinated annual work planning of watershed operations through the Phased Watershed Development Plans system, which will determine the allocation of resources to each watershed and subbasin and the financial, administrative, technical, and research measures required for each.

B. *INTERACTION*

- Activities and occasions promoting interagency and interdisciplinary collaboration such as professional exchanges, workshops, and jointly planned/executed operations.

C. *DATA*

- Greater attention to data collection and analysis to support planning, research and operations; chose project ties to AGRHYMET and project use of AGRHYMET's GIS.
- Definitive choice of a soil classification system and pursuit of soil classification work, along with completion of other natural resources inventories.

D. RESEARCH OUTREACH

- Broadened INIA effort, as its capabilities mature, to develop research applications in both conservation and agriculture. INIA should begin to move soon into hydrologic and other research relating to conservation work that is recommended by the DGCSFER and this Report.
- Intensification of INIA field trials, demonstrations, exclosures, and other field researches and research applications on site.
- Expansion of socio-economic research bearing on agroforestry, cropping systems, land use, irrigation, and other watershed operations, with the inclusion of farmers and communities in planning and decision-making in these matters.

E. EXTENSION

- Major initiatives in the planning and development of an extension service enabling it to discharge the increased responsibility of linking research to watershed activities and farmer productivity; systematic INIA training of extension agents; close advisory experimental relationships between technicians and agents and farmers as together they attempt to increase agricultural output. Similarly, efficient water utilization in irrigation to complement water control, increased water storage, and better water harvesting. And, development of forestry enterprise, with plantings for fuelwood and other marketable products, as well as supply of alternative fuels to decrease pressure on plantations.

F. LABOR

- Further inquiries and decisions as to a viable labor mobilization system or systems. This requires objective and disinterested analysis of existing systems. (See below.)

II. CHANGES IN PL 480

The Evaluation of PL 480 concludes, first, that it is being properly managed by the USAID and GOCV. Staff on both sides has been strengthened. Some residual problems of recent years have been resolved. A factual basis has been refined and updated for analysis and negotiation of other matters, such as a more accurate determination of costs that may be deducted from EMPA's sales proceeds deposited with the National Development Fund, and sale pricing. Bilateral negotiations, which are of an ongoing nature, have had good results and are likely to be productive in the future. More important, the program has achieved the long-standing purposes set for it, i.e., to contribute to coverage of the country's food deficit, and to employ the rural poor in useful public works.

It is advisable, and necessary for timing reasons, that the program continue for at least another year on the basis set forth in the FY 89 Transfer Authorization, as refined and amended in the proposed FY 90 TA. Meanwhile, changes should be planned for the FY 91-95 period with a view to a multi-year authorization corresponding to the time frame of the new consolidated project and its changing requirements. Like the watershed project, the Cape Verde PL 480 program has varied little over the last six years. The commodity list is constant and the generated local currency goes to labor in the same conservation works.

The purpose of reconsidering the allocation of local currency is to make sure that new and vital research and watershed purposes get support according to new priorities. Discussions among project and PL 480 managers leading to an FY 91-95 TA can look ahead to indicate eligibility for a number of probable uses. Most important, perhaps, is a fund or mechanism for compensation of farmers or landowners who agree to enclosures to permit natural revegetation of eroded over-grated land, mainly on upper and steep slopes; who will allow overcultivated land to lie fallow; who agree to the use of their land as demonstration and/or experimentation plots; or who let their land be used for tree plantings for erosion control purposes.

The Rural Assistance Program and its extension corps is already funded entirely by PL 480. As the official extension service is strengthened, to become the principal link between research and agricultural practice, it should not be neglected as it has been in the past and must be funded. Similarly, the Agriculture Development Directorate's contribution to success of the project is probably essential and support should be considered. At INIA, funding is needed, among other things, for labor on its enclosures and other field experiments, and for stipends for extension trainees. The agencies just mentioned belong to the Ministry of Rural Development. Other quasi-autonomous agencies will also serve project purposes and may deserve support -- notably the Water Resources Board.

None of these eligibilities is categorically different from those authorized under the current TA, including salaries, supplies, fuel, vehicles, incentives, collateral studies, establishment of nurseries for agro-forestry stock, etc. The wider and more imaginative range of uses raises the question of global availability of public sector funds for those public purposes. Escudo requirements for the traditional and ongoing program -- RAP and watershed installations -- are not likely to decrease much beyond savings that may result from more efficient labor mobilization systems. New revenue may be generated from diversification of the commodity-import list, but not in great amounts. Thus, the Government may face the need to reconsider its priorities overall, as well as its tax base and rates, and may need to explore with donors new international assistance programs.

This is not the first report to suggest a broader range of commodities for the PL 480 program in Cape Verde. The matter of animal feed discussed in the Evaluations might be addressed with fewer negative perceptions were corn as the basis of feed for the important livestock industry to be replaced by sorghum. Another proposal for study is the import of plywood on concessional Title I terms. Other commodities might be considered for transformation or industrial uses providing economic benefits such as relief of a

negative balance of payments and stimulation of industrial output for local consumption and for exports. The potential foreign exchange benefits, whether from import substitution or earnings, would allow commercial food imports offsetting U.S. donations. The counterpart funds made available for development programs, including especially the activities with which this Report is concerned, would be used in the same important, constructive ways as at present.

In short, the PL 480 program is sound and serves its purpose well, but must now be redeveloped in conjunction with the new directions and demands of the consolidated project it supports. Redesigned as proposed, it would not depart from existing PL480 criteria. The redesign is necessary, however, in order for the appropriated-dollar project to achieve its purpose.

SECTION FOUR - DESIGN: THE WHOLE

I. GOALS REDEFINED

As the new project broadens to accommodate a shift of emphasis to increased agricultural production, new goal statements are required.

The 1982 statement of goal of the Food Crop Research Project, in the Project Paper's Logical Framework, was, "In the long run to support GOVC development goals in: food self-sufficiency, rural employment, rural income, [and] nutrition."

The goal of the Watershed Development Project stated in the 1988 Project Paper Amendment is, "to stabilize the natural environment and increase agricultural production potential..." PL480 Title II, Section 206 Program objectives, according to Transfer Authorizations/Agreements, are (paraphrased), to diminish the need for food assistance through conservation and other activities in rural development.

Food self-sufficiency is no longer considered a realistic hope for Cape Verde. Increased agricultural *production* with a diminished food aid requirements is possible. The project will seek it, both in the short and the long run, rather than limiting its aim to increasing agricultural *potential*. The strategy of moving into agricultural research applications, with a strengthened extension mechanism, is to take advantage of the "potential" created by structural and non-structural watershed works and INIA research.

Thus, an updated and combined project goal statement might read:

"In an integrated equitable and participatory rural development program, support of GOVC efforts to develop soil, water, and vegetative resources and to bring research findings to bear on production systems so as to increase crop, livestock, and forestry production while protecting the environment."

II. WATERSHED WORKS AND AGRICULTURAL POTENTIALS

The restatement of goals is based on a concrete understanding of what work has to be done in the broader horizon of the new project and what it can deliver to agriculture. We state this as follows.

The volcanic rock upthrusts at the mountain tops and the extremely steep slopes (above 45%) just below them will be left alone, allowing natural revegetation to occur.

Below these extremely steep slopes, the very steep slopes (30 to 45%) that may be suitable for carefully controlled range use will first have to be protected from livestock and people foraging for feed or fuel, and re-established to perennial plants that will protect soil surfaces. Steep slopes (20 to 30%) not suitable for corn and pulses alone because of unacceptable erosion may be usable for agroforestry, with mixtures of trees, bushes, and other perennial plants with corn and well-nodulated pulses. Methods for compensation of people displaced from these slopes will have to be developed, and policies formulated to formalize access to land newly-formed from sediment. Slopes of less than 20% used for dryland agriculture will require moisture- and soil-conserving practices for food and feed crops. Areas with semi-arid and arid climates will be suitable for perennial range and forestry to the exclusion of highly uncertain food crops at very low and expensive production levels. In the ribeiras, both dryland and irrigated agriculture, with careful and informed management of scarce water and other resources, and additional water resource development, can lead to improved food production. When these goals are achieved, landscapes will provide an acceptable quality of life for populations that have understood the need for integrated management and sustainable utilization of food resources and production.

III. PROJECT ELEMENTS

A. RESEARCH

Support to INIA will continue but at somewhat less than the current funding level. Much, but not all, of the necessary staff training has been achieved. Some additional instruments and other equipment are needed. Continuation of technical assistance is essential. INIA will increasingly research problems in hydrology and structural and vegetative erosion control as well as the augmentation, harvesting and uses of water and other aspects of natural resources development, as it simultaneously develops applications of research to agricultural production. It will also develop the capacity to train extension agents for all national programs in agricultural development.

B. WATERSHED DEVELOPMENT

Work in soil and water conservation and forestry of the type undertaken since 1982 will continue. A major planning effort, the production of Phased Watershed Development Plans for each watershed, will be completed. Hitherto incomplete systems of data collection necessary for understanding hydrological and soil phenomena -- the incidence and effects of rain, water flow, erosion, tree plantation, etc. -- will be upgraded on a scientific basis. This is the input for planning and carrying out integrated watershed development which is technically necessary and necessary also for achieving a sound balance between conservation for its own sake and work leading to benefits to farmers and rural communities.

C. PL 480 PROGRAM

More diverse uses of PL 480 escudos should be budgeted to correspond with and support the greater diversity in government activities serving the project's new goal.

Local currency for project activities will be in short supply. There is reason to hope, however, that diversification of the import program for its own separate reasons would have the side effect of increasing local currency availabilities. In addition, the approval of the new, consolidated U.S. project, one of the largest and most productive development activities in the country, will be the occasion for a reconsideration of national priorities and resource allocation.

D. LABOR MOBILIZATION

Although it derives from a rural tradition, the "community based work front" system of bringing labor to watershed jobs is associated with the U.S. project, which first put it to practical test. The CBWF is an ingenious concept, marrying conservation work requirements with farmer benefit and community development, and promising revitalization of public self-help in rural development in general. Project Rural Assistance Program "extensionists," who are native to village, have organized the crews quite successfully. They have established a connection, which is always problematic in rural programs, between national program management and local groups in the rural population mass, an encouraging achievement.

The Evaluation determined, however, that the success is qualified and limited. The system works only in a geographically limited area; when work is finished there the crew has no function. The laborers have an "entitlement" attitude and stretch the work out. These and other constraints frustrate engineers and foresters whose major interest is physical product throughout the thirteen watershed. In addition, the system's community relationships, experiments and achievements, while many in sheer number are slender in total achievement and replication and, it has "mobilized" fewer than one thousand laborers.

These are reasons that the system must be re-examined and restructured just as the RAP itself must be redirected. In the process, we caution against confusing an attractive, encouraging and meritorious image with a reality, and against automatically relying on the system as the foundation of the new project. Hardheaded adaptations of it are needed such as, possibly, contracting crew mobilization for profit. Limits to the utility in different places and conditions need definition, as do the role of the "classical" and other labor systems.

IV. LINKAGE, INTERACTION, AND EXTENSION

The new project assumes intensified interaction and collaboration among institutions and experts who previously contributed to goals of the projects but without coordination and also among several institutions that must now for the first time participate in this multi-discipline activity.

The "project" itself, in the sense of U.S. external assistance to various GOCV activities, will constitute a unified coordination and leadership center for all the participants, although its financial input will be limited with one exception to the areas previously funded (INIA, the DGCSFER's engineering and forestry work, the RAP program, and labor).

The exception is extension, where we recommend the engagement for a year or so of an expert consultant to assess the Extension Directorate's capabilities and needs in the light of the major expansion of the role required of it to become the principal link between research and agriculture.

Development of a viable extension service is a long-term undertaking. Existing Rural Assistance Program "extensionists," or "para-extension" agents, worked less in agriculture than in labor mobilization for conservation works and in certain community development activities. Generally, they have elementary education only, which would make it difficult to train them as full-fledged extension agents. Nevertheless, RAP constitutes an apparently successful experimental model for certain Extension Directorate functions of the future, pointing the way toward a "community based" linkage to research resources. We argue against the view that the Government's official extension agency (the Directorate) should be allowed to wither in favor of an experiment that is in any case provisional for the reason that it is funded entirely from U.S. assistance-related resources.

With respect to development of extension, as opposed to planning for it, we think it not unreasonable that if the plans are well prepared, another donor might be interested in taking on the job. (We take it as a given that A.I.D. will not fund a project in this area.)

V. OTHER DONOR PARTICIPATION

It is a necessary premise of goal achievement in this project that the U.S. must enlist the collaboration of other donors for work related to activities on which the success of U.S. assistance depends but which it cannot undertake itself. Possible collaborators: IFAD, the ADB, FAO, and bilateral agencies. In combining projects so different in character and operation as research and watershed development, and in projecting how multiple-agency contributions can be augmented and coordinated with the project and its complex goal, the managers of this project will take on the responsibility of contacts and negotiations that must develop for the creation of a kind of consortium of technical assistance inputs to the USAID matrix. Success of this project is not possible without the contributions and teamwork of other donors.

VI. U.S. MANAGEMENT OF ITS PROJECT ASSISTANCE

The Team was asked for its views on how the U.S. should administer its input to the GOCV agencies that will implement the designed work. We list here the criteria or minimum desiderata of any management system that may be adopted.

