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CAPE VERDE WATERSHED DEVELOPMENT PROJECT
655-0013
MID-TERM EVALUATION

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ACRONYMS AND DEFINITIONS

CIF	Cost including freight
DA	Development assistance
DGCSFER	Direcçao-Geral de Conservaçao de Solos, Florestas e Engenharia Rural (General Directorate for Soil Conservation, Forestry and Rural Engineering).
EEC	European Economic Community
FAO	Food and Agricultural Organization of the United Nations
FAS	Freight along side (vessel)
GOCV	Government of Cape Verde
INIA	Instituto Nacional de Investigacao Agraria (National Institute for Agrarian Research)
MDRP	Ministerio do Desenvolvimento Rural e Pescas (Ministry of Rural Development and Fisheries)
MPC	Ministry of Planning and Cooperation
NDF	National Development Fund
PIO/C	Project implementation order/commodities
PSC	Personal Services Contract (for AID personnel)
RAP	Rural Assistance Program
REDSO/WCA	Regional Economic Development Services Office/West Central Africa
SHM	Self-Help Measure
TA	Transfer Authorization, also Technical Assistance
UNSO	United Nations Sahel Office
USAID	U.S. Agency for International Development
WDP	Watershed Development Project

USAID/PRAIA

CAPE VERDE WATERSHED DEVELOPMENT PROJECT - #655-0013
MID-TERM EVALUATION

November - December, 1987

EXECUTIVE SUMMARY

The Cape Verde Watershed Development Project is well on its way to meeting or exceeding its quantitative goals for the construction of soil and water conservation structures, reforestation and employment generation. The use of local currency generated by the sale of P.L. 480 food to pay under-employed rural labor has been effectively integrated with technical assistance in achieving conservation goals. In addition to employment, the target population has learned valuable skills and has increased the productive potential of their land, increased potable water supplies and reduced flood damage. Recommendations have been offered which the evaluation team believes will enhance the contribution of the project to watershed development.

The Evaluation Process

This mid-term external evaluation of the Cape Verde Watershed Development Project was conducted by a four person team consisting of a rural sociologist (team leader) and two foresters from Tropical Research and Development, Inc. and a P.L. 480 expert provided by AID/REDSO. The team arrived in Cape Verde on November 12, 1987 and departed leaving a draft report on December 10, 1987.

Of the total 15 watersheds under the WDP, eight on Santiago Island were chosen for field evaluation. Watersheds under the responsibility of all five coordinators were visited.

Project Authorization and Funding

Project authorized:	August, 1984
Technical assistance contracted:	October, 1985
Technical assistance initiated:	January, 1986
Technical assistance to end:	January, 1989
Project assistance completion Date:	September, 1988
	(Extended to June, 1990)

Technical assistance grant:	\$5,611,000
Host country contribution:	\$1,384,000
Funds from sale of P.L. 480 food:	<u>\$14,800,000</u>
Total:	\$21,975,000

Counterparts

The Ministry of Rural Development (MDR) is the counterpart organization responsible for implementation of the WDP. Managerial support is provided by USAID. The National Development Fund (NDF) provides local currency for payments to the rural workers and for the purchase of local commodities. The Secretariat of State for Cooperation and Planning is the coordinating agency.

Technical assistance needs for project implementation have been provided by Sheladia Associates, Inc. This AID contractor began operation in January of 1986 using the services of long and short-term advisors. The major function of the technical assistance has been field supervision, training, extension work, monitoring and evaluation.

The Problems Addressed

The Watershed Development Project addresses major environmental constraints on development in Cape Verde. This archipelago nation is affected by the Sahelian climate of continental Africa. In the past, the people have suffered periodic famines caused by droughts which exacted a heavy toll in lost lives. In addition to recurrent drought cycles, the normal rainfall is infrequent and erratic, often coming in heavy downpours. The rugged landscape is either used for cultivation of staple crops, primarily corn and beans, or is subjected to denudation by overgrazing and collection of fuelwood and fodder. Steep slopes, inappropriate land use and aggressive rainfall together have led to severe erosion problems that have resulted in reduced productivity of the land. Rapid runoff of soil-laden water has caused downstream sedimentation and has contributed to saltwater intrusion.

Project Purpose and Strategy

The purpose of the Watershed Development Project is to make a significant contribution to solving the problems identified through specific activities designed to stabilize soil, slow runoff and promote water infiltration. These activities are expected to result in sustainable increases in the production of crops, livestock and wood products, especially fuelwood.

The development strategy adopted has been to build physical soil and water conservation structures in the watersheds in order to control erosion, increase water infiltration, create new agricultural land and control flooding. These structures consist of contour rock walls, check dams, catchment dams and groins and water reservoirs. Tree planting and seeding of ground cover are the major non-structural measures for achieving soil and water conservation goals of the project. Nurseries have been developed to supply seedlings. An important element in the project's

design is the Rural Assistance Program which provides, through members of local communities recruited and trained for the purpose, extension services in farming practices, tree planting, location and building of simple water control structures, and counseling in nutrition, health, child care and hygiene.

Purpose of the Evaluation

The evaluation was designed to (1) provide a measure of progress to date, (2) assess the realism of original assumptions and (3) provide recommendations to guide implementation through the projected completion date of June 30, 1990.

In addition, the evaluation team was asked to assess the merits of expanding the project to Serra Malaqueta and Pico de Antonia regions. The team observed that the WDP is presently operating near the limits of its capacity. Expansion into new areas is not recommended until successes in the present 15 watersheds have been achieved.

Methods of Evaluation

The evaluation team addressed three major functional areas of the Project; soil and water conservation, forestry and the rural assistance program. The team, together with their counterparts, visited eight representative watersheds on the island of Santiago among the fifteen within which the Project operates. Other places were also visited to observe the work of related project activities and to secure additional information. Direct field observations were made, beneficiaries and Project personnel were interviewed, and literature provided to the team by USAID/Praia. The detailed Scope of Work for the team is found as an annex to this document, as are the references cited.

Accomplishments To Date

Substantial progress has been made toward accomplishing the goals of the Project. Some of the readily quantified results are summarized in the Table below. On the island of Santiago where activities have been concentrated, Project sponsored reforestation activities have accounted for 44 percent of the trees planted by all projects. Of equal importance have been the less-readily quantified activities which have contributed to development. Prominent is training, ranging from on-the-spot transfer of technology accomplished by extensionists working with individual farmers through short courses for paratechnical personnel to graduate degree programs abroad.

The establishment of the Rural Assistance Program coupled with the creation of the community based work fronts has been a major factor in the successful achievement of Project goals to date. This organizational structure can be expected to serve as an

important vehicle for rural development beyond the scope and life time of the present project. Family members participating in the work fronts have improved the productivity of their land, learned valuable skills and earned badly needed income which has been injected into the local economy where it has had a strong multiplier effect. The project has contributed more than half the total rural income on the island of Santiago.

Findings and Recommendations

From an overall perspective watershed management interventions have been successful. Refinements and alternatives are suggested, some represent opportunities created by successes during the past two years. The linking of PL 480 and watershed development activities has proved to be a cost effective mechanism for development project implementation. It is an assumption of the TR&D evaluation that the PL 480 program will continue and that watershed development activities with a strong food production component will continue to have a high priority with AID and the GOCV beyond the 1990 PACD of this project. The major findings and recommendations below should be considered by decisionmakers in USAID and the GOCV. The body of the evaluation contains more detailed commentary of potential interest to technical implementation staff.

1. **Future food production** - It is a stated goal of the Project to reduce chronic food shortages in Cape Verde. A measure of progress will be decreasing dependence on P.L. 480 food sales and a consequent decrease in the funds available to support watershed development activities. This leads to the need to identify and subject to benefit/cost analysis those interventions with readily identifiable production benefits which are in turn feasible under minimal subsidy, such as "djunta-mao" reciprocal labor arrangements. Soil stabilization structures and multiple use tree plantings now offer the opportunity to introduce crops, crop management practices and animal production techniques which will both result in further production increases as well as contribute to the conservation of the soil resource.

Recommendations -

* Explore how the results of agroforestry and farming systems projects elsewhere in Sahelian Africa could be applied to take advantage of advances in soil and water conservation.

* Take full advantage of opportunities to augment the use of irrigation in concert with improved crops and cropping systems. Irrigation to provide crop security during the normal planting cycle is generally more cost effective and socially equitable than dry season irrigation as a first step.

2. **Investments in the public interest** - Management of public lands in upper watersheds, flood control and prevention of salt water intrusion are all bonafide areas of public investment which farmers are unlikely to undertake because of the cost and lack of associated direct benefit. Tree planting in upper watershed areas should be examined carefully from a benefit/cost perspective. Tree planting is logistically difficult and costly per hectare in remote areas. If survival rates are high, growth rates acceptable, and the products in demand, then such plantings may be justifiable. Generally this is not the case. The upper watershed area in need of vegetative cover for erosion control is so vast that tree planting will not make a dent in the problem - needed first is success in fuel and fodder production on-farm where people have a vested interest in seedling survival. Then education in non-destructive livestock management and fuelwood collection in upper watersheds can be more successful. A soil conserving cover can begin to reestablish itself with minimal intervention, and planting efforts concentrated on the optimum sites.

Recommendations -

- * Determine if an optimum distribution of effort is being made in the use of scarce funds and trained leaders between works that will always have to be government financed and those which have the potential of becoming profitable activities of individuals or local organizations.
- * In relation to the above recommendation - public works, such as roads having a diffuse benefit stream, should be performed by traditional work fronts, on a piecework basis if appropriate. Where benefits to individuals or groups within a defined community are evident, then community based work fronts should perform the work.
- * Assure that conservation strategies are in tune with site-specific land tenancy (renters may not favor improvements that could result in higher rents).
- * Assure that existing policies do not discourage project sponsored activities (if forest law states that trees are the patrimony of the state, then motivation to plant trees is dulled).
- * Assess whether women's capabilities and activities are being effectively supported and whether women are receiving equal pay for equivalent work.

3. **Importance of Measurement** - The section of this evaluation

on watershed monitoring mentions that the return to Cape Verde of a specific individual trained at the graduate level in hydrology is needed in order to install rain and stream gauges and analyze the resulting data. While true, the project could benefit immediately from establishing simple measurement experiments without the need for specialized training. The WDP represents a valuable model - of conservation practices, organization of people and innovative use of P.L. 480 funds. These experiences should be shared, perhaps through the Club du Sahel network. However, to do so will require documentation of results.