- Separate contracts or agreements are required for the two basic project elements, research and field operations. For the first, a university with home resources in the required skills seems the most appropriate, but a non-academic institution might also be capable. For the field operations, the technical assistance recruited from whatever source should include expertise in hydrology research and engineering, in ecology, forestry, agriculture, and in extension. This does not mean that these experts would all be stationed here but that they should be accessible for whatever periods are required by workplans.

- In the consolidated overall management, that is, in the function now played by the USAID that will be delegated to an agent, a principal consideration and one that should be expressed imperatively in the agreement or contract, is that the managing agency respect the differentiated GOCV agencies and functions contributing to rural development, while urging that relating to the project work be fully coordinated. Similarly, it must respect the different areas of activity of the sub-contracted technical assistance groups.

We make this point again because with unified U.S. management a tendency will inevitably develop to press the necessary coordination of GOCV agencies to the point of tampering with their structure and mandate. A managing authority is tempted to do so because it must put the achievement of its immediate and relatively circumscribed task first. In the new project, however, the "project" task is more limited than the tasks of the agencies unless it be defined as the coordination of all those agencies and their work. The Government of Cape Verde is already uneasy, not about a U.S. intention to dictate the structure and relationship of its agencies but about the weight and authority of a consolidated U.S. managing agent and the tendency just mentioned, that they consider quite real.

The choice of a Private Voluntary Agency as the managing agent seems to us arbitrary as no reasons for it were available to us. On reflection, we see advantages to it - such as the fact that, since a PVO would negotiate its own agreements with the Government, the latter would have an opportunity to speak for itself about whatever concerns and plans it believes important.

We note also that the "grass-roots" work which typifies the special contribution of PVOs will be important in the new project -- in communities and in extension. That is a function quite different from the administrative task at the center of the activities that a PVO will apparently be asked to perform. Presumably it will be able to call on its own personnel network for the grassroots function (even if its performed by a subcontractor) while acting in the principal function of manager. There are not many PVOs known primarily for management to choose from; and when the process of negotiation and selection begins, a reconsideration of the assumption that it must be a PVO may be in order.

ANNEXES

- ANNEX A. Work Order Statement of Work
for the Evaluation/Design Task
- ANNEX B. Synopsis/Precis: Evaluation Scope
of Work Questions
- ANNEX C. 1. Project Logical Framework Food Crop
Research Project
- ANNEX C. 2. Watershed Development Logical Framework
- ANNEX C. 3. Title II
- ANNEX D. Documents Consulted & Bibliography
- ANNEX E. Persons Interviewed and Consulted
- ANNEX F. 1. Table (a): Technical Assistance Provided to FCRP
- ANNEX F. 2. Table (b): Long Term FCRP Training
- ANNEX F. 3. Table (c): Short Term Training - FCRP
- ANNEX F. 4. Table (d): INIA Staffing - January 1990
- ANNEX G. 1. Tables
- ANNEX G. 2. Proposed Research Topics for Forestry and Range
- ANNEX G. 3. Categories of Control Structures used in the WDP
- ANNEX H. Abbreviations used in the text
- ANNEX I. Organization Chart
- ANNEX J. Watershed Development Activities
- ANNEX K. Graphic Management of U.S. Consolidated Project

Annexes cont.

- ANNEX L. Labor Mobilization, Use of Labor, Extension
& Communities
- ANNEX M. Map
- ANNEX N. Strategic Plan - National Institute
for Agrarian Research

ANNEX A

WORK ORDER STATEMENT OF WORK FOR THE EVALUATION/DESIGN TASK

ARTICLE I - TITLE

End-of-Project Evaluation of the Food Crop Research Project (655- 0011), the Watershed Development Project (655-0013), and the PL-480 Title II, Section 206 Program for Cape Verde.

ARTICLE II - OBJECTIVE

The objective of this work order is to perform an evaluation of the above-mentioned projects through an analysis of their activities and accomplishments in order to make detailed recommendations for future A.I.D. involvement in agricultural research, watershed development, and rural employment generation activities in Cape Verde. Evaluators will place particular emphasis in their recommendations upon the necessity to achieve a more effective management coordination of these heretofore separate activities.

ARTICLE III - STATEMENT OF WORK

This work order requests the services of a five-person team to carry out the evaluation. Below are the individual specialist requirements as they relate to preparation of the evaluation report:

1. Agricultural Economist
2. Agronomist
3. Civil Engineer/Hydrologist
4. Community Forester
5. Food Aid Specialist

The contracting organization shall propose one of the above individuals to act as Team Leader. This individual will act as team spokesman and coordinator vis-a-vis the USAID mission and the GOCV. As this person will have overall writing and editing responsibilities for the final product of the team, it would be highly desirable for that individual to have some skills as an Evaluation Specialist and/or prior experience as an evaluation team leader.

The team leader will be responsible for the overall report including synthesizing and integrating observations and recommendations. The recommendations should flow from an analysis of specific issues/questions raised in this Scope-of-Work and should be based on field observations, data and information available within the project, and discussions with USAID, GOCV officials and other knowledgeable sources dealing with similar or related projects and interventions (e.g., other donors).

The Agronomist and Economist will be primarily responsible for evaluating the Food Crops Research Project while the Civil Engineer/Hydrologist, and Forestry Specialist will have primary responsibility for the Watershed Development Project. The Food Aid Specialist will review all aspects of the PL-480 Program as they relate to the WDP. However, each of the members will also evaluate the cross-cutting concerns, relationships and linkages with the other project so as to provide a comprehensive picture of the two projects and make appropriate recommendations for a combined future project.

A. General:

Related to FCRP:

1. Evaluate the overall status of the FCRP and its progress to date in achieving the project purpose and identify the principal constraints, if any, for lack of progress.
2. Review the status of implementation of recommendations made by the previous evaluation (RDA International, Inc., Oct. 1986), and identify any constraints to the implementation of those recommendations.
3. Identify any priority measures which should be taken in the remaining period of the FCRP to move it closer to the achievement of the project purpose.
4. Assess the extent to which the socio-economic data and information collected on the characteristics of Cape Verdean production systems were employed by INIA researchers to serve as a basis for developing a research strategy and specific research inquiries to address on-farm problems and constraints.
5. Review critically the linkages between the FCRP and WDP and the extent to which INIA/FCRP was able to address the research needs of watershed development areas (e.g., soil, soil moisture, water management and forestry technologies, etc.). Suggest the means for strengthening linkages so that the development of watersheds proceeds in tandem with evolving technologies to improve production and resource conservation in the watersheds.
6. Assess the institutional development needs of INIA in the follow-on project in terms of training, equipment, infrastructure, technical assistance and other inputs. This assessment should be based on a realistic determination of critical research needs of Cape Verde given the current size and structure of INIA, the relevance of the range of activities and programs, and the long-term capacity of Cape Verde to sustain the wide-ranging research and training functions performed by INIA.
7. Based on the analysis and assessments emerging from the above, identify issues to be examined by the PID team and provide recommendations as to the nature of assistance and inputs to be provided to INIA in the planned follow-on project (WARD) with particular attention to the improvement of co-ordination and linkages between the two projects.

17. What has been the relative importance attributed to the proportion of maintenance work on existing structures and new construction of soil conservation structures? Should the proportion of maintenance/new construction be any different in the follow-on projects? Assess the need of structure maintenance and the question of sustainability.

18. Consider the WDP approach to soil and water conservation activities in light of approaches utilized by the Italian and GTZ-run projects in Santiago. How can the follow-on project address the challenges of contract-type work which tends to draw qualified personnel away from more traditionally-run projects?

19. How can the new WARD project strengthen coordination between research and extension in soil and water resource utilization in the context of rural Cape Verde's needs and resource potentials?

20. Evaluate the attempt's to "institutionalize a hydrological monitoring system" in terms of indigenous institutional capacity, incentives, and the need to perform such monitoring.

21. Assess the appropriateness of the TA, the commodities and the training furnished to the WDP.

22. How can future project activities increase incentives to individual farmers, landholders, and community groups to invest in the land and the renewable resources available to them?

23. Based on the analysis and assessments emerging from the above, identify issues to be examined by the PID team and provide recommendations as to the nature of assistance and inputs to be provided to watershed development in the planned follow-on project (WARD) with particular attention to the improvement of co-ordination and linkages between the two projects.

B. Specific:

1. Agronomist:

a. Assess the nature of technical assistance provided to date in terms of its appropriateness, adequacy, and the role it has played in assisting INIA in setting an appropriate research strategy and research planning, review and evaluation processes.

b. Assess the extent to which the research undertaken in food crops and related disciplines has been relevant to the production system's characteristics, constraints and needs.

c. Evaluate the food crop research strategy and assess the extent to which it is based on a clear identification of targets of opportunity for production-resource improvements in major agroclimatic zones/subzones and farmer groups/sub-groups.

8. Access the status and appropriateness of project inputs and outputs called for in the Project Paper and Project Paper Supplement.

9. Consider the current duration of the project PACD and make recommendations concerning extension, if necessary.

Issues Related to WDP:

10. Evaluate the overall status of the WDP and its progress to date in achieving the project purpose and identify the principal constraints, if any, for lack of progress.

11. Whereas the original WDP project objective was employment generation and conservation and the ultimate objective of sustainable utilization, would resource replenishment (i.e., investment in fertility) be a useful concept for the next project objective?

12. Given the soil and water conservation needs and agricultural potential of Santiago as well as available resources for the project, how appropriate was the focus of the WDP with respect to its concentration on "selected" watersheds? Should the focus have been on fewer watersheds thereby making "show case" success stories which could then be replicated? If so, what should have been the criteria for selection? Should this approach be retained in the future, or should project emphasis be placed on fewer numbers of watersheds? Assess the merits of a coordinated program and the efficacy of attempting to implement a far-off watershed in Santo Antao island.

13. Considering the Phased Watershed Development Plan drafts produced to date and its impact on future project planning and implementation, would any lesser degree of detail on the land-use capability maps be acceptable when the objective is to identify specific areas for treatment and to plan and cost such treatment? Can the planning and monitoring benefits justify the expense of 1:12,500 scale, 10-meter contour maps or aerial-photo-based contour mapping?

14. Comment on the applicability of the NRMS-type approach to on-farm productivity and resource renewal and suggest means of implementing such an approach in the agricultural areas of the watersheds in the new WARD project.

15. Consider the Geographic Information System (GIS) installed in the WDP as a planning tool and suggest whatever other potentials it holds for soil conservation planning and program implementation in Cape Verde.

16. Assess the quality of work performed and the organizational merits of the Community Based Work Fronts (CBWF) and the "classical" or traditional field work organization. What are the limits and opportunities of the CBWF long-term soil conservation approach in Cape Verde in the light of John Lewis and Thomas Gardiner assessments and MDRP rural development strategies?

d. Given the predominant nature of production constraints in Cape Verde (soil, rainfall infiltration, low levels of moisture, limited groundwater for irrigation) resulting from low, erratic and unevenly distributed rainfall, what is the level of effort devoted to this constraint and to what extent is the research effort related to near vs. long-term solutions? Assess the research in this vital area including the linkages with the WDP and provide recommendations for improvements. Also assess the extent to which watershed development sites have been utilized as adaptive research sites: (a) to monitor reduced erosion, improved moisture regimes, increased availability of ground-water in irrigated areas and crop growth performance and (b) to design and test interventions/technologies.

e. Review the research efforts and resources devoted to plant improvement (germ plasm collection, introduction, evaluation and testing), and cropping systems improvement (integrated approach to soil and crop management practices) and recommend improvements/redirections if required.

f. Inventory the research outputs (results and technologies) in the project to date in terms of major thrusts: i) screening and introduction of varieties in key crops: maize, beans, cowpeas, sweet potato, cassava, banana; ii) agricultural practices; iii) soil fertility, soil-moisture management and conservation practices; and iv) water management (irrigation) practices and technologies.

g. Assess the extent to which inventoried technologies are undergoing research on-station and to what extent they have reached the on-farm testing stage and the on-farm dissemination stage.

h. Review INIA's linkages with regional, international or other national agricultural research institutions and participation in the regional research networks and collaborative research programs (Bean-cowpea CRSP, Topsoils CRSP, West African Maize and Cowpea research networks). Evaluate the role of FRCP in facilitating these linkages.

i. Evaluate the efficacy and timeliness of research data analysis and reporting and the extent to which research findings are communicated to the user agencies. Recommend steps for improvement if any.

j. Review the status of procurement of scientific and laboratory equipment in terms of needs and appropriateness to Cape Verdean conditions, identify issues, if any, relating to maintenance, servicing and spares etc., and make appropriate recommendations.

k. Review the status of library/documentation center, its progress and problems including the management and operation of the documentation center.

2. Agricultural Economist:

a. Review the social-science component in the FCR project and assess the adequacy of resources provided (TA and support costs) and the role the project has played in providing information relating to the nature of the production systems (resources employed, productivity, and level of technology in current use), constraints and opportunities for improvement.

b. Assess the socio-economic research conducted to date in the project including the timeliness of data analysis and reporting and evaluate the extent to which INIA employed the information (data base) generated by this component to develop research targeted on specific problems of the production systems in the three major agro-climatic zones and recommend steps to improve the integration of socio-economic and agronomic research in Cape Verde.

c. Evaluate the extent to which socio-economic considerations are built into the research review and evaluation process including the socio-economic analysis of technologies tested on farmers fields.

d. Review the extent to which representative farm types (seventy-two farms identified in the phase-II of the Santiago Survey) were utilized by the researchers to conduct on-farm testing and recommend steps to expand on-farm research program to test prototype technologies.

e. Assess the strength of the socio-economic unit at INIA in terms of qualified researchers, support personnel (e.g., trained enumerators) and resources, and recommend steps to institutionalize the role of the Social Science Department as an integral part of the research system which can provide services to the relevant GOCV units for planning agricultural development in the country.

f. Evaluate the long-term training component (progress, problems and future needs) in terms of (i) program structure and staffing pattern, (ii) emerging needs by discipline and speciality, and (iii) placement of returned participants - including the extent to which the project supported them with short-term TA consultants.

g. Review the incentive system and practices in INIA as well as the research personnel evaluation system and recommend ways and means (specially non-salary incentives) of enhancing researcher motivation and performance.

3. Civil Engineer/Hydrologist:

In the context of evaluating WDP, the Civil Engineer will identify (i) specific research needs of the watershed development (e.g., soil erosion, soil stabilization, run-off measurement, etc.), (ii) the extent to which they were met by INIA or other institutions, and (iii) problems and constraints in meeting those needs in the past and recommend ways and means of providing research support to this component in the following project. The recommendations should identify national institutions (INIA or others) where expertise for such support would be available.

801

a. Has the watershed project worked effectively to control erosion, conserve soil and water, and increase productivity by concentrating on structures in the streambeds and valley floor channels, or should the emphasis in each watershed have been top down (beginning at the watershed highest point or dividing line) or concurrent action throughout the basin?

b. Has the variation between the baseline and recent characteristic drainage basin (subbasin) hydrographs shown that project efforts have had a beneficial impact on increasing baseflows and decreasing storm torrents; and are hydrographs the best and most appropriate longterm project success monitoring tool?

c. Has the rainfall guage network proposed in the project paper proven to be sufficient to the GOCV priorities and the needs of the Department of Agroclimatology and Hydrology as well as to other users and the project?

d. What is the best mechanism for INIA to address specific research questions and issues (such as a soil classification survey, rainfall data analysis, and a study of the optimum use for the improved streambed sites) which can continue to support progress and assist in removing constraints to the achievement of common project and GOCV goals and objectives?

e. Assess the design, construction and efficiency of various soil conservation structures (e.g., gabions, contour rock walls, gully plugging structures). What is the efficacy and efficiency of the present practices? Should practices be modified for the future?

f. How effective is the organization of the maintenance program for the soil and water conservation structures?

4. Community Forester (Renewable Resource Management Planner)

In the context of evaluating forestry aspects of the WDP, the forester will identify (i) specific research needs of the component, (ii) the extent to which they were met by (INIA or other institutions), (iii) problems and constraints in meeting those needs, and (iv) recommend ways and means of providing research support to this component in the following project.

a. Assess the methods of planting, species selection, planting sites, and survival rates of seedling plantings on marginal land, and the effectiveness of this action on the achievement of the project purpose.

b. Comment on the results of the assessment of the demand and interest that local farmers have in tree planting for their own personal needs, and suggest how such a program could be organized, implemented, and monitored; and utilize incentives.

c. Assess the potential advantages and disadvantages of paying farmers for planting and protecting firewood tree species, windbreaks, and tree inter-crops. Discuss supplying kerosene stoves and kerosene (for say a

five-year period) for the above purpose instead of cash.

d. Consider the relative successes or failures of adequately treating slopes currently under cultivation with biological and other measures designed to prevent soil erosion and enhance soil conservation.

e. Discuss the functional roles and degree of collaboration between the National Extension Service, Rural Assistance Program animators, and the watershed-based Forestry Zonal Supervisors in National, Community, and on-farm renewable resource management programs.

f. Elaborate the measures necessary to institutionalize the effective role women (notably head of household women) play in the forest nursery and tree planting program in the rural areas.

g. Assess the extent to which the project has utilized a variety of tree species (eg: native vs exotic species, trees for the production of firewood, food and fodder products, trees for controlling soil erosion and promoting soil stabilization) in order to provide a range of benefits to watershed populations; and recommend steps to improve the mix of trees to meet the divergent needs of the population and resource conservation. Discuss the need for a forest product marketing study.

h. Discuss what near-term incentives are available to the watershed population resulting from forest related activities, and recommend steps to be taken to ensure that the watershed population will be the beneficiaries of the long-term (20 year) impacts of the project interventions.

5. Food Aid Specialist:

This Specialist shall assess the role and effectiveness of the PL-480 Assistance Program in the project area with respect to:

- a. The level and appropriateness of assistance being furnished;
- b. The utility of employment-generating work schemes to the overall watershed development program;
- c. The impact of labor-intensive employment on soil and water conservation activities within the project area;
- d. Potential role of PL-480-generated labor-intensive employment to INIA and agricultural research in general; and
- e. The continuing role of PL-480 work schemes in the maintenance of existing soil and water conservation structures within the project area.

The Specialist shall also review and assess PL-480 program implementation in Cape Verde with respect to whether:

- a. Required reports are properly prepared and submitted on a timely basis;
- b. The Transfer Authorization terms and program reporting requirements are realistic in terms of GOCV institutional and human resources capabilities;
- c. Adequate accounting is maintained over the arrival, storage, shipment and distribution of the donated commodities;
- d. Proper facilities exist for storage and handling to ensure distribution of the commodities in good condition;
- e. Proceeds from the sale of commodities are accounted for and used only for approved program expenses;
- f. Commodities unfit for human consumption are promptly reported and disposed of by approved methods;
- g. The amounts of local currency generated have been sufficient to pay the stipulated number of project workers;
- h. Adequate supervision is being provided to the program;
- i. Commodities and proceeds are flowing as planned;
- j. Funds are being transferred from EMPA, NDF and MDRP to make worker payments on a timely basis;
- k. The overall terms of the Transfer Authorization and Grant Agreement are being complied with.

Finally, the Food Aid Specialist shall make recommendations and provide guidance as to the next phase of the PL-480 Title II Section 206 Program, Food for Progress, or other type program, as appropriate.

1 101

SYNOPSIS/PRECIIS: EVALUATION SCOPE OF WORK QUESTIONS

(Re-sequenced and re-phrased- With evaluation handbook lines noted below)

|| THIS Interpollates the Questions and PUTS THEM in the Form of a Report OUTLINE (dra

FORMAT

Executive Summary

Project Identification Sheet

Table of Contents

Background

Purpose of the Evaluation, and "Scope" questions
Context: Economic; Political; Social, (and other)
Team Composition; Methodology

Evaluation Findings

Conclusions drawn from these findings

Recommendations and "Lessons Learned"

Appendices

Report, Overall

[NB. Background, Findings, Conclusions, Recommendations, are to be reported, cogently, in approximately thirtyfive or forty pages.)

SYNOPSIS OF QUESTIONS FOR BOOK ONE; THE EVALUATIONS

(We begin with Exec Summary, Project(s) ID Sheet(s), Table of Contents, and Background, Then:)

as above.

PART ONE: FOOD CROP RESEARCH PROJECT

I. FINDINGS OF FACT AND INITIAL ASSESSMENTS

A. The "Project" (Contractor and other)

1. Project Inputs measured against original and revised project plans (PP, PP amdt, evaluation).
[Covers both the agronomic, in the broad Fribourgian sense, and the social/economic inputs or inputs for INIA's soc/econ work.]

- a. Technical assistance- quantity, quality, timing
- b. Training
- c. Commodities

2. Project's (AID's, contractor's) contribution to INIA's research strategy and its planning, review, and evaluation processes
3. Rating overall of performance on basic inputs, against planned standard, and, then, against a "reasonable professional" standard (a broader view)

B. INIA's Research Product to Date

1. Assessment of:
 - a. Research strategy, planning, review, evaluation
 - b. Contribution of research to possible improvements in production methods and land and water management
 - c. Relevance of the research to characteristics of food crop production systems as practiced
 - d. Adequacy of research attention to constraints of physical environment; and does it seek short- and/or long-term solutions
 - e. Extent and manner of use of watershed sites for adaptive research (relating to erosion, moisture, groundwater for irrigation, and crop growth), and for designing and testing new methods/technologies
 - f. Research in plant and cropping systems
 - g. Research done on new varieties, cultivation practices, soil, and water management- on-station as well as on-site (testing)
2. Socio/economic research:
 - a. What information has been provided on production systems; and has that research generated research integrating its findings in the systems?
 - b. Findings as to on-farm research output and testing
3. Findings as to competence of INIA's data analysis and reporting
4. Examine INIA's communications and collaboration with other research activities, domestic and outside C.V., and with operating agencies
5. Adequacy of library and documentation center

- C. General overview of findings, including adjustments in response to 1986 evaluation recommendations

II. CONCLUSIONS AND RECOMMENDATIONS IN THESE MATTERS

[These are (a) evaluation judgements of a higher order and generality than "assessments," above, and can deal with the "project" and INIA's work in the same breath, and, (b) recommendations for action in the period through 31 December 1990.]

III. ISSUES CARRIED FORWARD TO BOOK TWO, DESIGN OF WARD

[More a listing than a discussion, as the themes and questions listed will be developed in design form in the manner appropriate to the structure of Book Two-- which, of course, will examine issues and make design recommendations bearing on questions arising from a number of sources, not just from this list.]

PART TWO: WATERSHED MANAGEMENT/DEVELOPMENT PROJECT

I. FINDINGS OF FACT AND INITIAL ASSESSMENTS

A. Project Inputs

1. Technical assistance (to both forestry and conservation works)
2. Training
3. Commodities
4. Research provided (in quantity &/or utility, and quality)

[1.-4. above: what the project provided, and measurement of that against what the Project Paper "promised" or required ^

B. Progress & Achievements

1. Soil and water conservation
2. Afforestation
3. Labor and communities (RAP, CBWF, other (?))
4. Administrative and planning mechanisms

[Here, assessments enter, as well as descriptive material (of fact).]

II. CONCLUSIONS AND RECOMMENDATIONS

A. Broad and comprehensive conclusions (perhaps 5 or 6)

B. Recommendations for action through December, 1990

[Under A., "constraints" or reasons for delay or non-performance are appropriate-- ie,, problems. B. might, but not necessarily, include issues and main themes you think should be carried forward into the Design Paper, the "BOOK TWO.]

111. TECHNICAL ISSUES AND REMARKS
 [Professional observations-- of methodology or feasibility. For ex. - seen outside the project context but bearing on it.]
- A. INIA and Research Activities
1. Those relating to agronomy (if any...this is an opport., not a req't)
 2. Those relating to the social/economic/cultural aspect of our interrelated problems- if any (ie, if not covered elsewhere)
- B. Watershed activities [These respond to Scope questions and are therefore obligatory. I propose separating them out from the "project evaluation" per se because they seem to involve professional judgements applicable anywhere, that need elucidation before they can be applied to this particular case.... You (JM & VL) may not like this segregation, in which case you would go back to the more orthodox outline above.]
1. The top-down ^{vs} bottom-up ^{vs} concurrent ^(Sequence of Conserv. measures) issue
 2. Hydrology monitoring
 3. Rainfall measurement systems
 4. NMRS
 5. Mapping (1:12,500)
 6. GIS (a new question)
 7. Labor mobilization [See q. 16, new scope- GO & JH will take great interest in this, along w/ JM, VL and perhaps HF... Also, I may hire a researcher for several days to probe this large and important area.]
 8. Matters of structures maintenance
 9. Methods & perspectives of the Italians
 10. Technical implications of model basins (concentration)
 11. Women, ie, technically (W.I.D.)
- V. Research-Operations Coordination
- [This is a transcendent issue, so important we'll want to develop a list of subtopics, in conference.]
- IV. Major Conclusions & Recommendations on These Matters
 [recs. through Dec 90; plus, perhaps, a listing of principal themes to be carried forward to Design]

PART THREE: FOOD AID & LOCAL CURRENCY PROGRAM

- I. INTRODUCTORY & BACKGROUND ^{Prior Evaluations of.}
 [History of food aid. Its significance now in rel. to the other two projects. My emphases, from among the list of Q.s.]
- II. FINDINGS
- A. As to "non-issue" Scope questions
 - B. As to emphasized ^(issue) questions. [Neutral facts; context, etc.]

115

- C. Separate discussion of relation of PL480 worker resource and WDP as employer- common and separate purposes; the degree the purposes have been unified; the law, in this matter, etc. Also: works planning; labor force mobilization; its methodology; supervision.

III. ISSUES EMERGING FROM THE FOREGOING (Conclusions)

- A. EMPA; NDF; Pricing; Reports & Accounts; Donor Relations;
- B. The Operational Mechanism: top (MinFin & MinRD), mid (the GEP & DG), down to "project" (DG op. office-Sheladia counterpart office), and bottom (tech direction-controll~~ers~~ - the works and the workers)
- C. Food Aid Level; Fin & Phys Operations (national level); adequacy of L/C amounts generated, for current project needs. Discuss other uses of LC. Discuss as a range of options mechanisms other than PL480, II., \$206 for achieving its effects (or other effects)

IV. BEST JUDGMENTS & RECOMMENDATIONS IN THESE MATTERS

BOOK TWO: DESIGN

[We will select topics
(and an outline)
when we have mastered
all the above
subjects.]