Recommendations -

- * The use of marked stakes to measure soil erosion or accumulation in areas where conservation treatments have been applied, compared with untreated control areas.
- * A thorough sampling of tree seedling survival over time, noting the apparent cause of mortality - grazing animals, drought, thin soil or improper planting.
- * Trips to the field during major rainfall events to observe first hand the dynamics of water-borne soil movement and the effectiveness of erosion control measures. Field observations should be immediately compared with locally collected rainfall amount and duration data.
- * The location of rain gauges at nurseries or rural schools using a cooperating or paid recorder to establish a minimal information base, at least for major events.

4. **Watershed management planning** - It was found that the wide range of activities being implemented within the watersheds would yield a higher level of development benefits if activities were part of a more clearly defined watershed management program. Such a program would establish an appropriate sequence of activities, both geographically and in time, and an optimum level of emphasis that should be given to different tasks. A viable plan is based on a set of objectives rooted in a realistic assessment of what is physically, technically, socially and economically feasible.

Recommendations -

- * Using whatever maps and aerial photography available, have an experienced geomorphologist go into the field with WDP foresters and agronomists to identify problems and opportunities. The geomorphologist can rapidly apply battlefield triage to each watershed, indicating (a) what areas and processes are too costly to treat, (b) what areas are either not seriously degrading or which will recuperate with minimal intervention, (c) where to focus major project efforts in order to realize

the most on-site and downstream benefits, and (d) what modifications in conservation techniques might be more effective.

* A thorough analysis of management options by a resource economist would assist greatly in providing additional criteria upon which to base WDP strategies for the future.

5. **Planning and Coordination** - An Interagency Coordinating Group was originally envisioned as being essential to efficient project functioning and accountability. It has been found that effective communication among government departments with respect to complementary programs would be valuable to the WDP.

Recommendations -

* The evaluation concurs with the decision of AID to encourage the convening of meetings of the Interagency Coordinating Group at least quarterly in order to provide the opportunity for information exchange.

* Coordination in the elaboration of WDP annual plans in the framework of the five year rural development plan would contribute to greater recognition and potential for continuity beyond the project PACD.

* John Lewis, in his rapid assessment of the WDP in December of 1987 notes that government programs are stretched to the limits of their resources in achieving their own goals, making extra efforts associated with integration of programs not feasible (p. 23). This perspective does not preclude exchange of information.

* Promote the coordination among donors to assure compatibility among projects and minimum competitive stress on GOCV counterpart personnel.

6. **The Rural Assistance Program (RAP)** - The RAP has been a highly successful, largely because of its flexibility, innovativeness and close linkages to the communities in which it works. Its 23 village level extension agents provided advice and guidance in the building of simple physical structures, nutrition, health, farming systems and aided in the management and supervision of community based work fronts that perform the labor on physical structures.

Recommendations -

* The evaluation team recommends that steps be taken to integrate the RAP into the National Extension Service. The reason cited is the real hazard that the RAP, which was created

as part of the WDP, would be disbanded once the project is phased out.

* John Lewis' assessment advocates a opposite direction for integration (p. 26); the gradual absorption of RAP animators, as cooperative staff, into the community work fronts.

7. **Cultural assessment** - It has been found during the project that community-based work fronts are more productive than the traditional work fronts and that there is a widespread interest in tree planting by individuals. It is recommended that more be learned about those aspects of Cape Verdean culture directly relevant to the effective motivation of people to participate in subsidized conservation and production activities.

Recommendations -

- * Assess the actual and potential role of women in rural life; providing fuel and water, animal management, crop production, household gardening, food processing and decision-making.
- * Evaluate existing attitudes and practices in the management of livestock and forest/vegetation resources.
- * Assess skills and experience in soil conservation, especially in the construction and maintenance of terraces.
- * Determine the effect of land tenure; particularly share cropping, holding size and degree of fragmentation; on participation in conservation activities.
- * Establish the importance of community organizations in carrying out conservation and maintenance activities.

8. **Benefits and costs** - It is possible to say with confidence that project benefits exceed costs if we allocate the benefits from government expenditure of local currency funds to income generation. Of more interest, however, is the benefit/cost relationship between increased food and fodder production, increased water supply and reliability, and flooding reduction on one hand, and overall local currency and dollar technical assistance expenditures on the other.

Recommendations -

- * In forestry measure - Survival rate and growth increment of trees planted, values assigned to firewood, poles, fodder and fruit projected from planted trees, soil conservation benefits attributable to catchment dams (caldeiras) constructed and surviving trees, and the benefits attributable to reduced

pressure on fragile upper watershed areas.

* In agriculture measure - Increased area of potentially productive soil accumulated behind various infrastructural works, yield potential from increased irrigation capability, crop yield increase attributable to nitrogen fixing cover crops and to organic matter from tree leaves and cover crops, and actual increases in crop and animal production from treated areas as compared to controls.

* Contract a resource economist well versed in calculating and monetizing conservation benefits such as those mentioned above. The first task of the economist will be to design monitoring strategies to provide more accurate measures for end-of-project calculations. This recommendation is supported by John Lewis in his December report, p. 21.

9. **Computer Enhanced Aerial Photography** - The photography of the Island of Santiago is nearly complete. The data base these photographs will provide is potentially useful to the GOCV as well as to donor agencies for project planning and implementation, especially in the area of watershed management planning and correlation of meteorological and hydrological monitoring data. A decision to extend photographic coverage to include the entire country is premature. Several questions are unanswered. What is the quality of the original photography? Will personnel be available to utilize the equipment and generate the information: Once the information is generated will it be used effectively? Specifically, will watershed monitoring actually be carried out?

Recommendation -

* Delay further acquisition of aerial photography until the quality of existing photography has been evaluated, the feasibility of its use has been assessed and the contribution to achieving stated project objectives has been reevaluated.

LESSONS LEARNED

1. That the Cape Verdean rural people have characteristics closely related to their cultural history which strongly influence what approaches to watershed development will be successful. An example is the reciprocal work system, djunta mao, and its influence on the success of the community based work fronts.

2. That conservation activities do have a significant positive effect on the production of food and feed, although it is predicted that further increases are feasible with modifications in cropping practices, crops and animal management, and use of irrigation where appropriate.

3. That watershed management planning can lead to more efficient use of funds, labor and materials. particular attention should be given to the appropriate interventions in upper watershed areas.

4. That monitoring of key natural processes that affect project activities, as well as the activities themselves, is a valid use of project funds and personnel. Most of the monitoring can be carried out without the need for sophisticated equipment or specially trained personnel.

PROJECT IDENTIFICATION DATA AND BACKGROUND

Project Identification Data

Country: Republic of Cape Verde
Title: Cape Verde Watershed Development
Number: 655-0013
Dates: Authorized June 15, 1984
Original Project Assistance Completion Date,
September 30, 1988
Extended Project Assistance Completion Date, June
30, 1990.
Funding: A.I.D. Development Assistance Grant US\$ 5,611,000
PL 480, Section 206 14,800,000
Host Country Counterpart 1,384,000

Total 21,975.000

Mode of Implementation:

Ministry of Rural Development and Fisheries,
Republic of Cape Verde.

A.I.D. contractor, Sheladia Associates, Inc.
Riverdale, Maryland.

A.I.D. subcontractor, California Polytechnic
Institute, San Luis Obispo.

A.I.D. subcontractor, Oregon State University.

Project Designers:

USAID/REDSO.WCA
AID/W/PM/TD/IDI
AID/W/AFR/TR/ARD
Government of Cape Verde
Ronco, Inc.
University of Arizona
University of Wisconsin

Responsible Mission Officials

Former: Tom Ball, USAID Representative
August Hartman, Agricultural Development
Officer
Mary Beth Bennett, Project Manager

Current: Tom Luche, USAID Representative
Jose Goncalves, Project Manager

Previous Evaluations: None.

Project Background

The Cape Verde Watershed Development Project (WDP) was authorized on June 15, 1984 for the purpose of developing and protecting soil and water resources in fifteen watersheds, fourteen on Santiago island and one on the island of Santo Antao. It is a spin off of two prior projects, the Watershed Management Project and the Food for Development Project.

The goal of the WDP is to stabilize the natural environment, to increase the agricultural production potential, and to develop and protect the soil and water resources of the project-designated watersheds.

Initially, the project was scheduled to end September 30, 1988. However, on April 1, 1987, the WDP was extended to a new project assistance completion date of June 30, 1990.

Sheladia Associates contracted to provide technical assistance in October 1985 and the technical assistance team arrived in Praia, Santiago island in January 1986. The Sheladia technical assistance contract terminates in January 1989.

The project is funded by a dollar grant which is to be used for technical assistance, training, commodities and other expenses. A local currency component is derived from the sale of corn, rice and beans supplied under PL 480, Title II, Section 206 to the GOCV. These funds are to be used for labor performed on the watersheds. The GOCV contribution is in the amount of US \$1,384,000 equivalent.

The Ministry of Rural Development (MDR) is the counterpart organization responsible for implementation of the WDP. Managerial support is provided by USAID. The National Development Fund (NDF) provides local currency for payments to the rural workers and for the purchase of local commodities. The Secretariat of State for Cooperation and Planning is the coordinating agency.

Technical assistance needs for project implementation have been provided by Sheladia Associates, Inc. This AID contractor began operation in January of 1986 using the services of long and short-term advisors. The major function of the technical assistance has been field supervision, training, extension work, monitoring and evaluation. The forestry unit of Sheladia is

responsible for reforestation and ecological work and provides technical support for the field activities. This unit works in close cooperation with the Forestry Division of the Ministry for Rural Development. It also engages in informal research in collaboration with INIA and provides training of field workers.

WDP field activities are carried out by five watershed coordinators or technicians who supervise the principal controllers. The controllers are responsible for the field supervision of the four crew foremen. Each crew has 30 to 40 workers. Other field staff of the forestry component are extensionists, forest watchers and nursery foremen. All coordinators, controllers and extensionists have some practical experience in forestry but a limited background in technical forestry practices.

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1. PROJECT PAPER ACTIONS AND OUTPUTS

1.1 Project Paper Actions

1.1.1 Planning

The Ministry of Rural Development and the technical assistance team will prepare a comprehensive phased development plan prior to the disbursement of local currency generated from the sale of PL 480 commodities. The plan will provide a detailed outline for the development of project watersheds during the first few months of implementation (pages 3-4 of action memorandum).

The Center for Agrarian Studies (now the National Institute for Agrarian Research, INIA) will hold periodic meetings for representatives of all watershed development projects. These meetings will provide an opportunity to share their various experiences.