~~JW
pWED
idid Luel
178+ Ngerr
C. M. ...~~

Annexes

PROJECT LOGICAL FRAMEWORK FOOD CROP RESEARCH PROJECT

Narrative	Verifiable indicators	Sources of information	Assumptions
<p>GOAL. 1. In the long run the project is expected to support GOCV development goals in: food self-sufficiency rural employment rural income nutrition</p> <p>PURPOSE 1. The Institute demonstrates its capacity to impact on food production, though probably only in a limited way during Phase I.</p> <p>OUTPUTS</p> <ol style="list-style-type: none"> 1. 7 Masters Degree equivalents 2. 2 Ph.D.'s earned 3. Research Program established 4. Rural Economy Survey carried out 5. Initial research projects undertaken 6. Management/administrative/financial systems set up for Institute 7. Information and Communications Center established 8. 2 houses and 1 duplex built for project and future use. <p>INPUTS GOCV (U.S.)</p> <ol style="list-style-type: none"> 1. Research management (T.A.) 2. Research staff (training) 3. Research facilities (additions) 4. Operating budget 	<p>Series of data should be established for measuring progress in each goal.</p> <p>EOPS</p> <ol style="list-style-type: none"> 1. Have demonstrated results to farmers, and started to develop a grass roots constituency. 2. Have earned the support or project sponsors in Cape Verde so that research is better integrated. 3. Have developed active exchange with counterpart institutions outside Cape Verde. <p>Records should be kept of each potential application according to stages of research, so that progress can be evaluated against baseline conditions.</p> <ol style="list-style-type: none"> 1. Well managed research program 2. Baseline data 3. Adequate staff 4. Connections with counterpart institutions. 	<p>National Statistics</p> <p>Project evaluations</p> <p>Research program records</p> <p>AID, Institute Administrative records</p>	<p>Good management of inputs</p> <p>Adherence to project implementation plan</p>

LCDFRAME (con't)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
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Inputs

U.S.	Part I	Part II	B. Scheduling (millions)			
A. PL480, Title II, Section 206 (local currency for salaries)	A. Budget	Year	DA	PL480		
	1. PL480 (see Financial Breakdown) \$7.8 million	1984	1.611	--		
B. Development Assistance	2. Development Assistance	1985	2.0	1.95		
1. Technical Assistance	\$5.611 million	1986	1.5	1.95		
2. Training	3. GOCV contribution	1987	.389	1.95		
3. Commodities	\$1.1 million	1988	1.7	1.95		
		1989	0.3	1.95		

1. Approval and funding of DA and PL480 assisted components occurs in a timely fashion
1. USAID/Praia Project officer position is refilled promptly.

GOCV

- A. Personnel, office space, recurrent costs, POI.
- B. Training of rural assistance workers

ANNEX C.2.

CAPE VERDE WATERSHED DEVELOPMENT - (655-0013) LOP Funding - \$5.611 million (DFA)
LOGICAL FRAMEWORK \$7.8 million (PI480)
 PACD - 9/30/88

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Goal: To stabilize the natural environment and increase agricultural production potential in the project area</p>	<ul style="list-style-type: none"> - Increased utilization of water for agricultural and domestic purpose - Increased agricultural production within project watersheds 	<p>GOCV and International Donor Reports on food production</p>	<ul style="list-style-type: none"> 1. Long range U.S. and other donor assistance is consistent in policy direction and funding levels 2. Health, population and migration trends favor agriculture production
<p>Purpose: To develop and protect the soil and water resources of the project-designated watersheds</p>	<p><u>End Phased Project Status</u></p> <ul style="list-style-type: none"> 1. Watershed Development plans accepted and used by MDRP 2. Phase out plans prepared for FCR and WD projects 3. Rural laborers organized into CBWF will make up more than 25% of program work force 4. Report to determine investment potential of watersheds complete 	<ul style="list-style-type: none"> 1. Project Evaluations 2. Land use maps 3. USAID reporting 	<ul style="list-style-type: none"> 1. Farmers will invest more in agriculture on secure land. 2. Project watersheds have potential for increase agricultural production
<p>Output 1. Various soil and water conservation structures and technologies implanted.</p> <p>Output 2. DGCSFER staff trained</p> <p>Output 3. CBWF used on NLT 25% of construction program</p> <p>Output 4. Build and equip two offices for DGCSFER</p> <p>Output 5. <u>(2 PWDP completed)</u></p> <p>Output 6. 240,000 person months of rural employment</p>	<ul style="list-style-type: none"> -DGCSFER workplans and reports -project training plans and reports -DGCSFER/RAP activity reports -USAID project implementation reports -USAID Project reports and site visit -USAID Project files and DGCSFER -DGCSFER annual reports and progress reports. 	<ul style="list-style-type: none"> 1. Project Evaluation 2. USAID/GOCV reports 3. Financial Records (EMPA, MEF, FND) 4. Contractor reports 	<ul style="list-style-type: none"> 1. SWC technology appropriate for Cape Verde 2. Local labor exists in sufficient supply 3. Interagency cooperation realized

accordance with section 1709 of this title, (2) the specific uses to which the foreign currencies are to be put are set forth in a written agreement between the United States and the recipient country, and (3) such agreement provides that the currencies will be used for (A) alleviating the causes of the need for the assistance in accordance with the purposes and policies specified in section 2151a of title 22, (B) programs and projects to increase the effectiveness of food distribution and increase the availability of food commodities provided under this subchapter to the neediest individuals in recipient countries.¹⁰⁰ The President shall include information on currencies used in accordance with this section in the reports required under section 1736b of this title and section 2417 of title 22, or (C) health programs and projects, including the immunization of children.¹⁰¹

(b)¹⁰² Not later than February 15, 1988, and annually thereafter, the President shall report to Congress on sales and barter, and use of foreign currency proceeds, under this section and section 207 during the preceding fiscal year. Such report shall include information on—

(1) the quantity of commodities furnished for such sale or barter;

(2) the amount of funds (including dollar equivalents for foreign currencies) and value of services generated from such sales and barter in the preceding fiscal year;

(3) how such funds and services were used;

(4) the amount of foreign currency proceeds that were used under agreements under this section and section 207 in the preceding fiscal year, and the percentage of the quantity of all commodities and products furnished under this section and section 207 in such fiscal year such use represented;

(5) the President's best estimate of the amount of foreign currency proceeds that will be used, under agreements under this section and section 207, in the then current fiscal year and the next following fiscal year (if all requests for such use are agreed to), and the percentage that such estimated use represents of the quantity of all commodities and products that the President estimates will be furnished under this section and section 207 in each such fiscal year;

(6) the effectiveness of such sales, barter, and use during the preceding fiscal year in facilitating the distribution of commodities and products under this section and section 207;

(7) the extent to which such sales, barter, or uses—

(A) displace or interfere with commercial sales of United States agricultural commodities and products that otherwise would be made;

(B) affect usual marketings of the United States;

(C) disrupt world prices of agricultural commodities or normal patterns of trade with friendly countries; or

(D) discourage local production and marketing of agricultural commodities in the countries in which commodities and products are distributed under this title; and

(8) the President's recommendations, if any, for changes to improve the conduct of sales, barter, or use activities under this section and section 207.

ANNEX C. 3.

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TITLE II

Sec. 201.⁷⁵ (a) ⁷⁶ The President is authorized to determine requirements and furnish agricultural commodities, on behalf of the people of the United States of America, to meet famine or other urgent or extraordinary relief requirements; to combat malnutrition, especially in children; to promote economic and community development in friendly developing areas; and for needy persons and nonprofit school lunch and preschool feeding programs outside the United States. The Commodity Credit Corporation shall make available to the President such agricultural commodities determined to be available under section 401 as he may request.

(b) ⁷⁶. ⁷⁷ The minimum quantity of agricultural commodities distributed under this title for each of the fiscal years beginning on September 30, 1987, September 30, 1988, September 30, 1989, and September 30, 1990, shall be 1,900,000 metric tons, of which 1,425,000 metric tons for nonemergency programs shall be distributed through nonprofit voluntary agencies, cooperatives, and the World Food Program; unless the President determines that such distribution cannot be used effectively to carry out the purposes of this title.

(c) ⁷⁸ (1) Except as provided in paragraph (2), in distributing agricultural commodities under this title, the President shall—

(A) consider—

(i) the nutritional assistance to recipients and beneficiaries in the United States that would result from distributing such commodities in the form of processed and protein-fortified products, including processed milk, plant protein products, and fruit, nut, and vegetable products;

(ii) the nutritional needs of the proposed recipients of the commodities;

(iii) the cost effectiveness of providing such commodities, for purposes of selecting commodities for distribution under nonemergency programs; and

(iv) the purposes of this title; and

(B) ensure that at least 75 percent of the quantity of agricultural commodities required to be distributed each fiscal year under subsection (b) for nonemergency programs be in the form of processed or fortified products or bagged commodities.

(2) The President may waive the requirement under paragraph (1)(B) or make available a smaller percentage of fortified or processed food than required under paragraph (1)(B) during any fiscal year in which the President determines that the requirements of the programs established under this title will not be best served by the distribution of fortified or processed food in the amounts required under paragraph (1)(B).

Sec. 206. (a) ⁸⁸ Except to meet famine or other urgent or extraordinary relief requirements, or for nonemergency programs conducted by nonprofit voluntary agencies or cooperatives, ⁹⁹ no assistance under this subchapter shall be provided under an agreement permitting generation of foreign currency proceeds unless (1) the country receiving the assistance is undertaking self-help measures in

Agriculture Trade Development and Assistance Act of 1954, as amended (Public Law 480).

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ANNEX D

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A N N E X E

PERSONS INTERVIEWED AND CONSULTED

Note: Does not include farmers, community leaders, watershed laborers, and lower echelon employees of GOCV and donor agencies.

A.I.D./STATE PERSONNEL

Abel, Larry	AFR (AID/W)
Barber, Jose	Food Aid Assistant, USAID Praia
Glasston, Meg	Training, USAID Praia
Goncalves, Jose	A/General Dev. Officer, USAID, Praia
Handler, Howard	Deputy Director, REDSO/WCA
Hirsch, Daniel	Consul, U.S. Embassy, Praia
Jones, John	Gen'l Dev. Officer, USAID, Praia
Luche, Thomas C.	AID Representative to Cape Verde
Pippitt, Cameron	Proj. Dev. Officer, REDSO/WCA
Rader, Pat	AFR/DP (AID/W)
Shampain, Judy	AFR/DR (AID/W)
Werlin, Louise	Desk Officer (AID/W)

PROJECT CONTRACTOR PERSONNEL

Langworthy, Mark	(Univ. of Arizona)
Macarian, Victoria	(FCRP, Univ. of Arizona)
Theisen, Paul	(WDP - Sheladia)
Veracruz, Jose	(WDP - Sheladia)

MINISTRY OF PLAN AND COOPERATION (GOCV)

Rocha, Jose Luis	Dct., Bilateral Division
Vicente, Adelina	Food Aid Coordinator

INIA

Barbosa, Jose Luis	Horticulture Research
Cruy, Oswaldo de Oliveira	Training Division
Lobo, Maria Luisa	President
Martins, Alexandrina	Div. of Agroclimatology and Hydrology
Montero, Evelyne	Div. of Agroclimatology and Hydrology
Morais, Joaquim	Documentation Center
Morais, Julio	Soils Research
Sabino, Antonio	Hydrologic Engineer
Silva, Carlos	Dept. of Research
Silva, Nora	

MINISTRY OF RURAL DEVELOPMENT (GOCV)

Bamba, Antonio	Agric. Engineer, Extension Directorate
Delgado, Manvel	Dct. Gen'l, DGCSFER
Frederico, Manvel Antonio	Inventory Central, WDP (DGCSFER)
Madena, Maria	DGCSFER, Forestry Dev.
Marta, Ana Emilia	Administrator, WDP (DGCSFER)
Martins, Daniel Sena	DGCSFER, Chief of Rural Engineering
Novoa, Luis	DGCSFER, Forestry Exploitation
Roberto, Maria Julia	Directorate Gen'l for Extension
Santos, Helder	Secretary of State, MRDP
Silva, Amadeu	WDP, Head, Rural Assistance Program
Silva, Jose	WDP, R.A.P.

OTHER GOV'T OF CAPE VERDE

Cardoso, Placido	Director, EMPA Warehouses
Duarte, Aida	i/c External Trade, EMPA
Fortes, Fatima	Exec. Dct., National Development Fund
Martins, Manuel	Silos Manager, EMPA
Moreira, Manuel	Reg. Dct., Nat'l Inst. of Cooperatives
Rodrigues, Elisa	Advisor, Commerce Department
Teixeira, Victor	Chief, EMPA Laboratories

ANNEX F. 1.

Table (a): TECHNICAL ASSISTANCE PROVIDED TO FCRP

DISCIPLINE	NAME	INSTITUTION	DURATION
<u>Completed to Date</u>			(Months)
Agron/Team Leader	V. Macarian	Arizona	60
Soil Scientist	T. Crawford	Arizona	24
Soil Scientist	M. Burr	Arizona	12
Ag. Economist	M. Langworthy	Arizona	18
Ag. Economist	J. Belknap	Wisconsin	12
Anthropologist	T. Finan	Arizona	5
Legume Specialist	R. Buhrow	Arizona	6
Library Specialist	I. Stroehlein	Arizona	4
Business Admin.	Dale Anderson	Arizona	4
Ag. Admin.	L. W. Decuhirst	Arizona	1
Ag. Admin.	J. Hillman	Arizona	2.5
Ag. Economics	J. Wade	Arizona	1
Soil Fertility	J. Stroehlein	Arizona	2
Cassava Specialist	M. Porto	Embrapa	2
Run-off Agric., <u>1/</u> Water Harvesting	J. Matlock	Arizona	1
Soil Conservation <u>2/</u>	F. Delgado	Arizona	1
Horticulture	Merle Jensen	Arizona	1
Irrig. Engineer	D. Slack	Arizona	1

Irrig. Engineer	W. Hart	Arizona	1
Plant Pathology	M. McClure	Arizona	1
Soil Mapping, Classification Land Use	B. L. Allen	Texas Tech.	1
Soil Fertility	J. B. Jones	Georgia	1
Agroclimatology	H. Bohn	Arizona	.5
Information Svcs	Larry Klass Antony Rosen	Arizona Arizona	.25 .25
Integrated Pest Management	John Henry	Montana	1
Admin. Services	L. Cosgrove	Arizona	.25
Agric. Admin.	B. Cardon	Arizona	.5

Pending Through End of Project

Chief of Party	V. Macarian	Arizona	6
Ag. Economics	M. Langworthy	Arizona	1
Anthropology	T. Finan	Arizona	1
Soil Stabilization			1
Root-Tubes Crops <u>3/</u>	S. K. Hahn	IITA	.5
Cassava	M. Porto	CIAT/IITA	1
Ag. Admin.	J. Hillman	Arizona	.5
Other			2

1/ Conducted workshops on Watershed Development with INIA and S.W. conservation service one on general level i.e. "how to" other for specific ribeira on Maio.

2/ Introduced improved forage and fruit Opuntia species subsequently planted in coastal areas by WDP.

3/ Hahn was scheduled to come in April, but had problems obtaining a visa to Senegal.

ANNEX F. 2.

Table (b): LONG TERM FCRP TRAINING

PROGRAM	CANDIDATE	INSTITUTION	PROGRAM COMPLETION DATE
Ph.D DEGREE			
(Programmed)			
Soil Science	Jorge Brito	UA	9/90
Crop Science	Jorge Brito	UA	9/90
(Not Programmed)			
Agroclimatology	Luis Alves	UA	9/90
Horticulture	José Levy	UC-Davis	8/92
Field Crops	M.I. Andrade	N. Carolina	8/92
M.S. DEGREE			
(Programmed)			
Field Crop	M.I. Andrade	UA	86
Veg. Crop Prod.	J. Levy	UA	86
Fruit Crop Prod. 2]	J. Fortes	UA	88
Pathology	Z. Levy	UA	86
Irrig. Engineering	J. Almeida	UA	86
Anthropology	R. Varela	UA	87
Bus. Admin.	M. Macedo		85
(Program reduced)			
Entomology			85
(Candidates not accepted)			
Plant Breeding			85
(Program cancelled)			
Ag. Econ			85
(Candidate not accepted)			

(Not Programmed)

Soil Physics	J. Morais	UA	86
Forage Pathology	M.T. Vera Cruz	New Mexico	12/90

DEPT. OF NATURAL RESOURCES

Soils Division

J. Brito - Ph.D., UA - Soil Chemistry (training continues)
I. Bautista - B.S. - Colorado - Soil Science
J. Morais - B.S., M.S. - Arizona - Soil Physics, Stabilization
M. Santos - Portugal - Soil Lab. Manager
R. Fernandes - B.S. - Cuba - Soil Fertility

Botany Division

S. Gomes - Associates - Portugal - Botany - Ecology
I. Gomes - B.S. - Portugal - Ecology - Environment

DEPT. OF AGROCLIMATOLOGY

Hydrology Division

A. Sabino - B.S. - Portugal, M.S. - Arizona - Water Harvesting,
Run-off Agric
E. Monteiro - Associate - Hydrology
L. Alves - M.S., Ph.D. - Arizona - Agroclimatology
Ulysses - B.S. - Cuba

Agroclimatology

J. Moreno - AGRIMET, Niamey
Alexandrina Moreno - AGRIMET, Niamey

Stella Bonchimoll- Associate - AGRIMET, Niamey
Irineu Nascimento - Associate - AGRIMET, Niamey
C. Coutinho - Associate - U.S. - AGRIMET, Niamey
F. Nascimento - Associate - AGRIMET, Niamey

INIA - CD

Joaquim Morais - B.S. - University of Dakar - Library science

Training Center

Oswaldo Cruz - B.S. - Portugal

Gloria Silva - B.S. - Italy - Psychology

B.S. DEGREE

(Not programmed)

Plant Pathology L. Fortes UA 10/89

ANNEX F. 3.

Table (c): SHORT TERM TRAINING - FCRP

COMPLETED

AREA OF TRAINING	NAME	LOCATION	MONTHS
Library Science	Joaquim Morais	Arizona	12
Business Admin.	Madelina Maceda	Arizona	12
Social Sciences	Elisio Rodrigues	Arizona	12
Biological Control	Jorge Brito	Montana State	12
Management	Madelina Maceda	George Wash Uni	3
Ag. Admin.	Horacio Soares	Minnesota	1
Ag. Admin	Maria Luisa Lobo	Washington	1
Sweet Potato Res	Maria Luisa Lobo	USDA Veg. Res. Lab. Chareston, S.C.	0.25
Horticulture	Jose Levy	AVADC - Taiwan	1
Irrigation Policy	Julio Almeida	Colorado State	1
Irrigatin Management	Julio Almeida	Colorado State	1
Pesticide Disposal	Jorge Brito	Mali	1
Soil Fertility Lab. Management	J. Morais	Univ. Georgia	1.5
Soil Fertility Lab. Management	Manuela Santos	Univ. Georgia	1.5
Soil Fertility Field Lab. Techniques	E. Barros	Auburn	1.5
Instrumentation	C. Coutinho	Varian. Assoc. Palo Alto, CA	.5

PENDING

Instrumentation	L. Fonseca	EMBRAPA	2
Bean Production	Nora Silva	CIAT	2
Cassava Production	J. M. Barbosa	CIAT/IITA	1.5

ANNEX F. 4.

Table (d): INIA STAFFING - JANUARY 1990

PRODUCTION DIVISION

Irrigated Agriculture

M.I. Andrade - B.S, M.S. - UA., Ph.D - CSU -
Root-Tuber Crops

J.M. Barbosa - B.S. - Cuba - Root-Tuber Crops

J. Levy - BS., M.S. - UA. - Ph.D. UC-D Avis - Horticulture

A. Querido - B.S. - UC. - DAVIS - Horticulture

N. Silva - B.S. - Bulgaria - Horticulture (part time)

J. Fortes - B.S., M.S. - Arizona - Fruiticulture

A. Silva - Assoc. Portugal - Watershed Development

Dryland Agriculture

C. Silva - B.S. - Portugal - Cereals, Cowpeas

E. Silva - Assoc. - Portugal - Cereals, Cowpeas

N. Silva - B.S. - Bulgaria - Legumes (pulses)

Crop Protection Division

Jorge Brito - B.S. - Bulgaria - Grasshopper

Anna Faria - B.S. - E. Germany - Biocontrol

E. Fortes - B.S. - Arizona - Pathogenic Fungi

M. L. Lobo - B.S. - Portugal, Germany -
Sweet Potato Weevil

F. Delgado - B.S. - Bulgaria - Biocontrol

ANNEX G. 1. - TABLES

TABLE (a): TREE PLANTING ACTIVITIES 1985-1990

WATERSHED	CONGO BEAN SEEDED	TREES PLANTED (000)	PEOPLE EMPLOYED (1000 person days)
TARRAFAL MT	NA	66.4	NA
TARRAFAL ST	578	714.2	38.4
CUBA	450	210.2	26.3
PRINCIPAL	250	70.4	11.4
*SAO MIGUEL	274	265.4	19.0
*FLAMENGOS	660	395.6	37.1
*SALTOS	600	270.1	29.1
*SANTA CRUZ	865	814.7	50.6
PICOS	528	464.4	23.1
SECA	459	483.7	28.7
SAO DOMINGOS	180	105.6	7.1
CUMBA	204	92.3	6.9
MANGUE	160	93.8	8.2
TOTAL	9208 (1)	4,106.4 (2)	285.7 (3)

Source: Watershed Development Project Files

(1) Includes 4000 kg distributed by RAP.

(2) Includes 59676 planted in Sao Francisco and Sao Tome/Portete.

(3) Represents 81% of planned work schedules.

* The four watersheds included in the Watershed Management Project, predecessor of the current Watershed Development Project, and carried into the current project.

NOTE: Tarrafal MT is on Santo Antão Island. The remaining twelve watersheds are on the main island, Santiago.

Table (b): FORESTRY SITE PREPARATION ACTIVITIES 1986-1990.

YEAR	MICRO- CATCHMENTS (000)	CONTOUR FURROWS (000)	PLANTING PITS (000)
1985	23.9	540.4	305.1
1986	93.5	517.1	580.6
1987	189.2	76.7	558.2
1988	471.0	582.5	673.7
1989	396.7	816.3	812.0
1990(planned)	722.0	450.0	812.1
TOTALS	1,896.3	2,983.1	3,718.1

Source: Watershed Development Project Files

Table (c): MINISTRY OF RURAL DEVELOPMENT FORESTRY TRAINING ACTIVITIES 1986-1989

TYPE OF TRAINING	1986	NUMBER OF PARTICIPANTS		
		1987	1988	1989
Nursery supervisors	20	15	39	
Fruit tree production				17
Rhizobium inoculation				17
Planting site preparation	20		20	60
Tree planting practices	20	49	69	17
Tree pruning techniques				17
Forestry supervisors			18	
	<u>60</u>	<u>84</u>	<u>186</u>	<u>68</u>

Source: Watershed Development Project files, Rural Assistance Program Training Activity.

OTHER TRAINING	YEAR	LOCATION	NUMBER OF PARTICIPANTS
Small animal production	1985-86	Trindade	4
Control of "Gafanhoto"	yearly	Santa Cruz	22
Integrated pest management	1986	INIA	4
Rural extension	1986	Tarrafal	28
Irrigation extension	1986	INIA	28
Health, hygiene and nutrition	1986	Tarrafal	30
Soil conservation	1987	INIA	28
Potato seed multiplication	1987	INIA	23
Rural communication training	1988	INIA	28
Agrarian reform	1989	INIA	2
			<u>197</u>

Source: Rural Assistance Program files.

Table (d): Control Structures Built by Project and Project Paper Targets (1985-1989)

Type of soil and water conservation structure	Project Targets	Total Completed	Total Percent to 9/30/89 Completed
construction of rock-stabilized structures (ha)	1,000	1,137	113.7
construction of dikes, check dams and gully plugs (#)	3,000	2,775	92.5
construction of embankment groins and longitudinal walls (m)	4,000	8,508	212.7
construction of catchment check dams and tanks (#)	20	17	85.0
construction of reservoirs (#)	20	25	125.0
construction of water conduction works (km)	20	13	65.0
	<u>8,060</u>	<u>12,475</u>	<u>155 %</u>

Table (e): SHORT TERM CONSULTANCIES TO WDP

NAME	ASSIGNMENT	YEAR	WEEKS
Lutz	Implementation Workshop	1986	3
Kaminski	Project Manager Visit	1986	2
Redditt	Irrigation Specialist	1986	8
Bedolfe	Extension Training	1986	8
Belknap	Computer Training	1986	4
Norton	Erosion Modeling	1986	5
Theisen	Community Dev. Training	1986	10
Wilson	Civil Engineering Design	1987	8
OSU	Remote Sensing Workshop	1987	1
Reigelman	Stream Reach Inventory	1987	8
Kaminski	Project Manager Visit	1987	1
OSU	Project Manager Visit	1987	1
Rosenfeld	Aerial Survey Planning	1987	1
Belknap	Computer Training	1987	7
Rosenfeld	Aerial Survey Coordination	1987	2
Lenhart	Rainfall Data Analysis	1987	4
Norton	Erosion Modeling	1987	4
Klingeman	Fluvial Processes Study	1987	4
Amati	Home Office Field Visit	1987	1
Rosenfeld	GIS Installation	1988	2
Simonson	Soil Survey	1988	8
McLoughlin	Economic Assessment	1988	6
Fitzgerald	Heavy Equipment Inventory	1988	7
Bradbury	Manager Field Visit	1988	1
Walker	Aerial Survey Coordination	1988	5
Lutz	Home Office Field Visit	1988	2
Gardiner	Rural Extension Assessment	1988	12
Egli	Watershed Development Planning	1988	8
Lenhart	Rainfall Information System	1988	4
Peirce	Data Analysis	1989	12
Egli	Phased Watershed Development	1989	7
Fitzgerald	Equipment Inventory	1989	2
Serna	Management Information Systems	1990	6
Planned	Surveying and Drafting	1990	6

ANNEX G. 2.

PROPOSED RESEARCH TOPICS FOR FORESTRY AND RANGE

- Statistically-sound study of seedling survival and correlation to species, site quality, method of site preparation, rainfall. This should be institutionalized and become part of the annual plan.
- Develop methods for determination of tree growth and yield of wood and other products and correlate to species, site quality, rainfall, and other variables.
- Determine economic rotation age of primary fuelwood species to maximize biomass production.
- Research harvest systems to maximize wood production without sacrificing goals of soil and water conservation.
- Testing of a variety of containers for economic efficiency in terms of container cost per seedling produced, labor time in preparing soil mix and filling containers, transport cost and damage during transport, and effect on tree mortality and growth rates.
- Species and variety trials of trees and shrubs to diversify planting for fuelwood, forage, and agroforestry.
- Species and provenance trials to find additional salt-tolerant trees and shrubs suitable for seashore planting.
- Broad investigation of integrated agroforestry systems for rainfed land in lower and upper watersheds which will serve the following purposes:
 - * stabilize the soil and increase soil fertility
 - * provide a good fuelwood
 - * provide valuable non-energy products
 - * acceptable to farmers
- Study of range ecology and range recovery.
- Analysis of the nutritive quality of the common rangeland grasses and shrubs such as *Dichostachys cineria*.
- Determination of range carrying capacity for cattle and goats.
- Field trials of grasses and sub-shrubs for range revegetation.