1.1.2 The following entities are to be involved in project implementation:

National level Inter-agency Coordination Commission
Secretariat of State for Cooperation and Planning (now Ministry of Planning and Cooperation)
EMPA (Empresa Nacional de Abastecimientos)
National Development Fund
Ministry of Rural Development and Fisheries
USAID
Project Implementation Committee
Center for Agrarian Studies (INIA)
General Directorate for Soil Conservation, Forestry and Rural Engineering (DGCSFER)
Office of Underground Water (now Junta dos Recursos Hídricos)
Farmers Support Program

1.1.3 Technical assistance team members as follows:

Long-term: watershed management specialist and team leader (3 years); agricultural engineer (2 years); silvo-pastoralist and forester (1 year).

Short-term: hydrologist-geological engineer, extension training specialist and aerial photography (possible).

In addition, it was expected that a food monitor and an administrative assistant would be recruited locally.

1.1.4 Comparison

The team will keep detailed records on comparative costs of alternative treatments and on the results of water runoff and related indices in sub-watersheds of varying characteristics.

1.1.5 Food crop research and watershed development link

The Food Crops Research Project will be doing most of its field work in the project areas and will include an evaluation of the technical components needed as recommendations for new practices.

1.1.6 Extension

Extension agents on Watershed Development will be working with small farmers to suggest new practices, receive farmers' feedback and eventually extend the field-tested technologies that are suitable for broader application.

1.1.7 PL 480 Administration

The Ministry of Rural Development is to prepare vouchers on a regular basis for submission to the National Development Fund. EMPA will receive, sell and store PL 480 commodities, remit the local currency proceeds to USAID account, and maintain adequate grain storage facilities. The Secretariat of State for Cooperation and Planning is to provide coordination for inter-agency exchange of information in project implementation, to establish price levels for grain sales in accordance with technical assistance, and to engage in policy dialogues with USAID. The National Development Fund is to maintain a separate account for local currency generated under the PL 480 program and to pay the Ministry of Rural Development upon receipt of a voucher. The Agency for International Development is to provide funding, technical support, training and commodities, management of activities listed, and to monitor GOCV management of resources.

Maintaining the price of corn at world market prices will require a continued dialogue between the U.S. and Cape Verde governments.

1.1.8 Area coverage

The soil and water conservation program will expand to approximately fifteen watersheds in Santiago and Santo Antao islands.

1.1.9 Watershed monitoring

A network of both recording and non-recording rain gauges will be set up in the project and the control watersheds. A local hydrologist will be trained to replace the hydrologist assigned to the project.

1.1.10 Community involvement

Maintenance and repair of soil and water conservation structures should involve local community groups and will be addressed during project implementation. Long-term technical assistance

will be required to cover the project responsibilities in community development and extension.

1.2 Project paper outputs

- 1.2.1 Treat approximately 7,500 hectares with contour furrows.
- 1.2.2 Treat approximately 1,000 hectares with rock stabilized contour terraces.
- 1.2.3 Construct 2,500 check dams.
- 1.2.4 Construct 10 subterranean catchment dams.
- 1.2.5 Install 4,000 meters of catchment dams.
- 1.2.6 Augment physical structures with vegetative soil and water conservation.
- 1.2.7 Train 6 persons in U.S. degree programs and short-term opportunities (five degree programs, one short-term program).
- 1.2.8 Support the pilot extension (rural assistance) effort until the National Extension and Animation Service is fully operational.
- 1.2.9 Support community based water management committees.
- 1.2.10 Foster the coordination of research and extension in soil and water conservation.
- 1.2.11 Refine watershed plans.

Aerial photographs will be taken to document the changes that have resulted from the construction of soil and water conservation structures during the late 1970s.

2. EVALUATION PROCESS

2.1 Evaluation teams

Evaluation teams from USAID and the GOCV were assembled to review the project. The teams met twice at the beginning of the evaluation, again at the completion of visits to watershed development project areas and a final meeting at the completion of the report draft. Visits to the field were made by designated members of each team.

2.2 Evaluation criteria

A set of performance criteria were established for evaluation in the field of each functional area of the watershed development project; soil and water conservation, forestry, and the rural assistance program. These criteria were prepared with reference to the scope of work (see Section 15.2).

2.3 Methodology

2.3.1 Primary data: site selection and field visits

The WDP operates in 15 watersheds, 14 located on Santiago Island and one on Santo Antao Island. Due to its remoteness, a visit to the watershed on Santo Antao would have involved a six day effort to look at a single watershed and for this reason it was excluded.

Of the remaining watersheds, seven were selected for site visits. For the 14 watersheds there are five watershed coordinators. Three of the coordinators have responsibility for three watersheds each, and two coordinators have responsibility for two areas. Watersheds were selected to include one watershed under the control of each of the five coordinators the coordinators are very important in regard to project execution. Tarrafal, Flamengos, Santa Cruz Seca (Jusante or downstream), Picos (Montante or upstream), Cumba and Mangue. Another watershed, Sao Francisco, was added at the request of the project manager. In all, eight of the 14 watershed areas in which the project has work on Santiago Island were visited.

The watershed sample is stratified in relationship to the representation of coordinators and random in that every other watershed was selected consistent with as wide a representation as possible of coordinators. The evaluation team is satisfied that the areas visited and the persons contacted are representative of the WDP effort on Santiago Island.

In addition to the eight watersheds mentioned above which were visited by each member of the evaluation team a number of other places were visited in order to observe the work of related

project activities or to secure additional information.

2.3.2 Primary data, interviews with knowledgeable persons

Knowledgeable persons, mainly but not exclusively, having an official capacity with either the GOCV (including members of the counterpart team), USAID-Praia or the technical assistance team were interviewed. In addition more than 50 persons who were residents of the project areas and participants in various activities occurring in the areas, e.g., traditional work crews, rural assistance committee members (comissao de moradores), rural assistance program extensionists forest watchers, nursery workers and others were interviewed (see Appendix IV).

2.3.3 Secondary data

Project and background reports supplied by USAID-Praia were reviewed. (See bibliography for a list of documents reviewed).

3. SOIL AND WATER CONSERVATION

3.1 Description and summary of activities

The rural works component is composed of the construction of soil and water structures as project outputs 1-5 on pp. 14-15. They also appear in the logical framework (p. 79) and in the transfer agreement as project activities a-e. Table 1. reflects the accomplishments to date in relationship to targets. Sixty-nine percent of the rock walls, 57 percent of check dams, 110 percent of catchment dams and 31 percent of groins have been completed. However, only 6 percent of the anticipated project paper target of 7,500 hectares of contour furrows have been completed.

Table 1. Water Control Structures Built by Project in 1985, 1986 and the First Half of 1987 in Relation to Project Paper Targets

Kind	1985	1986	1987	Total	Project Paper Target	Percent Finished	Quantity Remaining
Contour furrows (Hectares)	177.3	--	85.7	--	7,500	--	--
Rock walls (Hectares)	218.5	330.1	144.3	693	1,000	69	307
Check dams (Number)	530	711	241	1,482	2,600	57	1,118
Catchment dams (Number)	--	--	--	>10	11	>110	0
Embankment Groins & Walls (m)	1,006.4	326	1,298.5	2,630.9	4,000	65.7	1,369.4

Source: Directorate General of Soil Conservation, Forestry and Rural Engineering, Ministry of Rural Development, Annual Reports for 1985, 1986 and first semester of 1987.

In addition to the structures anticipated in the project paper other structures, representing a substantial effort, have been built. These consist of 8 reservoirs with nearly 7,000 cubic meters total capacity, 4.4 kilometers of irrigation canals, 2 kilometers of irrigation pipe and .8 kilometers of longitudinal walls that have been installed or constructed. Also, a section of road was built and an additional repaired (Table 2). Substantial work is planned for 1988 (Table 3).

Table 2. Additional Water Control and Other Structures
 Built in 1985, 1986 and The First Half of 1987 (a)

Kind	1985	1986	1987	Total
Reservoirs				
Number	-.-	4	4	8
Capacity in m3		6,185	760	6,945
Irrigation canals				
Meters	633	526	3,239	4,398
Irrigation pipe installed, meters	240	510	1,330	2,080
Roads				
Built, meters	100	-.-	850	950
repaired, meters	67,723	76,353	96,570	240,646

Source: See Table 1.

(a) In addition to outputs listed on pp. 14-15 of the project paper.

Table 3. Soil Conservation Structures Planned for 1988

Kind and Unit	Amount
Contour furrows	
Meters	--
Rock Walls	
Hectares	86
Check Dams and Catchment Dams	
Number	238
Groins	
Meters (a)	2,000
Reservoirs	
Number	10
Capacity in m3	5,610
Irrigation canals	
Meters	1,100
Irrigation pipe	
Meters	12,360
Longitudinal walls	
Meters (b)	2,090

Source: See Table 1.

Note: The DGCSFER has programmed 287 maintenance workers for 1987 to work 25 days a month each, for 10 months. The figure of 2,000 meters comes from a calculation of 2 cubic meters per linear meter. To withstand the force of a 20 year flood event, an average of 6 cubic meters is recommended. In that case, the linear measurement will be 667 meters. With a recommended average of 4 cubic meters applied to the volume proposed, the linear dimension will be 1171 meters.

The Directorate of Soil Conservation, Forestry and Rural Engineering within the Ministry of Rural Development and Fisheries has five coordinators responsible for the project work in the 14 watersheds on Santiago Island. Each coordinator works independently and is responsible to the head of the directorate. Coordinators have not had the formal or advanced academic training that would qualify them as professional hydraulic engineers. Nevertheless, they are familiar with the technical problems of soil and water conservation. Each has a direct and detailed knowledge of the watersheds for which he is responsible and training in conservation promotion.

During September and October, during the rainy season, the coordinators and engineers get together and plan the structures they propose to construct in each watershed. Included are the calculations of the workdays and materials needed for the coming year. These plans are for the current year only and are not related to an overall long-term watershed plan. The proposals do not include detailed geological information or topographical studies of the sites in question, nor drawings of the structures. The previous year's plan determines in large measure the allocation of money, material, labor and equipment to be needed among the coordinators and the watersheds. The next step in the planning process is when the directorate coordinates the proposals into an annual plan of activities. The plan must then receive the approval of the MDRP. The plan includes all the activities of the directorate, including projects funded from other sources and implemented in other areas.

The construction and planting season lasts from January through August. During this time, the coordinators inform the local civil authorities of their labor needs. A list of potential workers by communities and families are compiled and workers are assigned on the basis of the proximity to the work area and on the needs of each family. The men form the category of stone masons, and the women are the stone carriers, the men are paid more than the women. The crews vary in size. A typical crew has twenty or more workers, half of them are stone masons and half the stone carriers. In addition, there is a time-keeper and a foreman. Tools, materials and equipment are requested and delivered as needed. Heavy machinery is located and repaired at a central depot and moves from site to site under its own power. The heavy machinery is unavailable due to repairs approximately half the time.