ANNEX G. 3.

CATEGORIES OF CONTROL STRUCTURES USED IN THE WDP

Type of Structure	Description
Crescent shaped microcatchments (calderas)	constructed hillslopes to intercept interrill and rill flow and retain water around plants.
Contour furrows (banquetas)	constructed on hillslopes contours to reduce flow velocity and promote water infiltration.
Contour rock walls (muretos)	constructed along hillslope contours and across shallow gullies to trap sediment.
Check dams (diques de correcao torrencial)	constructed on channel cross sections, gullies and ravines to halt concentrated flow erosion and sediment transport, attenuate flood peak, and establish new farm lands. These structures have overflow spillways, generally built across the central part of the structure.
Catchment check dams (diques de captacao)	constructed on channel cross sections to perform the same function as traditional check dams to store subsurface water. The retained water can be pumped or drained by gravity through a pipe or canal to some downstream point of interest.
Recharge check dams (diques de recarga)	constructed on channel cross section to perform the same function as traditional check dams and temporarily store water. The retained water later infiltrates by natural seepage to recharge the water table.
Embankment groins (espigoes)	constructed along the margins of large channels to prevent overflows and deflect the water flow from the eroding banks.

Type of structure	Description
Wells (pocos)	dug in streambeds to give access to subsurface water. They are often placed a short distance downstream of check dams, to take advantage of the increased water infiltration.
canals (canais)	constructed to transport water from catchment check dams to tanks.
tanks (reservatorios)	constructed to store water for later irrigation and/or domestic use.

Source: USAID Cape Verde Watershed Development Project (1984)

ANNEX H

ABBREVIATIONS USED IN THE TEXT

ADB	African Development Bank
ADO	Agricultural Development Officer (of a USAID)
AGRHYMET	Agro/Hydrologic/Meteologic Agency (in Niamey, Niger)
AGRIS	
AID/W	Agency for International Development , Washington (hq.)
CBWF	Community Based Work Front
CCC	Commodity Credit Corporation
CEA	Center for Agrarian Studies (INIA predecessor)
CIAT	
CIF	Charges, Insurance, Freight (indicator of shipping price)
CWF	Classical Work Front
DGCSFER	Directorate General for Soil Conservation, Forestry and Rural Engineering (Port. initials)
EMBRAPA	National Agricultural & Fisheries Enterprise of Brazil
EMPA	National Food Import Enterprise (Cape Verde - public corporation)
FAO	United Nations Food & Agriculture Organization
FCRP	Food Crop Research Project
FOB	Freight on Board (shipping price indicator)
GDO	General Development Officer (of a USAID)
GIS	Geographic Information System
GOCV	Government of the Republic of Cape Verde

Annex H., cont.

GTZ	Gesellschaft fur Technische Zusammenarbeit (German Technical Assistance Program)
ICRISAT	
IFAD	International Food & Development Agency (in Rome)
INC	National Institute of Cooperative
INIA	National Institute for Agricultural Research
JRH	Water Resources Board (associated with the MDRP)
LOP	Life of Project
MDRP	Ministry of Rural Development & Fisheries
MT	Metric Tons
NDF	National Development Fund
NOAA	National Oceanic & Atmospheric Agency (U.S.)
PACD	Project Assistance Completion Date
PID	Project Identification Document (having much of the design function of a PP, in this particular case)
PL480	Public Law 480: Agricultural Trade Development and Assistance Act of 1954, as amended
PP	Project Paper, an AID project planning document
PVC	Designation of a certain kind of irrigation pipe
PVO	Private Voluntary Organization
PWDP	Phases Watershed Development Plan
RAP	Rural Assistance Program (part of the WDP)
REDSO/WCA	AID's Regional Economic Development Services Office for West and Coastal Africa (in Abidjan, Ivory Coast)
RIS	Rainfall Information System
SCS	Soil Conservation Service (of the U.S. Dep't of Agric.)

Annex H., cont.

SHM	Self Help Measure (as required in connection with PL480 food grants)
SWC	Soil and Water Conservation
TA	Technical assistance, or, Transfer Authorization/Agreement (used in connection with U.S. food aid)
UNSO	United Nations Regional Office for Sudan & Sahel
USAID	United States Agency for International Development (initials usually reserved for a country office--see also, AID/W)
USDH	U.S. Direct Hire (regularly employed personnel, as opposed to contract personnel)
USLE	Technical designation of test plot
WARD	Watershed & Applied Research Development (one of the names proposed for the consolidated project, FY91-95, combining FCRP, PL480 and WDP)
WDP	Watershed Development Project

A N N E X I.

MINISTRE DU DEVELOPPEMENT RURAL ET DES PECHEES

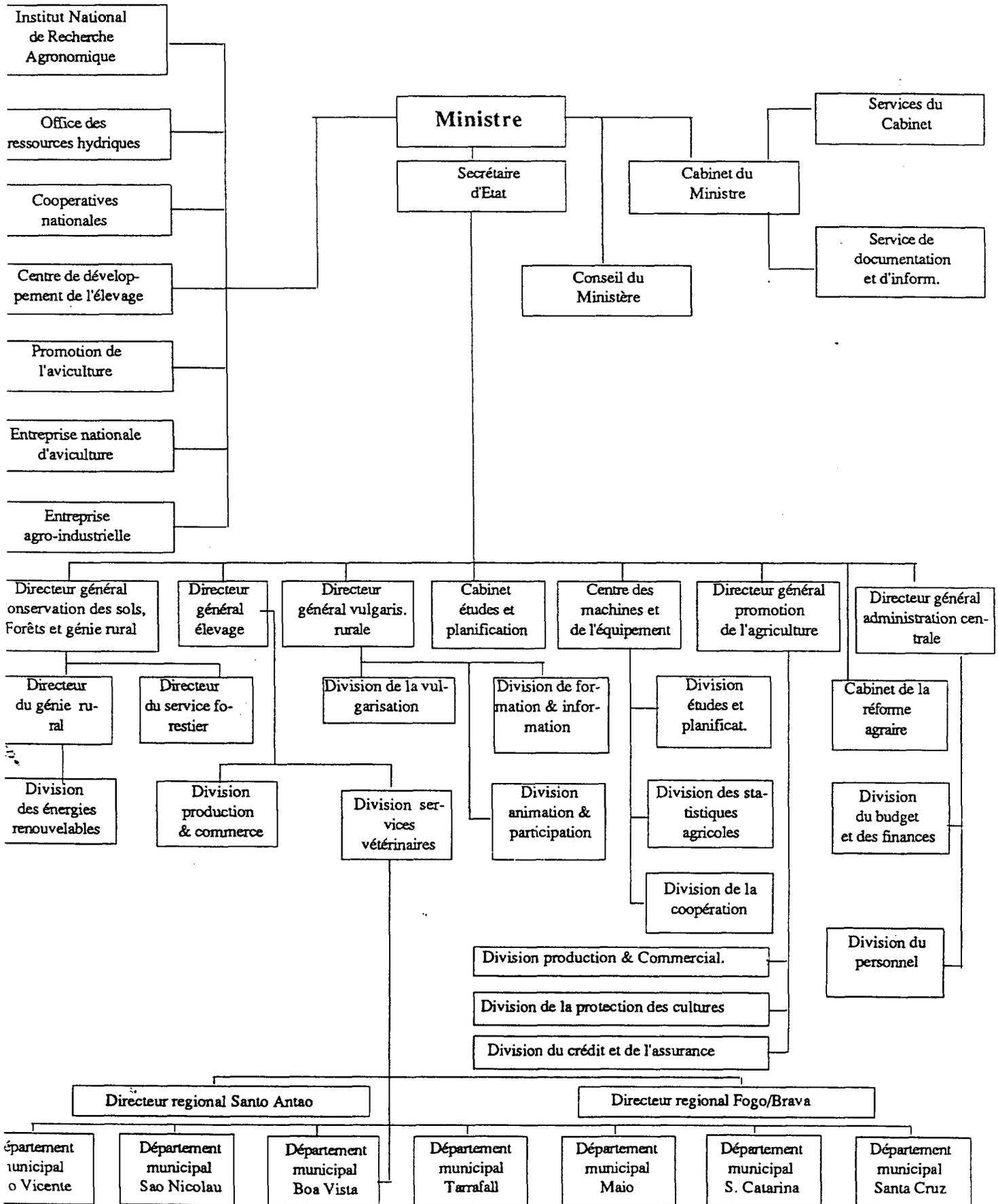
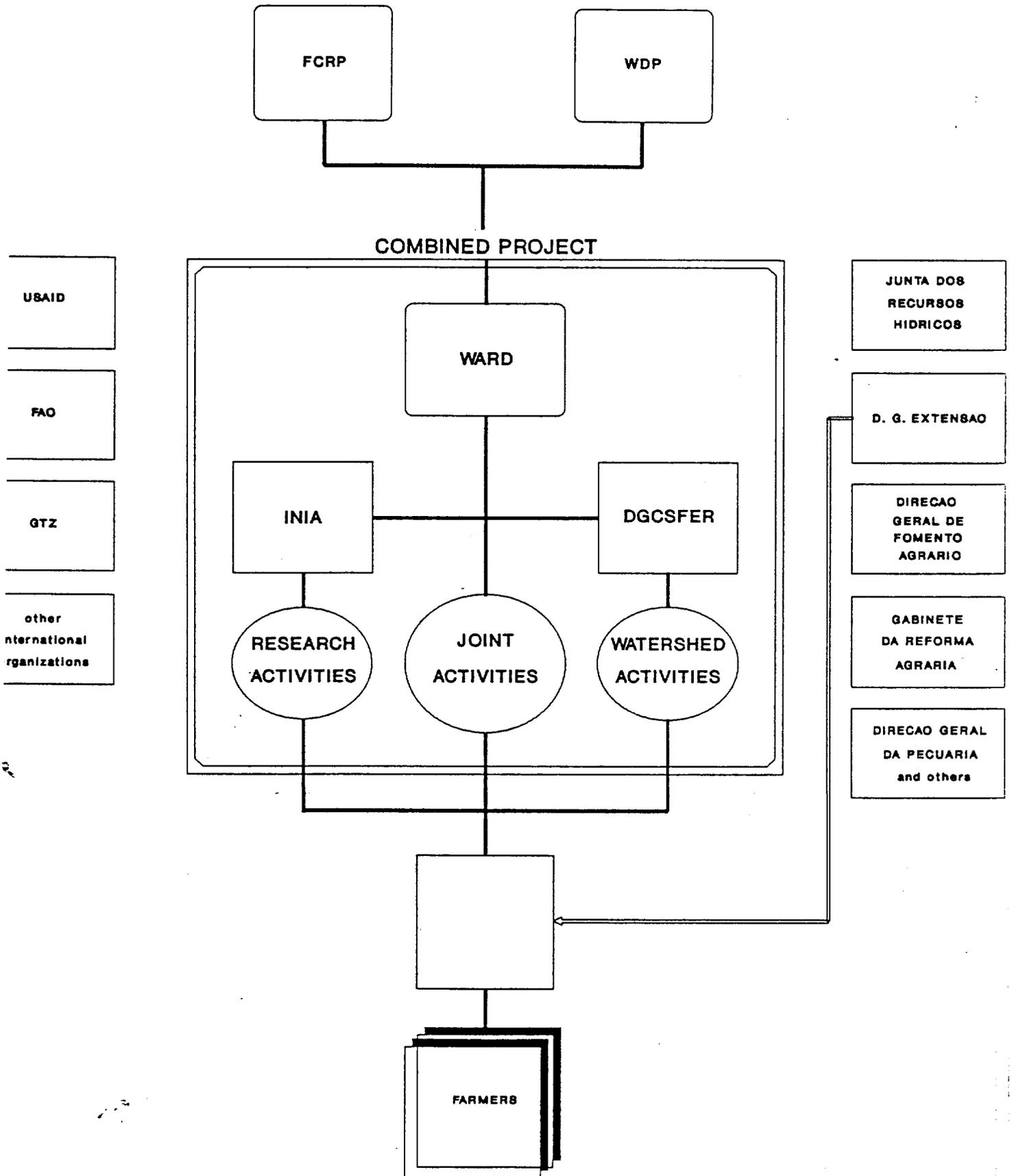


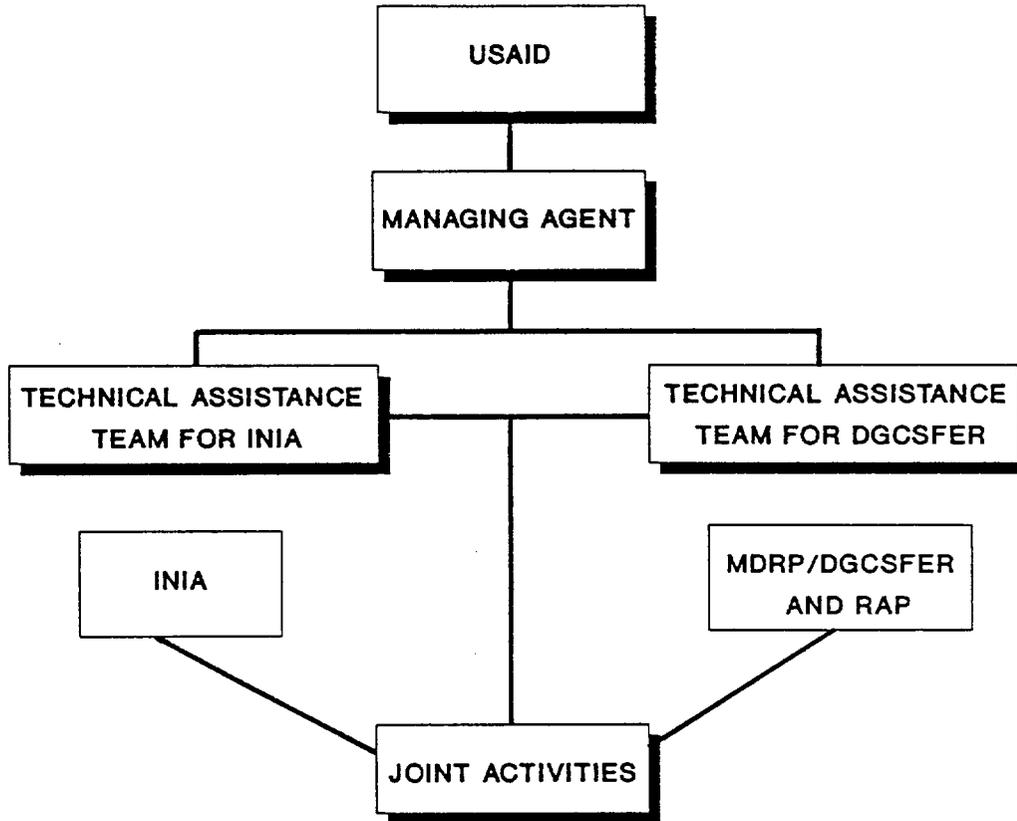
Figure 2: CAPE VERDE WATERSHED DEVELOPMENT ACTIVITIES



OBJECTIVE: INCREASED AGRICULTURAL PRODUCTION AND PROFITS CONSISTENT WITH SOUND ECOLOGICAL PRACTICES

ANNEX K

FIG. 3. GRAPHIC OF MANAGEMENT OF U.S. CONSOLIDATED PROJECT



A N N E X L

LABOR MOBILIZATION, USE OF LABOR, EXTENSION, & COMMUNITIES

This paper unifies and amplifies discussions of labor, extension and community initiative that the text took piecemeal (as was required by the Statement of Work in which the questions fell under several different headings). Here, the topics--how PL 480-funded labor is recruited for "work fronts"; how it is utilized by the watershed project; and how these questions relate to community benefit (rural action and extension)-- are each viewed as a function of the others in a larger picture. If the Team learned well from observation and from others who know the subject in depth, our analysis will support persuasive recommendations on a problem of great challenge to the project in achievement of the rural development goal.

PURPOSES & STANDARDS

First, labor efficiency is sought in the physical work of watershed conservation. Second and at the same time, the system of labor mobilization and utilization must engage farmers and communities in the public program of rural development; and third, it must produce self-help self-interest benefits to individuals and communities (that is, private land improvement over and above wages earned).

The agencies active in this complex must, in their relation to labor: make contact with the labor "pool" of widely dispersed individual; arrange their recruitment; train them and form them into crews; and monitor their work, or, alternatively, promote separate auto-directed activities.

Also, the agencies must establish productive linkages between research, watershed works, and the rural producers.

They must provide technical guidance, improvement of method in agriculture, and rational planning on problems ranging from correct design of conservation structures to the social/economic viability of the overall programs.

The agencies are: (a) INIA, with a mandate larger than its title (agricultural research) suggests, which in future will research hydrology, soil mechanics, structures design, and other aspects of integrated watershed development, (b) the DGCSFER, labor's employer, which, engineers and manages structural and vegetative conservation activity, (c) the Rural Assistance Program (RAP) organization, a project unit (located somewhat autonomously in the DGCSFER) which, through its community contacts, mobilizes crews for WDP works and has also initiated "community development" activity; and, (d) the Directorate for Extension, which should presumably provide the professional link between agricultural research and farm productivity. (The directorates of agricultural development

and agrarian reform, as well as the water resources board and other agencies, are also essential as future contributors to the goal of the consolidated U.S. project, but are not part of it financially or administratively.)

QUESTIONS:

For present purposes the key questions narrow down to: (a) What are the merits of the different work-front systems (for labor recruitment and utilization) and can two or more systems work simultaneously toward the dual purpose of efficiency and community benefit? (b) what agency can best manage the labor resource? (c) What should RAP now focus on, among the several programs it has launched? and in the longer run what should be done with it as an organization? (d) What mandate should the official extension service have, in relation to RAP, in agricultural extension, and in the broader aspects of community and rural development?

PRESENT SITUATION

The Rural Assistance Program, which is only six years old, has some thirty agents in the field. It's principal achievement is the organization of the "community based work fronts" (crews) that do part of the WDP's work in the watersheds (paid by the project from PL480 counterpart funds).

RAP agents are recruited from the rural milieu, which gives them community access and rapport, but also explains their limited education (seldom beyond the secondary level).

In addition to forming the fronts, RAP has worked with the cooperatives institute in some villages to develop savings and credit systems. It has advised in maternal and child health; introduced a fuel efficient stove for testing in farmer homes; and conducted a wide variety of training sessions for its own personnel and for farmers. It has also advised in both dryland and irrigated farming. Its most significant extension work in the watersheds is supervision and advice for the WDP's extensive and successful tree planting program. Finally, RAP seems to have developed new ways of communicating with farmers using techniques and relationships that constitute a resource for the future.

The Extension Directorate is nominally responsible for agricultural extension for the country as a whole (as opposed to RAP's project-limited scope of only the thirteen designated watersheds). It dates from 1985, and has fewer agents (eighteen) than does RAP. While RAP is a creation of the U.S. project, Extension is a creature of the GOCV's regular establishment and is funded from the regular budget. Unlike RAP, it has a narrow, too narrow, set of activities, as yet. Its agenda consists of individual items (such as distribution of potatoe seeds and grasshopper control) rather than broad agricultural objectives. It deals with the already "evolved" farmers in irrigated and market agriculture. Its agents have an urban background and are more highly educated than RAP's. The Service is trying now on a small scale to create local grassroots teams to work with

158

community leaders and to coordinate with on-site agents of other ministries engaged in rural development.

The Service is at something of an impasse as to leadership, funds, organization and role definition. The little outside support it has had came mainly from the FAO. Like RAP, it has not had technical "packages" to give farmers, even if it had the organization to deliver it, since INIA has not yet reached the stage of producing them.

The two labor mobilization systems in use are the "community based work fronts" (CBWF) and the "classical" fronts. The former is called in Portuguese, "frentes de trabalho reconvertiveis" (FTR), that is, "converted work front"; the latter, "frentes de trabalho classicos" (FTC), or "classical work fronts." Both have parallels in old tradition, and the converted fronts, as they are known to Cape Verdeans, are so-called because they modify the classic fronts by the application of certain specific community-related principles. At this stage (seven years after their creation) the FTRs do 20-25 percent of the WDP's work and the FTCs do the rest.

PRINCIPLES & PERFORMANCE

The principles underlying the converted community based work system dictate that:

- they should work near their communities
- they should work on individual or community land, mostly, rather than public land, and thus that
- their projects should produce improvements to the land of individuals or their community, in addition to wage benefits
- the work should be labor-intensive, in order to maximize the wage benefit

As the individual's land may be improved, he is paid less than labor in the classical fronts. This corollates with the "enlightenment" principle, that the CBWFs are expected to raise their horizons through the WDP experience and to believe that, with community dedication, progress can be made in the larger sphere of rural development generally.

It is reported that under certain circumstances both the morale and the productivity of the converted fronts are higher than in the classical fronts. On the other hand, a factor counting as a principle in the CBWF system is "entitlement." Given the PL480 purpose of generating employment and income, the laborers (men, women and children) can claim jobs during the non-agricultural season if watershed projects are underway near their communities.

A fair assessment of the RAP system will allow for the fact that the organization is small and fragile. It has not focused (yet) on what it might best do, eventually: its program to date can be classified as exploratory or experimental. Undertrained agents have been asked to perform in areas they are not equipped for. According to a December 1988 review, (see Annex D., Gardiner), coordination between RAP and INIA and the Extension Service has been poor. Some of RAP's achievements are singular, or successful as cases or models but not generalized on a broader scale (the stove initiative, for example, and the

coop credit scheme, which seems to be at a standstill), for reasons attributable to RAP but also to factors beyond its control. While RAP's main success has been in labor mobilization and guidance, conservation work is complex and technical, at a certain level, and RAP agents cannot be expected ever to become capable of advice at that level (on structural design, emplacement, etc.). Finally, definitive evaluation of RAP is difficult because it does not have a built in monitoring system. (Development of a fresh labor policy will require a critical analysis of what is already known about RAP and the fronts it and a probing, if not lengthy, inquiry into unknown territory.)

It is already conceded that the CBWF system has both operational and theoretical weaknesses. From the engineer's standpoint, its utility is limited by the geographic principle. Works supervisors wanting to get the job done (employment generation is not their business) would prefer to hire on a capability, rather than an entitlement, basis and keep the crew intact as it moves to sites beyond the community reach. Occasionally, the labor-intensive stipulation also constrains the engineer (although seldom in maintenance as opposed to construction work).

A study commissioned by the Evaluation Team (Annex D., Risoli), and other reports, establish also that often the CBWF principles are ignored in practice. The crews go beyond their community zone, and work land that is not their own. In addition, and despite entitlement, their greater short-term job security is offset by less long-term security as the work moves out of range. In consequence, work is sometimes stretched out, morale suffers, and productivity drops. The study quotes several workers as saying that work in converted fronts is no different from the classical front experience--"a mesma coisa!" There is then the irony that higher paid classical fronts sometimes serve both themselves and the work purpose better, while sometimes the converted fronts live up to expectations.

In long range perspective, the converted front concept and its RAP promoters have probably made a significant if unmeasurable "difference"--one reported by the commissioned study. Under colonial government, labor for rural public works was more or less drafted, compulsory. The converted system has brought a sense of "liberation" to the relationship between the rural labor pool and the central government. This is due to the manner they are recruited (a voluntary signing up); to the fact that they participate in a larger enterprise; that they have some say as to what specific work will be done; and that they receive benefit outside the indirect benefit of protected resources and in addition to wage income, (when their land is improved). Even if the upbeat sense of freedom and a widened participation in social progress were to falter, it is unlikely to disappear. That is a practical factor in planning for the future.

RECOMMENDATIONS

With enthusiasm for the abstract concept of the CBWFs and for RAP's achievements but little empirical support, some planners have suggested future roles that seem extreme. One is that the converted front attitude will catch on with the rural population to the extent that self-help will substitute for pay, that rural development will be a self-generating voluntary movement. Another, that the RAP's "barefoot extensionists" can, with across-the-board training, undertake the entire gamut of community development interventions,

in a sort of bottom-up rural regeneration. Such optimism will lead to disillusion. RAP, the fronts, and Extension have all made positive but insufficient preparations for the future. All are overloaded, and would be swamped by unrealistic expectations. Neither romanticizing nor belittling achievements to date, we think practical and viable advances can be made, but on a step by step basis.

1. The realistic alternatives for RAP are, to:

- maintain its status quo as an arm of the U.S. project, concentrating on workcrew mobilization
- transfer it as an entity from DGCSFER to the Extension Directorate
- transfer RAP personnel to Extension, as individuals,
- leave labor mobilization and supervision to DGCSFER technicians, allowing RAP (wherever housed) to focus on rural extension-like contacts
- equip RAP agents to specialize as communicators with the rural population, regardless of subject, so that they could deliver "packages" prepared by others on a range of subjects including agriculture, health and so on.

2. Clearly, some of these alternatives cannot be effected soon. The packages are not ready. Extension is unprepared to absorb RAP or its agents. RAP agents are not equipped for supervising watershed works at the technical level.

3. RAP can and should begin to define its role and focus on a program. This can be a progressive adaptation. It could start with aggressive INIA training of RAP personnel, not in technical subjects but in what their background suggests is their strong suit: the skills and methodologies of grassroots operations. INIA could simultaneously give them the elements of an agricultural package of advice to farmers; and over time they could get similar support from other ministries. RAP's organizational integrity would be preserved for, say 18-24 months, and in the present location (DGCSFER).

4. During that period, the Extension service should be (and will be, according to our recommendations) the object of intense efforts at renewal, personnel expansion and upgrading, and definition of an appropriate and focused program of its own. We assume USAID support to planning these measures, and other-donor help in implementation. INIA would participate in in-country training, and help to forge a close operating collaboration both with Extension.

5. RAP and Extension will thus be preparing for complimentary roles: Extension as the formal, technical, and policy guide; RAP or RAP agents as the carriers, as the "informal" grassroots arm.

6. Once the ground is prepared, in the next 18-30 months, say, the RAP organization should shift intact to Extension. Then over a following six-month period, RAP's and Extension's proper roles and the relationships between them, as well as the issue of whether RAP should retain an organizational entity, would be settled from *within* the Extension Service. The outcome of this second round of restructuring would be a two-tier arrangement, one administering a comprehensive rural development program (however constrained by limited resources) that takes account of social/economic

realities and that provides sound technical supervision, and full coordination with INIA, and the second constituting a field service with person-to-person skills armed with credible packages carrying INIA's professional prestige. Some former RAP personnel might convert to the directing echelon, of course, and some Extension employees might move over to the field function. The present 18/30 (3/5) ratio of RAP field agents to Extension Service agents should probably change to 1/5, with expansion to 30 in the directing group and 150 in the field group.