3.2 Accomplishments and problems

The 1988 work plan (Table 3) anticipates that in three work seasons the structural outputs detailed in the project will be in place. Contour furrows are a notable exception. They were judged by planners to be unsuitable to the watersheds' steep

slopes. Another notable fact reflected in Tables 2 and 3 is the project's increasing emphasis on irrigation. However, reservoirs and irrigation canals do not appear as discrete project paper outputs and catchment dams and irrigation pipe are only peripherally mentioned.

The crew foremen receive verbal instructions from the coordinators as to the design, location and materials for each structure. The coordinators visit work sites often but the foremen are given only general rather than close supervision. As a result, the daily time and material sheets are often incomplete and sometimes in error.

The preceding describes the procedures of the crew hired by the coordinators and paid for with project funds. The results of community based work front appears in section seven.

The critique of the rural works component involves two principal concerns; (a) the quality and adequacy of the designs, materials and workmanship and, (b) the efficiency of the construction operations. The most important and significant fact is that the structures are not the result of careful on-site investigation and professional calculations. Their construction is guided by the work experience of non-professional supervisors. Dams and groins are generally well placed because the configurations of a stream bed are evident. Also, the amount and duration of the water flow is unknown. Therefore, the structures are either over or under-designed in relationship to the counter forces in the area. Evidence were observed of rigid dams built earlier on unstable subsoil which subsequently failed due to undermining by the hydrostatic pressure of the saturated soils upstream and by water flow at the base. The materials used are gabions, dry rock wall and rock mortar. Many of the structures therefore may lack data needed to implement the base structural designs and calculate safety factors. In the opinion of the counterpart team's hydraulic engineer at least 30 percent of structures built during the past eight years are in need of repair. These are located mainly in the Flamengos, Sao Miguel and Picos watersheds where a previous project was implemented from 1979-1983.

Also notable is an apparent lack of coordination within each of the project's watersheds and among the watersheds as a whole. The coordinators' proposals and structures appear to be insufficiently related to each other or to an over-all long-term plan. For example, a check dam is constructed and the upstream basin fills so rapidly that the coordinator proposes to heighten the dam. Are the foundations strong enough to carry the extra weight? The coordinators do not have the data needed to make that decision.

The preceding observations do not vitiate the project, but they strongly indicate the need for more data in the planning, design and operational phases.

3.3 Recommendations

(a) The Directorate should have a technical section headed by a professional hydraulic engineer, preferably a Cape Verdean, who is responsible for the quality and scheduling of the coordinators' work. This person would be a counterpart to the project's hydraulic engineer. Antonio Sabino, now studying in the U.S. on a M.A. degree in hydrology and irrigation will probably assume this responsibility upon his return to Cape Verde. The duties suggested for this position include:

- 1) The allocation of new construction and maintenance in the watersheds.
- 2) The type of structures needed in the upper as opposed to the lower watersheds.
- 3) The types of vegetative controls needed.
- 4) The design of the structures.
- 5) Collection and analysis of hydrology, geology and soils data for each site.
- 6) Control and scheduling of materials, machines and labor.

(b) The AID project manager should be involved in the development of the annual work plan to ascertain that it reflects the objectives of the project paper and its amendments. The project should continue the building of appropriate pathways or roads in the watersheds areas.

(c) Technical recommendations for improving the quality of structures are as follow:

- 1) Greater use of convex dams.
- 2) Less reliance on concrete and greater use of gabion wherever a dam rests on soil rather than rock.
- 3) Dams with upstream sloping structures.
- 4) Dam wings sloping toward the spillway.
- 5) Longitudinal embankments covered by gabions.
- 6) Greater use of a double layer of gabions as aprons to dissipate the water force on the spillway.
- 7) Installation of graded filters on the upstream faces of caption dams to filter and collect sediment free ground water
- 8) Low gabion walls connecting opposite groins.

(d) More attention should be paid in the identification, measurement, protection, and putting into cultivation the arable land created behind the dams.

(e) Priority should be given to completing those structures under construction and to maintenance and repair of the others damaged.

(f) The employment as soon as possible of a mechanic-operator to train Cape Verdeans in the operation and service of the heavy machinery and vehicles. This would reduce down-time on equipment

by at least 25 percent.

(g) More careful scheduling of the backhoe, dump trucks and bulldozers is needed to provide efficiency at the work sites.

(h) Visits to the field by foreman should be more frequent.

4. FORESTRY

4.1 Description and summary of activities

4.1.1 Procedures followed

The forestry team consisting of two silviculturists visited 8 of the 14 watersheds located in the north eastern half of Santiago Island. Nurseries, private plantings (home gardens), new and old plantations, land preparation areas and trial species sites were visited. The forestry consultant also went to the critical areas designated for afforestation located in Pico de Antonia and Serra de Malagueta.

Forestry, soil and water conservation matters related to the project were discussed with Sheladia forester Paul Theisen, national counterparts (coordinators), officials of the Forestry Division of the Ministry of Rural Development, FAO officials, cadre level staff, the heads of the nurseries, foremen, forest watchers, extension workers, controllers and farmers.

4.1.2 Objectives and organization of activities

The major objectives of the forestry component in the project paper can be summarized as follows: (a) to augment the physical structures with vegetative soil and water conservation methods, (b) to provide potential sources of fuelwood, fodder and other forest products for the rural population, (c) to support the coordination of research and extension in soil and water conservation and, (d) to create employment for the rural population.

4.1.3 Forestry Activities

The forestry component employs two principal biological methods: tree planting and the establishment of vegetative covers. Both involve local seed collection, species selection, nursery operations, planting site preparation, plantations, private planting, protection, mapping and applied silvicultural research. The forestry component also trained field personnel and provides extension support for community work fronts.

The project area has a variety of agro-ecological zones ranging from arid to humid. This results in a considerable variation in the establishment of plantations and forest management systems. Based on the weather patterns of Cape Verde, especially the quantity and distribution of rainfall, seedling production, site preparation and planting require careful planning and timely completion. The plantations also takes into account the scarcity of land available for agricultural purposes and the needs of the rural population for food, energy and fodder. These conditions influence the planting methods and the selection of species.

4.1.4 Nursery operations

Nursery operations are carried out from January to August of each year. They involve local seed collection, the filling of plastic bags (20 cm by 7 cm) with soil mixtures, the seeding of small fine seeds such as Atriplex and Eucalyptus in containers, the seeding of small or medium size seeds such as Prosopis in plastic bags. The tending, protection and transportation of seedlings to the field is all part of the nursery operation.

4.1.5 Planting site preparation

Planting site preparation is done from January to August of each year. Depending on soil conditions and surface relief, flat areas vs. steep slopes, the following structures are used:

(a) Caldeiras, crescent shaped micro-catchments, are built on contour lines and are supported by rock walls when these are available or simply by earthmounds. A tree seedling is planted in each micro-catchment. Each caldeira has the capacity to retain 80-100 mm of water flow from rainfall within a period of 24 hours. In general, each micro-catchment is designed to hold 2 to 3 cubic meters of reserve water.

(b) Banquetas em curva de nivel or contour furrows are ditches dug along the contour lines of hillsides. These ditches are designed to decrease runoff and erosion and to increase water infiltration and ground moisture in the vicinity of the ditch.

(c) Arretos or contour rock walls are built on the contour of steep slopes designed to stop soil erosion and increase rain water infiltration. They function the same as contour ditches but require less maintenance due to their rock masonry.

(d) Covas simples or simple pits are planting holes 60 x 60 x 60 cm.

4.1.6 Planting methods

The spacing of planting pits varies according to local topographic conditions and the availability of land for tree planting. The following spacing was used:

(a) In flat littoral and semi-arid zones where land was available for tree planting there is 5m x 5m between caldeiras.

(b) Contour planting in banquetas varies according to land use patterns, slope and to the density of old plantations of Prosopis and Parkinsonia. The following approximate spacing is used: 10m x 10m; 10m x 5m and, sometimes, 5m x 5m.

(c) Planting along arretos, normally built on the slopes of rainfed agriculture areas, does not follow predetermined spacing.

Trees are scattered on land holdings of the landowners or tenants.

(d) Simple pits are used for group plantings of the tops of ridges in humid and semi-humid zones. In humid zones spacing is 3m x 3m, in semi-humid zones, 5m x 5m.

(e) Tree planting and seeding of small size vegetative covers is done from August to September. Work begins shortly after the first rains and must be accomplished in a few days because the ground dries out rapidly.

4.1.7 Maintenance and protection

These operations provide protection from the competition of grasses and other undesirable vegetation. It includes repairs to the caldeiras (mini-catchments) and the early pruning of trees. The damage from accidental cutting during grass harvesting and by the browsing of domestic animals is monitored. Damage from grazing is said to be the major factor in seedling mortality. The forestry component uses forest watchers and cleaning work crews to accomplish these duties.

4.1.8 Private planting

Private planting is used as an indirect method to reduce deforestation. Once private plantings have been established people can begin to use them to meet their needs for fuelwood, fodder and food. There was some doubt about this strategy for tree planting and therefore was not emphasized during the first year. During the second year it was found that farmers were aware of the benefit to planting trees around their houses (home gardens), in small irrigated strips along the main valleys, on marginal slopes and ridge tops, and at the edges of their land holdings. Most of the trees planted have been for fuelwood. Next in number are fruit trees, and perennial crops used for food. There are two types of seedling distribution adopted by the project: trees planted by individual farmers and trees planted by work crews for maintenance.

4.1.9 Demonstration plots

In 1987 the forestry component conducted demonstration plots in collaboration with INIA as follows:

(a) Godim forage informal trial. This was a trial of various forage producing species which could be planted on the contours and would reinforce existing rock walls with a vegetative cover. Most of the species selected are nitrogen fixers. The species, Leucanea leucocephala var. Peru, Leucanea leucocephala var K8, Leucanea leucocephala var. cunningham, Sesbania sesban, Sesbania grandiflora and Parkinsonia aculeata were planted with a 2m

spacing on contour rock walls or arretos.

(b) Exposed coastal sites. These demonstration plots were established on a site near Santa Cruz. Species planted with 5m x 5m spacing were Acacia holosericea, Acacia bivenosa, Prosopis cinerea, and Acacia cyanophylla.

(c) Atriplex trial. This trial was designed to test atriplex species which have been used in other countries. The species planted were Atriplex canescens, Atriplex glauca, Atriplex lentiformis, Atriplex nummularia, Atriplex vesicaria, and Atriplex sagittifolia.

(d) Opuntia planting trial. This multi-purpose species was established to observe its performance in the degraded compacted soils of the coastal area where only atriplex will grow. Approximately 200 pads of Opuntia sp. (spineless cactus) were established on an exposed coastal site of Pedra Badejo.