7. We think it desirable to desegregate the CBWF doctrine, however well it has served in post-independence explorations of the problem.

The principles have been diluted, and it is doubtful whether they can or should be recaptured for general application (due to the disparity between the engineer's requirements and the fronts' aspirations and limitations). But,

- the system can work well in its pure form in the specific time, place and work circumstances appropriate to it;
- it could be stretched to operate beyond the community range provided the conditions for doing so are established in an explicit variation of the geographic principle;
- and it can continue as the main mechanism for a reduced program of works in which community benefit can be confidently predicted and in works not requiring (or requiring only minimal) DGCSFER technical oversight.

8. The classical workfronts would always be available to the engineers/employers as they push to complete their agenda of soil/water/forestry conservation. But they should take a leaf from the CBWF book as to an enlightened worker-status including "liberated" aspirations and rights. This transfer of attitudes will probably occur naturally as a consequence of the converted front experience and of the government's social policies.

9. Another much discussed experiment has been launched and it should be watched: contracted work fronts. Under this system, an individual would be selected to mobilize labor in whatever way suits him/her to perform a given quantity of work in a certain time for a stipulated sum of money.

Many questions arise (as Gardiner notes): who develops the contracts? how is the contractor selected? who develops specifications and budgets? who supplies materials, provides logistics, supervision, etc.? and, especially, who benefits?

Tests of this arrangement would not replace plans for restructuring the more widely applicable systems, and it seems doubtful that it would ever be used extensively-- for lack of people capable of executing such contracts and because it would be difficult to square with PL480 goal of equitable generation of income (assuming that other funding for the contracts would not be available).

10. Meanwhile, the other systems should be modified. The modus operandi of CBWF's should be redefined; the pay differential as against classic fronts should be eliminated, perhaps; and means should be devised for CBWFs to operate more widely and with continuity of employment. Classic fronts would continue as the

162

principal labor arrangement, but under less arbitrary, engineer-dicated terms than have obtained. And, finally, a searching analysis should be done of where and under what conditions each system can best be used.

CODA

Indeed, a review of the whole matter should take place later this calendar year, if possible, and before the consolidated project is funded. Decisions can be made promptly since most of the urgent ones will only involve further exploration of the ultimate patterns of operation, and therefore be provisional. It is not to be expected in a matter as weighty and complex as this (representing a peaceful social/economic, and technical and administrative, revolution, of sorts) that a sound and enduring system will be in place until toward the end of the project's five year life, at best.

ANNEX N

STRATEGIC PLAN - NATIONAL INSTITUTE FOR AGRARIAN RESEARCH

1. Strategies

The program of work for the National Institute for Agrarian Research is aimed at addressing the following problems and, with minor changes, will constitute the program of work for the entire life of the Third National Plan of Development.

- a) Urgent need for new orientation in national agriculture trying to improve utilization of soil and water resources, promoting their preservation and regulation;
- b) Need to intensify rainfed and irrigated crop production to permit food self-sufficiency in locally grown food crops with the exception of grain;
- c) Need to reinforce livestock activities;
- d) Need to increase technical, scientific and professional capabilities of INIA, MDRP, and other institutions under the tutelage of the Minister of Rural Development and Fisheries;
- e) Need to maintain and/or protect the environment;
- f) Need to accelerate the dialogue with the rural populations.

Basic strategies for guidance of this plan of work are as presented below:

Strategy 1. Natural resource management research strategy involves the search for sustainable production systems. Basically, three stages of activity are involved in this strategy. First, the measurement of the physical, chemical, biological and socio-economic elements of the resource base. Second, analysis of the determinants of stability and degradation of the resource base by studying the dynamic interactions of these elements. These include studies of soil erosion, and of fertility as measured by the physical, chemical and biological properties of the soil and their effects on biomass production, and studies of transport and storage of water and nutrients, and thirdly, designing resource management practices, or to design new ones which are capable of stabilizing or increasing output while avoiding degradation of the resource base.

Resource management by farmers is linked with their productivity objectives and the way farmers use the resources available to them to achieve these objectives. Therefore, it is important that there be an operational link between research to increase crop productivity and research directed toward long term maintenance of the resource base.

* From Third National Development Plan translated in 1989.

An improved knowledge of the natural resources (soil, water and vegetation) in terms of quality and quantity, including the characterization of their potential and limitations as the basis for further development in the agricultural, forestry and livestock sectors. Studies of the general character of soil and vegetation have been done, but for future planning purposes, it is necessary to have more detail. Thus, we shall continue in the preparation of the agro-climate maps for the islands of Brava, Maio and Boa Vista, but shall begin a well-detailed soil study of the Ribeira Seca watershed, in view of planning its best use.

The quantification of the erosion problem and the studies on underground water in sub-watersheds and/or hillsides would greatly assist in understanding the problems of infiltration of the rainfall and that of strengthening the aquifers and thus determine the amount of water they can furnish. Specific and general mapping covering the vegetation will permit us to follow the evolution of the ecosystem and the determination of the potential for pasture which are basically important in what concerns the protection of the environment and development of livestock. All the elements indicated, linked to the climate characterization and the hydrologic system of the system of the watersheds will clarify about the primary production and the planning of resource utilization.

There is a need to collect, classify and file the vegetal species existing in Cape Verde, maintaining a live collection of native and exotic specimens as a means of preservation. These elements, as well as others representing the geologic formations, the units of soil and the insect classes constitute a basic tool both for the teaching and tasks of identification of vegetal species, geological series, types of soil and insect classes, and it is the reason why they must be collected, classified and filed.

Objective 1. Maximize the level of sustainable agriculture in irrigated and rain-fed farming systems by determining and evaluating the status of soil fertility in the major agricultural areas of Cape Verde and by up-dating fertilizer recommendations.

Methodology 1.1. Establishment of a fully functional soil and water testing laboratory will elucidate fertility problems in irrigated and dryland agriculture.

Objective 2. In order to maximize land development and protective use of the land and water resources quantification of soil erosion with existing control measures need to be evaluated.

Methodology 1.2. Soil erosion plots will be used to quantify erosion.

Objective 3. Identify species ideal for slope protection and range restoration.

Methodology 1.3. Prepare vegetation maps of the agro-ecological zones found in the various islands.

Methodology 1.4. Evaluate native and introduced species for soil conservation and folder.

Objective 4. Establish a scientific foundation regarding location and practicability

of soil protecting construction, forest tree plantings and evaluation of program effectiveness.

Objective 5. Development the means to characterize, regulate and preserve the soil and water resources to permit stable crop production.

Methodology 5. Adapt and/or develop technologies permitting identification and predicting long-term changes in quantity and quality of available soil and water resources for crop production.

Methodology 6. Make available the necessary technologies to improve, protect and restore the productive capacity of agricultural soils.

Methodology 7. Develop improved systems of water utilization in order to obtain an efficient management of water resources.

Methodology 8. Develop sub-systems integrating soil and water use to optimize the soils production.

Strategy 2. The identification of agricultural production can only be reached through the improvement and/or the maintenance of soil fertility, study of the cultural know-how more adapted to the different ecological regions and types of culture, maximization of water use, utilization of species, varieties and/or cultivars more adapted to the environmental conditions, control and/or extermination of the pests and diseases affecting crop production.

The knowledge of genetic potential of species and/or varieties traditionally yielded is an essential element not only for improvement of productivity but also for comparison of their productive potential with that of species and varieties imported. The soil/water/plant relationship constitutes a basic element in water economy and its interaction with productivity.

Objective 1. Develop the means to increase the productivity and quality for the plants grown.

Methodology 2.1. Increase the resources in vegetal germplasm in order to ensure major genetic enabling an increase in productivity.

Methodology 2.2. Collect and characterize germplasm of major food crops to maintain genetic diversity from different agro-ecological zones.

Methodology 2.3. Select the vegetal germplasm for a controlled genetic crossing.

Methodology 2.4. Improve the existing agricultural techniques or introduce and adapt new technologies viewing an increase of productivity and lowering of production costs.

Methodology 2.5. Develop and adapt new methods of biological control and IPM and improve the existing ones to reduce production losses resulted from insects,

nematodes and other pests and diseases.

Strategy 3. Develop and/or adapt the means to permit maximum utilization of crop products.

Objective 1. Develop and/or adapt the means to permit maximum utilization of crop products.

Methodology 3.1. Develop and/or adapt the means to increase the characteristics inherent to production materials.

Methodology 3.2. Develop the means to reduce the post-harvest losses provoked by insects and micro-organisms.

Methodology 3.3. Develop the means to transform and process crop products.

Methodology 3.4. Analyze benefits and costs of technology related to maximizing crop utilization.

Strategy 4. A serious study of traditional irrigation systems, their improvement, the introduction of new systems and comparison of their efficiency with the traditional systems will be a continuing concern.

Methodology 4.1. Evaluate efficiency of new irrigation systems such as drip, sprinkler, porous tubes for adaptability and potential in Cape Verde.

Methodology 4.2. Study farm level management of irrigation water and water allocation in multi-user systems, assess economic impact of potential improvements resulting from more efficient allocation mechanisms.

Methodology 4.3. Water-harvesting and run-off agriculture techniques will be studied to evaluate their potential as supplementing irrigation or crop production during and after the rainy season.

Strategy 5. Soils are already known whose special characteristics or their situation in areas of arid or semi-arid climates are not able to permit regular crop production. For these soils, there is a need to find a cultivar or cultivars capable of economically viable yields. On the other hand, it may be advisable to resort to spontaneous plants with other than food purposes in the interim.

Methodology 5.1. Elucidate soil salinity problems of irrigated agriculture in arid and semi-arid zones of Santiago and Maio.

Methodology 5.2. Evaluate crops and crop species adapted to arid and semi-arid environments.

Methodology 5.3. Investigate alternate land use possibilities in areas where environmental conditions present limiting constraints to crop production.

Strategy 6. The system of production with interaction between the variables and constraints seems to be an essential element regarding crop productivity. Studies to characterize the traditional systems of production will be carried out and pilot projects established to their improvement. At the same time, the necessary data will be gathered to define and characterize the socio-economic indicators and to test changes which occur in those systems.

Methodology 6.1. Rural household surveys will be conducted on the major agricultural islands. Information will be collected about distribution of agricultural resources among rural households.

Methodology 6.2. Crop budgets will be constructed for major irrigated and rain-fed crops on Santiago and Santa Antao to provide information about the economic returns to crop production activities.

Methodology 6.3. New production techniques offer the potential to increase returns to farmers. However, adoption of new technologies by farmers is often hindered by a wide range of constraints. The benefits and constraints as perceived by farmers must be evaluated in order to better understand the likelihood of adoption and to identify mechanisms to facilitate farmer adoption.

Methodology 6.4. Previous fieldwork has indicated that livestock is an important factor in most rural households. The economic contribution of livestock is still unknown nor is the potential for increasing livestock activities.

Methodology 6.5. Evaluate the impact of land tenure patterns on production decisions and family welfare the type of land tenure influences the amount of agriculture; incomes that remains available to the family. Form of tenure may also influence production decisions. In particular, under a plausible set of assumptions, renters and sharecroppers may cultivate their land more intensively than do owners. An important related issue is the way that cooperatives are managed. Many cooperatives have had difficulties in efficiently managing their resources. Analysis may suggest ways to improve economic performance of cooperatives.

Strategy 7. Human Resource Development will continue at both local and international levels.

Objective 1. Reinforce the scientific, technical and/or professional capacity of INIA.

Methodology 7.1. Technical and/or professional training will continue by training basic technicians and by recycling courses and seminars for technicians within the MDRP.

Methodology 7.2. The training of INIA's technical and scientific staff will continue both locally, through the use of foreign technical assistance, and externally through intensive graduate and undergraduate degree programs, short-term training and attendance at professional meetings.

Strategy 8. Contacts with similar organizations abroad with the scope of obtaining technical and scientific information, material for trials, exchange of experiences, and establishment of bilateral programs of interest to Cape Verde and training of INIA's personnel.

Methodology 8.1. Cooperative and collaborative linkages will be established with the International Research Institutions, research universities and private organizations addressing problems encountered in Cape Verde.

Strategy 9. The acceleration of dialogue with the rural populations will take place through training of teams for rural development and information/training of laborers either through short-term seminars or visits to areas of experimentation.

Methodology 9.1. INIA training center facilities and staff as well as research technicians will actively involved in training of extensionists, farmers and MDRP technicians.

Strategy 10. The study of some diseases which affect livestock production will take place when the veterinary pathology facilities for the laboratory are completed.

Objective 1. Develop the means to increase the productivity of livestock and the quality of animal produce.

Methodology 10.1. Develop the forms and preventive means to control the diseases and pests which reduce animal production and the quality of products.

Strategy 11. Information Services will play an important role in facilitating exchange of ideas and methodologies and report results of research underway.

Methodology 11.1. The development of the integrated computerized library system will continue through the acquisition of relatively small but carefully selected lists of journals and books. Extension support publications will be produced, based on research findings, designed to upgrade the technical knowledge of the National Extension Service.

Methodology 11.2. INIA publications program will summarize technical activities in the form of the "Revista", Technical Bulletin, Monographs, annual reports, and annual work plans.

Methodology 11.3. Public information activities will include where appropriate field days, media relations, briefings and presentations to special groups and participation in agricultural shows.