4.1.10 Mapping

Field maps were prepared of nearly all planted areas in the various watersheds. The land survey is done after the planting season and is intended to identify both the areas planted and the forest resources of the project.

4.1.11 Forestry training

Two types of forestry training were conducted by the project. The formal training sessions were organized with the Forestry Division of the Ministry of Rural Development which trained 20 extensionists in 1986 in planting site preparation, nursery practices and planting techniques. Twenty extensionists were trained in 1987. A course for nursery foremen (women) was conducted in 1987. A tree planting demonstration for 50 participants was also conducted in 1987. Informal, on-the-spot training is provided during field inspections for the foremen responsible for the individual site preparation and for nursery workers as required.

4.1.12 Establishment of improved vegetative covers

The emphasis placed on biological methods is attested to by the increased cultivation of Congo Bean (Cajanus cajan). This perennial crop provides several products, a nutritious food grain with a 21% protein content, fodder and cooking fuel. It also serves as a biological means of erosion control. It has shown wide adaptability to various ecological conditions ranging from irrigated valleys to rocky ridge tops. It is also drought resistant and generally well accepted by farmers. Other perennial species used as ground covers were Jatropha sp. and Desmodium virgatum, a small shrub. Grass species used as ground

covers include Panicum sp., Sorghum sp., Sudan grass and millet. Propagation in nurseries and direct seeding in the field was done in 1986 and in 1987.

4.2 Accomplishments and problems

4.2.1 Revegetation

The following verifiable indicators measured project success in terms of revegetation and soil and water conservation measures.

(a) Tree planting. By the end of November 1987, a total of 1,218,628 tree seedlings had been planted in downstream areas and on the slopes of the 14 watersheds on Santiago Island. This figure included an estimated 582,988 seedlings in 1986 and 635,640 in 1987. These numbers correspond to 37% of all trees planted on Santiago Island in 1986 and to 44% of those planted in 1987 (Table 4). The number of seedlings planted by watershed is shown in Table 5. Progress against project paper targets is summarized in Table 6. From figures given in these tables it is apparent that the forestry component of the project is committed to an extensive reforestation effort on Santiago Island and is an important and integral component of the total soil and water conservation effort.

Table 4. Tree Seedlings Planted by the Watershed Development Project and by Other Projects, Number and Percent, Santiago Island, 1986 and 1987.

Project	Planted in 1986		Planted in 1987	
	Number	Percent	Number	Percent
Watershed Development	582,988	37.0	635,640	44.2
Community Rural Development (National Development Fund)				
Tarrafal	-.-	-.-	98,090	7.0
Santa Catarina	-.-	-.-	117,852	8.4
Santa Cruz	-.-	-.-	37,000	2.6
FAO Forestry Development Projects				
Belgian	571,386	35.8	273,714	19.4
European Economic Community	-.-	-.-	168,820	12.0
Praia Formosa Project, Swiss	-.-	-.-	38,057	2.7
Sao Joao Baptista Project, United Nations Sahel Office	-.-	-.-	22,901	1.6
Joao Valera Project, European Economic Community	-.-	-.-	29,690	2.1
Others	434,181	27.2	-.-	-.-
Total	1,588,555	100.0	1,421,764	100.0

Source: Sheladia Associates Quarterly and Annual Reports.

Table 5. Seedlings Planted, by Watershed, Number and Percent, Santiago Island, 1986 and 1987

Watershed	1986	1987	Total	Percent
Tarrafal SA	3,447	20,000	23,447	1.9
Tarrafal ST	138,460	107,211	245,671	20.1
Ribeira Cuba	26,123	54,390	80,513	6.6
Ribeira Principal	2,350	6,600	8,950	0.7
Sao Miguel	16,330	40,483	56,813	4.6
Flamengos	22,725	39,757	62,482	5.1
Salto	10,400	17,814	28,214	2.3
Santa Cruz	158,271	121,962	280,233	22.9
Picos (Jusante)	10,700	29,551	40,251	3.3
Ribeira Seca (Jusante)	41,378	29,405	70,783	5.8
Mangue	16,911	16,996	33,907	2.8
Picos (Montante)	40,373	53,983	94,356	7.7
Ribeira Seca (Montante)	42,761	43,607	86,368	7.1
Sao Domingos	14,700	15,579	30,279	2.5
Sao Francisco	7,201	6,137	13,338	1.1
Sao Tome	22,780	16,558	39,338	3.2
Cumba	11,400	15,507	26,907	2.2
Total	586,310	635,540	1,221,850	100.0

Source: Sheladia Associates Quarterly and Annual Reports.

Table 6. Vegetative Covers Planted and Seeded in the Watershed Project Area, Number, by Species, 1986 and 1987

Species	1986	1987	Total
Cajanus cajan			
Planted	5,730	10,755	16,485
Seeded (Kg)	105	871	976
Jathropa			
Seeded (Kg)	16	--	16

Source: Sheladia Associates

(b) Perennial and herbaceous vegetative covers. Since 1986 perennial crops and improved grasses have been extensively planted or seeded as ground covers to prevent soil erosion and as potential sources of fuelwood, fodder and food.

Cajanus cajan (pigeon pea or Congo bean) is the most important perennial crop planted or seeded by the project. The following distribution of Congo bean is reported for the project area as of November 1987.

Distribution of Congo Bean

Project Component	Planted	Kg of Seed
Forestry	16,485	976
Extension	8,700	1,000
Total	25,185	1,976

In addition, 16 kg of Jathropa seeds, and 66 kg of grass seeds have been established on an experimental basis within the project area (Table 6). Two hundred pads of opuntia were planted in the littoral of Santa Cruz. This work underscores the emphasis placed on biological conservation of the project.

4.2.2 Organization of tree seedling delivery

There are three kinds of tree seedling delivery which are appropriate for the future development of biological conservation and community forestry: (a) the planting of trees and other vegetative ground covers by project personnel, (b) the planting of trees and the seeding of vegetative cover by community based work fronts, and (c) the planting of trees, fruit trees and Congo bean seedlings by the farmers themselves.

Because of land use characteristics and the soil conditions of the project area these delivery systems have given rise to different plantation forms inside and outside of land holdings. Group plantings have been done in arid and semi-arid zones (coastal areas) with forest trees appropriate for exceptionally good rains. During the last two years farmers have planted traditional corn and bean crops between tree seedlings in rainfed agriculture areas (semi-arid to semi-humid zones) where private land holdings predominate. The following agro-forestry forms can be distinguished: (a) line tree plantations along

banquetas and arretos with corn and beans as agricultural crops (b) small group plantings on marginal slopes and ridge tops with some inter-cropping of congo beans and grasses (c) home gardens which consist of multi-purpose trees planted close to dwellings and, (d) tree planting along property lines so as to delimit land holdings.

4.2.3 Species planted

Major forestry species planted in 1986 and 1987 are given in Tables 7 and 8. It should be noted that under "other species" are included a number of experimental species. The following are considered promising for use under appropriate conditions in the project area: Acacia cyanophylla, Acacia bivenosa, Leucanea leucocephala, and Serbania grandiflora. Results of the tree planting by watershed are given in Table 5. The areas receiving the largest proportion of trees planted were Santa Cruz 23%, Tarrafal 12%, Ribeira Seca 12%, Cuba 7% and Flamengos 5%.

Table 7. Seedlings Planted, by Species, Number and Percent, Santiago Island, 1986 and 1987

Species	1986		1987	
	Number	Percent	Number	Percent
<i>Prosopis juliflora</i>	332,875	57.1	286,951	45.0
<i>Acacia holocericea</i>	101,182	17.3	126,304	19.9
<i>Parkinsonia aculeata</i>	96,703	16.6	69,171	10.9
<i>Atriplex</i> sp.	28,880	4.9	11,201	1.8
<i>Ziziphus mauritania</i>	2,321	0.4	11,432	1.8
<i>Melia azadirachta</i>	5,327	0.9	2,893	0.5
Other	15,700	2.7	127,688	20.1
Total	582,988	100.0	635,640	100.0

Source: Sheladia Associates Quarterly and Annual Reports.

Table 8. Number of Tree Seedlings Propagated in Nurseries of the Watershed Development Project Area, by Species, 1986 and 1987

Species	1986	1987	Total
Prosopis juliflora	313,690	338,614	652,304
A. holcericea	100,790	149,327	250,117
Parkinsonia	64,920	79,268	144,188
Atriplex	36,190	12,506	48,696
Melia	4,850	6,481	11,331
Ziziphus	2,650	13,481	13,131
Others	8,750	54,925	63,675
Total	531,840	654,602	1,186,442

Source: Sheladia Associates Quarterly and Annual Reports.

4.2.4 Nurseries

The number of seedlings produced in 1986 was 531,840. There were 15 permanent nurseries and 15 seasonal nurseries. Seedling production by individual nurseries varied from 2,370 to 64,050 plants, respectively. The number of seedlings produced in 1987 was 654,602. There were, in that year, 15 permanent and 26 seasonal nurseries (Table 9).

Table 9. Field Activities Targeted and Achieved, Santiago Island, 1986 and 1987 (a)

Activity	1986		1987		Achieved to date
	Target	Achieved	Target	Achieved	
Nurseries:					
Permanent	15	15	15	15	30
Seasonal	15	15	11	11	26
Tree seedlings produced	552,000	531,840	665,500	654,602	1,186,442
Trees planted	632,200	582,988	665,500	635,640	1,218,628
Vegetative covers:					
Number planted	-.-	5,730	-.-	10,755	16,485
Kg seeded	-.-	121	-.-	923	1,044
Fruit tree seedlings distributed	-.-	-.-	-.-	1,360	1,360
Seedlings distributed to community based work fronts	-.-	-.-	43,300	34,543	34,543
Demonstration plots	-.-	-.-	-.-	4	4
Training courses:					
Nursery operations	-.-	1	-.-	1	2
Site preparation	15	15	15	15	30
Planting techniques	-.-	1	-.-	1	2
Permanent workers:					
Nursery heads	15	15	15	15	15
Tending workers	-.-	-.-	40	30	30
Forest workers			63	45	45
Seasonal workers: (half year) (b)	-.-	-.-	3,718	1,260	1,260

Source: Sheladia Associates

(a) As of November 30, 1987.

(b) There was not a detailed manpower plan for 1986

of the six permanent nurseries visited, four had a good standard and two had a fair standard. None of these nurseries had tree seedlings when visited because the nursery season was over. Therefore, the quality of work has been assessed by the results of tree seedlings planted and information found in quarterly reports.

Late planting of many species resulted in small, unhealthy planting stock.

The use of large plastic bags, 20cm x 10cm, makes the transportation of seedlings from nursery to plantation sites difficult. Generally, seedlings are carried in cans on the heads of women. Because of this large size, they can deliver only a few plants in the cans at one time.

4.2.5 Site preparation

In general good progress has been made in site preparation structures for tree planting. These structures impede water runoff, control soil erosion and replenish ground water. Data on site preparation structures is given in Table 10. These data substantiate that correct site preparation has helped the good performance of the trees planted in them.

Table 10. Number of Micro-catchments, Contour Furrows and Pits Built in Project Area, 1986 and 1987

Year	Micro-catchments	Contour Furrows	Pits
1986	93,500	517,182	580,580
1987	189,188	76,682	558,150
Total	282,688	593,864	1,138,730

Source: Sheladia Associates Quarterly and Annual Reports.

4.2.6 The impact of trees on watershed environment and farming systems

Although the effectiveness of trees and other perennial vegetative covers on soil and water conservation are difficult to quantify, for this evaluation benefits can be assessed qualitatively. Tree cover assisted in the maintenance of physical structures. Trees and other perennial planted along the contour ditches and contour rock walls helped to stabilize the steep slopes. They also reduced soil erosion and slowed water runoff.

Trees, especially such nitrogen fixing trees as Acacia albida, and other perennials are generally believed to have direct positive effects on agricultural production. The combination of trees with agricultural crops offered farmers multiple domestic uses.

The integration of trees with agricultural crops is important in rainfed areas where the establishment of a permanent vegetative cover accomplished two purposes:

(a) technical objectives such as erosion control and improvement of production and,

(b) organizational objectives such as farmer participation in tree planting and overall motivation for soil and water conservation.

4.2.7 Field supervision and work organization

Field activities were initiated and carried out by technical officers or coordinators who received direction and guidance from the Directorate of Soil Conservation, Forestry and Rural Engineering. The staff engineer-technician planned and supervised the maintenance and construction of physical structures and other rural work programs. Due to the many demands of the watershed management activities the technical officers are unable to provide the supervision that is needed in the forestry and field areas. Trained and skilled forestry personnel (controllers and foremen) are needed. Labor force shortages have handicapped the implementation of land site preparation and tree planting. If the gains made to date are to be consolidated this labor shortage must be resolved. This can be accomplished by providing additional training to coordinators, controllers, foremen and workers and by providing directives for ensuring local participation.

4.2.8 Seed requirements and species selection

Difficulties associated with seed procurement limits areas being planted and reduces the diversity of species available to plant. These difficulties are found at both the national and local

level. It is generally realized by the Forestry Division of the Ministry of Rural Development that there is not an in country seed bank that is able to collect seed, to coordinate and arrange for the purchase of seed from outside Cape Verde, and to clean, fumigate and correctly store seed until it is needed.

4.2.9 Planting

Unless one watches the pitting and planting being done, it is difficult to assess the quality of the work. It can only be judged by survival and by the visible presence of a healthy young plantation three to five years after planting. Planting operations so far undertaken were done prior to the evaluation mission. The planting achievements and the techniques used were very suitable. The following points require attention:

- (a) Seedlings were still in their planting pots in Sao Miguel.
- (b) Poor quality and small size of seedlings planted in Tarrafal.
- (c) Patches of terrain left without any plantings as was observed in Tarrafal.
- (d) Grazing, especially in the absence of forest watchers, is a general problem in all areas visited.
- (e) Lack of weeding and maintenance in most of the areas that were visited.
- (f) Climactic factors, especially insufficient rain, make the scheduling of planting difficult. Labor shortages at planting time have hampered achievements in 1986 and 1987.
- (g) A number of technical and organizational issues that hamper success in some watersheds in particular, Sao Miguel, Flamengos, and Saltos, were identified by Sheladia in 1986. The main problems were lack of trucks, crew organization, rough handling of plants during transport, planting more than one tree per pit, and planting seedlings without removing the plastic nursery bags. Some of these problems were solved in 1987 but others still need a solution.
- (h) Transportation of seedlings in pans on the heads of the women to the planting sites is a laborious and costly task.

Many of the conditions mentioned above are due to either the lack of labor when it is needed or, to the need for revised implementation plans.

4.2.10 Harvesting of forest products

Although it is too early to assess the project's impact on farmers' forests and resource use patterns, positive trends were noted in the course of field visits. Tree plantations have increased the availability of fuel and fodder close to the farmers' houses. Thin branches, root-stems, root trailers and dead shrubs for firewood and fresh leaves and twigs for fodder have been harvested. The increased availability of grasses, a secondary benefit, has been important to local communities. The collection of grasses has already generated a positive response from families living close to plantation areas.

During field visits an increase in stall feeding, at least during the cropping season, was noted, contributing an incentive to control grazing on nearby plantations.

4.2.11 Technical assistance

The technical assistance for the forestry program provided by Sheladia Associates has been very effective. Cooperation between expatriate staff and national staff working on the project has been productive at every level.

Forestry advisor Paul A. Theisen arrived in Cape Verde on January 8, 1986 and has been in charge of the implementation of project forestry activities since then. As of November 30, 1986 his accomplishments included:

- (a) the timely submittal of quarterly reports,
- (b) held frequent meetings with the coordinators to discuss technical problems,
- (c) assisted national staff in the formulation of forestry plan activities for 1987 and 1988 and,
- (d) made weekly or more frequent field trips if necessary, to assist field staff in the implementation of forestry activities. During these field trips informal, on-the-spot training was given to the workers in nursery operations, site preparation and planting. He was instrumental in the establishment of demonstration plots with multi-purpose forest species in different ecological conditions of the project area. During the 1987 monthly meetings with the national project staff he presented reports of forestry activities.

4.2.12 Constraints

Several constraints impede the contribution of forestry to the project area. They fall under three categories which require attention during the remainder of the project.

Technical.

(a) Plan of work. The project paper is an imperfect working document with regard to the implementation of the forestry component.

(b) Poor quality of seedlings are often caused by water scarcity, transportation problems and poorly timed seeding schedules.

(c) Lack of quantitative data needed to evaluate the impact of biological methods on soil and water conservation and agricultural production. It is difficult to measure the farmers' perception of the benefits of forest resources. Additional data is needed to chose the tree species that are suitable for specific localities and communities. There is also a need for harvesting technology and improved seed collection and seedling transportation methods.

Institutional.

(a) Shortages of adequate amounts of labor when needed, particularly for site preparation and planting.

(b) Frequent changes of forestry trained foremen.

(c) Need for improved quality/quantity of training at all levels.

(d) Need for better supervision of field operations. (e) Need for incentives for field workers during the planting season.

Social.

Social constrains are those that limit the participation of local people. While there is some understanding and motivation on the part of villagers for private planting, they do not have a full appreciation of the benefits of tree planting. Some of these constraints:

(a) Loss of grazing land.

(b) Most farmers have small amounts of arable land and many rent or sharecrop. This adversely affects tree planting.

(c) The ownership of trees by private farmers and the right to benefit from them are not covered in forest legislation.

(d) A tendency for the accelerated deforestation of lands resulting from harmful methods of harvesting which remove all biomass, including roots. This is a direct consequence of the villagers' needs for fuelwood and fodder.

4.2.13 Summary

The project has the nucleus of its field operations in place. Staff have been appointed, methods of work devised and reforestation has begun to show encouraging results in seedling production, tree planting on bare land, on land holdings and along physical structures such as contour furrows and rock walls. Other accomplishments relate to private planting, direct seeding of small size perennial, improved fodder grasses and the introduction of multipurpose species.

Early evidence suggests that the use of biological methods as a complement to soil and water conservation has had a marked effect on reducing runoff from heavy rains, controlling soil erosion, and stabilizing physical structures built on the side slopes or in the valleys. A positive factor is the commitment of the forestry component of the project to creating basic conditions for community forestry. There are encouraging signs of the awareness of local people of the benefits of tree planting.

The approach being developed through the forestry component is appropriate to the ecological and socio-economic conditions prevailing in the project area. The experience of the project in developing nurseries, staff, and other elements of project infrastructure and in meeting production targets is also positive. The importance of this component lies in its commitment to creating basic conditions for community forestry development. The achievement of annual targets has been adversely affected by constraints which need to be solved during the remaining life of the project. The volume of work will increase rapidly creating new problems. Progress will need to be monitored periodically.

4.3 Recommendations

The many positive achievements of the project have been affected by technical, institutional and social constraints. On the basis of progress to date and taking these constraints into consideration, the following actions are recommended:

4.3.1 Community forestry

(a) Set objectives and targets according to a new approach directed to the development of community forestry which will promote the involvement of villagers in watershed conservation and train local leaders and the present staff of the forestry component in community forestry practices.

(b) Introduce family-operated nurseries along with encouraging private planting.

(c) Develop community forestry systems on farms in rainfed areas as well as in valleys.

(d) Introduce management plans tailored to specific groups of farmer's needs within a subwatershed on an experimental basis under the direction of local forestry committees.

(e) Develop applied forestry research oriented to community forestry development.

(f) Provide formal training at the M.S. and B.S. levels in community or social forestry.

(g) Seek introduction of land reform measures and modification of forestry legislation to support, motivate and involve villagers in watershed conservation.

4.3.2 Field supervision and work organization

Field activities are initiated by coordinators who receive direction and guidance from the Forestry Division of the Ministry of Rural Development. This staff (engineer-technician) must plan and oversee the maintenance and construction of physical structures and other rural work programs. They are frequently overworked with watershed management and provide less supervision than is desirable. Trained and skilled forestry personnel (controllers and foremen) are needed. Labor force shortages have limited the implementation of major activities such as site preparation and tree planting.

In order to consolidate the gains made to date these constraints should be removed. This can be accomplished by providing additional training for coordinators, controllers, foremen and workers and the development of directives for ensuring local participation.

4.3.3 Nurseries

An increased effort is needed to teach nursery operations and planning to the head of the nursery to increase their effectiveness and enable them to undertake the responsibility of seedling production. These plans should include timely seed collection, the species to be collected, the cleaning and storage of seeds, and the raising of an adequate number of seedlings for plantations and private planting.

4.3.4 Species selection

Present production of seedlings in the nurseries suggests that the project is going to expand the number of species yearly. In 1986 the number of species grown in the nurseries ranged from 1 to 6. In 1987 the number ranged from 2 to 10. Not all these species are of sufficient benefit or even sufficient demand to warrant inclusion in planting programs. There is a need to find

the right species for the sites. Failures should be limited in the initial phases of tree planting programs because they are very discouraging. The assessment of failure of species should be determined through research or by introducing them in the planting program only after rigorous testing.

Selection of species should be governed by consumer preferences, watershed protection potential and ecological conditions of the site. There are some species tolerant to difficult sites which are also preferred by farmers. For example, Prosopia juliflora, Acacia holocericea, Parkinsonia aculeata, Melia azedarachta, Ziziphus mauritania, Atriplex halimus and Cajanus cajan. The use of other species should be encouraged after testing in demonstration plots.

A prime objective of the project is to reforest bare land as quickly as possible in order to protect the watershed. Although of less immediate benefit to the villagers, this objective gradually improves water quality, stabilizes steep slopes and moderates runoff. The restoration process is lengthy. Considerable attention should be given to the species listed above which are capable of being established on highly degraded land. Once an initial cover of hardy species is established other stages in the restoration process are possible.

4.3.5 Fruit and medicinal species

The forestry component has the capacity to provide for private plantings of fruit trees, medicinal trees and, possibly, plants which provide raw materials for cottage industries, for example, jatropha seeds for soap industries and opuntia for cosmetic industries. More research is required to evaluate species and if they are of sufficient benefit to be incorporated into project plans. However, the prime objectives of the forestry component to generate fuelwood and fodder should not be lost.

4.3.6 Plantation establishment

Random checks revealed that plant survival varies from one site to another. A suitable method for detecting the causes of seedling mortality and to plan seedling production needs to be developed.

4.3.7 Maintenance and protection

Responsibility for these tasks lies with work crews and forest watchers. In most areas visited, weeding around trees was inadequate and animals were allowed to browse. Fencing around plantations should be considered in the light of costs, local cooperation and the availability of local materials. Live hedges could also be used. The project paper does not anticipate the need for labor and materials to fence the planted areas. Consequently,

provision is needed for fencing demonstration plots and for some changes in the use of forest fuels to promote effective participation of farmers and communities in tree planting and protection. An additional measure would be to replace forest watchers with forest workers who would both protect the area from grazing animals and cultivate the seedlings planted.

4.3.8 Seedling distribution

The initial response of farmers to seedling distribution was good. Discussions with the staff and with farmers in the field revealed a strong potential for agro-forestry. Therefore, agro-forestry systems that are feasible for the land holdings should be assessed in order to formulate a seedling distribution program. This action is needed to increase the effectiveness of the project and to improve seed procurement, nursery establishment, training and extension.

4.3.9 Mapping

Mapping should be done before starting major activities. This tool is most useful for planning planting and management programs. It is important that steps be taken to accomplish this task.

4.3.10 Harvesting of forest products

Applied research on harvesting techniques is needed. An effective means to extend local awareness and involvement is the formation of management committees and plans which will produce visible benefits from the plantations.

The implementation of management plans require the amendment of provisions of forest legislation to regulate the harvesting of forest products by villagers. Forest legislation presently excludes private landowners or communities from tree ownership and prohibits villagers from pruning and thinning trees on their own initiative. For these tasks legal authorization is needed. These rules have negative repercussions on the motivation of villagers and communities for planting trees.

4.3.11 Research

It was intended that forestry research to support project goals would have been done by INIA, the National Institute of Agrarian Research. However, INIA lacks staff and resources for this purpose.

A community forestry field research plan and action to implement it are needed. Some preliminary silvicultural research is being conducted to test species in different ecological conditions. This work is a good start and a training exercise for future programs and should be continued.

4.3.12 Forestry training

Training has been provided within country for extensionists, foremen and nursery heads through short courses and informal on-the-spot instruction. However, more training is needed. There is a need to improve the quality of training and for an adequate program of continuing education at the professional level.

4.3.13 Upstream biological work in Pico de Antonia and Serra Malagueta

The overall recommendation has been to postpone work in these areas until work in the areas of current operation have been successfully consolidated. However, when it is determined that activities should be initiated, the following discussion is relevant. The consultant and the Sheladia forester held several discussions with Forestry Division staff about forestry activities to be developed in the Pico de Antonia and Serra Malagueta areas. They visited those areas. The main recommendations are as follows:

(a) For the remainder of the project greater attention should be paid to upstream work using biological methods in the watersheds directly influenced by the Pico de Antonia and Serra Malagueta. The treatment of these areas, using vegetative methods should have the following objectives: to decrease rainfall runoff and sediment transport, to preserve agricultural lands and to reduce downstream capital investments for flood control and siltation, to meet the needs of farmers and communities established in these areas for fuelwood, fodder and food and to improve agricultural production through intercropping with multi-purpose tree species, especially nitrogen fixing trees.

(b) The following upstream watersheds within the project area are influenced by Serra Malagueta: Cuba, Tarrafal, Flamengos, Sao Miguel and Principal. Pico de antonia influences Picos and Santa Cruz. Taking into account logistic advantages such as the availability of labor, accessibility by road, motivation of villagers in terms of the need for fuelwood and fodder, the following upstream areas are appropriate: Boa Entrada, Santa Cruz watershed; Furna and Pingo de Chuva, Flamengos watershed; Corral de Asno, Cuba watershed and the upstream of Principal watershed.

(c) The following plantation methods for treatment of soil and water conservation take into account topographic conditions and land use: small group plantations on bare land; agro-forestry methods on land holdings; and protection of the uppermost slopes in less accessible areas.

(d) The following species for which villagers have expressed a preference are recommended: Prosopis juliflora, Acacia holoceric-

ea, Melia azedarach, Ziziphus mauritania, Leucanea leucocephala, Cajanus cajan and fruit trees.

4.3.14 Goals and targets

Project goals need to be more flexible. Consideration should be given to the organization of a pilot community forestry program to contribute to the development of rural communities. The goals behind this approach are to:

(a) Help communities establish a process of self-development through strengthening local institutions.

(b) Promote the involvement of community members through group action in undertaking conservation activities and, therefore, forestry activities.

(c) Encourage local leaders and community members to achieve common goals and solve common problems.

(d) Increase income and improve standards of living.

To attain these goals new proposals for reforestation oriented towards the development of community forestry should be realistic with regard to present project capabilities. They should recognize that any significant improvements of ecological conditions and forest conservation will come from healthy trees established and cared for on bare land and from private tree plantings by farmers on their own land. Success will also depend on the adoption by field foresters of an extension and advisory role in their relations with farmers.

Some of the major objectives of the forestry component of the project are in the annual program for 1987. They need some refinements to perform as expected. The following objectives and targets should be considered:

(a) Setting targets for community work fronts per watershed.

(b) Setting targets for tree planting and other perennial vegetative covers, especially for Cajanus cajan. These targets could be realistically set by the coordinators of each watershed in cooperation with the project forestry unit.

(c) Setting targets for nurseries. Family nurseries should be considered for those areas where there is a strong demand for private planting.

(d) Setting targets for seedling distribution.

(e) Setting targets for agro-forestry models on two or three farms which would be used for demonstration and extension purposes.

(e) Setting targets for training and extension activities.

(f) The ultimate objective should be the management of the plantations established in each watershed. This process will need to be spread over a number of years. A realistic goal on an experimental basis would be the preparation of six management or operational plans spread over a three year period. Adequate training in surveying and better equipment needs to be provided for each extensionist.

4.3.15 Technical operations

The present aim should be to support the permanent nurseries and to relocate some nurseries closer to plantation sites. A large number of small family nurseries should be established by renting private farm land and engaging family members as nursery laborers. This would expand seedling production, ease transportation problems, create employment and act as an extension promotion tool. Greater attention should be paid to:

(a) Preparing a nursery operations plan to include timing schedules for seed collection, seed treatment, soil mixtures, potting, sowing, caring for and selection of stock.

(b) Teaching nursery heads to make operation plans and enable them to obtain high quality vigorous stock.

(c) Obtaining good quality seed of suitable species and placing more reliance on well known species.

(d) Providing family nurseries with adequate materials such as plastic bags, seeds, fertilizers, watering equipment and technical assistance.

(e) Protecting nursery sites from animals such as goats and from seed destroying agents.

(f) Providing closer supervision and on-the-spot training.

4.3.16 Planting practices and protection

In light of the constraints on tree planting the following actions are recommended:

Planting practices:

(a) Prepare plans for planting on the few rainy days to include organizing crews and transporting plants before the rains.

(b) The standard of planting should be improved by placing the supervision of day-to-day work on the coordinators and con-

trollers. The foremen should be adequately instructed in this work by the controllers.

(c) Records of planting by species should also be kept by the foremen under the supervision of the controller.

(d) Planting and seeding of short rotation perennial such as Cajanus cajan, Leucuceana leucocephala, Desmanthus virgatus should be encouraged, especially for the protection of steep slopes and sites that are marginal for agricultural production and, as a source of fodder and fuelwood. Seeding of improved fodder grasses should be encouraged within the plantations and adjacent marginal lands.

(e) Plantings of untried species should be supported by adequate trial data.

(f) Seedling survival should be monitored in order to assess plantation performance.

Protection:

(a) Allocation of funds for fencing demonstration plots and protecting of strategic boundaries.

(b) Promotion of the involvement of villagers in grazing control through community management organizations. Grazing control can have the multiple benefit of protecting tree seedlings reducing erosion, and contributing to increased animal production.

(c) Providing follow-up maintenance of plantations by the forest watchers and work crews through cleaning operations such as hosing or cultivation (early pruning).

(d) Preparing publicity materials about the importance of the plantation to the community and to farmers.

(e) Providing incentives for the maintenance of physical structures built on side slopes.

4.3.17 Private planting

In order to encourage private planting by farmers the following trials and demonstrations should be undertaken:

(a) Increase free seedling distribution for private planting. Technical assistance and training of villagers should be provided in site selection, planting methods and care after planting. Records of private planting should be kept by controllers and nursery heads.

(b) Develop agro-forestry systems as a sound use of farm lands,

assessing the agro-forestry methods such as single tree planting, line or row plantings, group planting, home gardens and edge planting; improving these methods in terms of spacing, mixtures, intercropping multi-purpose species with annual and perennial crops and, management practices such as pollarding, lopping and coppicing; assessing sylvo-pastoral systems and introducing management systems such as stall feeding.

The areas selected for these trials must be easily accessible to fulfill the demonstration purpose. Since the demonstration is on private land, the owners may either be convinced of the benefits of the planting or be given trees as incentives. Data on crops tilled with trees and without trees can be collected to show whether the combinations have any undesirable effects.

4.3.18 Forest management plans

Because grazing problems and the tendency of harmful methods of fuelwood harvesting by villagers contribute to deforestation, work should begin with the forest management of critical areas of the watersheds. The adoption of a management plan for the forest area would serve two purposes:

- (a) it would inform the local people and communities about the benefits of community forestry and provide a feeling of participation among the villagers, and
- (b) regulate the use of forest resources.

Initially, the management plans devised should be as simple as possible. The principal technical procedures are: (a) mapping which will cover the entire area of the village or group of villages involved in community forestry, (b) making a physical demarcation of the boundaries of working areas of their subdivision into compartments, (c) making an appraisal of the forest resources contained in each compartment, (d) drawing up utilization plans and planting programs and, (e) adoption of management methods after discussion with and consent of the villagers.

4.3.19 Management committees

Community based work fronts operate within the project area. However, this organization is not yet committed to the maintenance and repair of the structures built on their land. Community participation should be broadened to include other members of the community and local leaders on a management committee. The formation of forestry committees require plans which will lead to concrete benefits from the management of forest resources. Therefore, in promoting involvement in watershed conservation, priority should be given to making these plans and committees functional during the remainder of the project.

4.3.20 Research

To strengthen research support for the forestry component of the project the following need to be explored:

- (a) Methodology to evaluate the effect of biological methods of soil and water conservation on agricultural production.
- (b) Estimates of productivity in plantations of short rotation perennial vegetative covers.
- (c) Methods of harvesting in plantations.
- (d) Development of agro-forestry and silvo-pastoral systems.
- (e) Devising seedling containers of an appropriate size.
- (f) Development of adequate means for the transportation of seedlings.
- (g) Forestry species priorities for rainfed areas.
- (h) Collection, storage and treatment of high quality seeds.

4.3.21 Upstream biological work

Priority should be given to extending biological methods to the upstream areas of the following watersheds: Cuba, Santa Cruz, Tarrafal, Flamengos, Sao Miguel, Principal and Picos. These watersheds are under the direct influence of Pico de Antonia and Serra Malagueta.

4.3.22 Forest policy

More training is needed for extensionists, mid-level supervisors (foremen, nursery heads, forest watchers and local leaders) in community and forestry issues. Training should also be provided for coordinators and controllers.

A new policy supporting community forestry activities should be formulated that would adopt simple procedures for the transfer of forest lands to any village with terms and conditions for reforestation and forest management prescribed that would ensure that villages or communities receive equitable benefits.

4.3.23 Technical assistance and training

Additional technical assistance and training are needed consisting of:

- (a) Extension of the Sheladia forestry program for 12 months to

support evaluation and impact studies.

(b) A two year fellowship for an M.S. degree in social forestry emphasizing applied silvicultural research. This person will be attached to INIA to support the forestry research program.

(c) Five scholarships at the B.S. level in social forestry.

(d) Consultancies in forest management and training, 3 months; forest legislation, 2 months, agro-forestry and extension, 3 months.

5. RURAL ASSISTANCE PROGRAM

5.1 Description and summary of activities

The Rural Assistance Program (RAP) was initiated as an activity of the Watershed Management Project (1981-1985), a predecessor of the WDP.

5.1.1 Structure

The RAP comes under the overall coordinator for the WDP for the GOCV, the Director of the Directorate General of Soil Conservation, Forestry and Rural Engineering (DGSCFER). An overall RAP coordinator for watersheds is over five coordinators responsible for all 15 project target watersheds. The RAP hires two extensionists per target watershed, generally one male one female, from each community. A total of 22 were functioning at the time of the evaluation. After training, they work in their own communities. Community-based work fronts (crews) provide the labor for construction of physical structures for soil and water conservation and planting of trees and other plants for erosion control.

5.1.2 Community-Based Work Fronts (CBWF)

Community-based work fronts are one of the most valuable creations of this project. The CBWFs are generally composed of persons who belong to land-owning households located in the community in which the work is to be performed. Only one member of a household may work in a work front at any one time; the average size of a work front is 30 persons. There may be more than one front in a community when conditions warrant.

Because members of the work front live and own land in the community, it is assumed that when they build structures they are enhancing the value of the land they own. This circumstance is expected to provide motivation for work on the building of the structures and to encourage persons to look after the maintenance and repair of the structures on their own initiative.

Each work front has a governing committee (Comissao de Gestao or crew chiefs) consisting of three persons elected by the members of the work front. These work crews operate under the guidance of the male extensionist, who answers to a coordinator of soil and water conservation and forestry who, in turn, answers to the director of the DGSCFER.

Payment to work front personnel is made by the MDRP (Ministry of Rural Development and Fisheries) using funds generated by the PL 480 program. The pay scale is 105 escudos a day for laborers (whether male or female) and 135 escudos for members of the governing committee (crew chiefs). One day's wages of every

week's pay is set aside in an individual savings plan. To be used as nest egg for rural savings/credit organizations.

Crews work from about February 1 to July 31. When the planting season begins in August, work ceases so the workers may cultivate their own crops. Work crews are composed of both men and women.

For years the MDRP (Ministry of Rural Development and Fisheries) has utilized traditional work fronts. These teams are wage labor hired to perform public service to construct check dams, plant trees, etc. While traditional work fronts also have a limitation of employment to one member of a household, they do not necessarily work in the community in which they live and do not work on land which they or other members of the crew may own. The normal fronts are composed of about the same number of persons as the community fronts, but are more highly stratified. The daily rate for common laborers is 90 escudos (women) to 105 (men). Stonemasons earn 165 and crew chiefs 270. (Gender-based pay differential does not apply on community work fronts; all earn the same.)

An important criterion for membership on either community or traditional work fronts is need. Other things being equal, families that are considered to be the neediest have priority for participation on the work fronts.

When a resident of the area cannot participate in the work front he/she may solicit that work be done on his or her land. He/she makes up for the improvement on the land by working at another time or by hiring labor to work on the land of others. This is a variation of the traditional mutual aid or "djunta mao" long practiced in Cape Verde.

The crew chiefs are expected to have some technical knowledge, keep payrolls and make payments, oversee attendance and discipline and work with the extensionist. They are elected to their positions.

5.1.3 Rural Assistance Extension

Candidates for extension training under the RAP were selected by community leaders and given simple tests. Of the 25 tested, 20 passed and were sent to be trained in Tarrafal and at INIA (the National Agricultural Research Center at Sao Jorge). There are two RAP extensionists in each watershed served by the project, one male and one female. Approximately two weeks of training were given at each location. For the male, extensionist training was principally in soil and water conservation structures and in agriculture; for the female extensionist, in home economics, hygiene and agriculture. Extensionists are expected to be literate and to be able to keep records of various kinds.

The extensionist plans the building of contour rock wall terraces and other structures (contour furrows, "calderas") and is the principal source of technical advice concerning these matters. They are the link between the coordinators and the work crew chiefs. The coordinators are principally concerned with outcomes while the extensionists deal with project execution. The work of the extensionists is critical to the success of the program.

5.2 Accomplishments and problems

The concept of recruiting (1) extension workers from the community in which they are to work and (2) work crews from land-owning families who live in the area in which the work is to be done is sound. Ideally, this approach will assure commitment, community support and effectiveness. Extension workers who are friends and neighbors of those with whom they work will be more believable and more effective than extension workers who come in from the outside. Laborers can be expected to work with greater enthusiasm and expend more effort on work that benefits them and their families.

In practice a number of factors can interfere to create a less than ideal situation. Owners of land located in the community may live at some distance from the community. Share cropping (common in Cape Verde), may account for a significant fraction of the agricultural land located in the community. There may not be enough land-owning families living in the community for a community based work front to be very meaningful and for the extension worker to be fully effective. Communities that are near urban centers, particularly Praia, may not be able to put together a community based work front because of wage competition with the city where daily wages may be two or three times higher.

In one instance, the members of the governing committee of the community work crew were also the persons constituting the community committee or Comissao de Moradores. The model requires that the governing committee of the work front be distinct from the comissao de moradores. However, it was stated that the members of the work crew preferred this arrangement because of the great confidence they place in the individuals in question. It was not possible to verify this statement.

In this same instance a significant number of the members of the work front were not landowners. To this extent it approached the organizational characteristics of the traditional work fronts (as opposed to community based fronts).

In one community, the community based work front has spent the entire season building a retaining wall to contain a landslide threatening a number of houses in the community. Consequently no work had been done on soil and water conservation structures, although some trees had been planted. While the work performed

was needed and probably urgent, no progress was made in works for soil and water conservation this year.

Extensionists keep a record book which notes days of labor and work performed (number of trees planted during the year, length of rock wall terraces constructed, etc.) Female extensionists appeared to be well acquainted with the health problems of the community and able to provide guidance in elementary matters of hygiene and health care. In only one instance was there a complaint that payments to the work front laborers were late.

Members of the communities perceive the work fronts as being an opportunity to earn income and make improvements on their land. They believe that work on rock wall terraces and calderas is more important than upper watershed reforestation because the benefits are readily perceived and are immediate while the benefits of reforestation are less obvious and are delayed. This generalization does not necessarily apply to on-farm planting of trees for individual use.

During the evaluation period (November) no community based work fronts were in operation because most members own land and were actively engaged in agricultural activities. There was general agreement, however that work was performed diligently and well. If true, this stands in sharp contrast to the traditional work fronts observed.

One traditional front was at work at the mouth of a ribeira gathering rocks for the construction of a check dam. Eight persons were present. One was a watchman who only guarded materials/supplies that had been brought to the locale. Of the remaining seven, two were crew chiefs who were supervising and five were actually working. The crew chiefs, both men, were paid 185 escudos a day. The gender pay differential was supported by both men and women as being just because men do more work. Yet, observation of the work being done left no doubt that the women typically carry more rocks than the men. This work front has 28 members, but 20 were absent on this day. The reasons given (but not verified) were that (1) workers can obtain better pay elsewhere, and (2) payments for labor done was several months late and workers needed immediate cash.

Another traditional work front was seen working on construction of a salt water intrusion dam. There were two water carriers (both women), 13 stonemasons, two crew chiefs, one guard and ten laborers on the crew. Ten were absent at the time of the visit. Of the 18 who were present seven were actually laboring. The guard and two water carriers were not working at the time. Eight were engaged in a discussion or merely standing around. An examination of the payroll indicated frequent absences (partially caused by late payment of laborers so that they seek other employment which has more dependable pay, returning to the work

front when no other work is available). The significance of absence because of farming responsibilities was not assessed. Female workers were paid 90 escudos, male workers 105, stone-masons 165, crew chiefs 270. This crew, if all were present would be paid a total of 4,020 escudos for a day's work.

A community based work front having 28 members would be paid 3,000 escudos a day. The "normal" front would cost 34 percent more than the community based front. When differences in labor productivity are taken into account the real differential must exceed 50 percent.

Thomas Gardiner, in his report compares community and traditional work fronts in table form (Table 11).

Table 11. Summary Comparison of Community With Traditional Work Fronts

Characteristics	Community	Traditional
1. Benefits to workers	salary plus SWC works built on lands they cultivate	salary only
2. # hours worked per day	7.5 - 8	variable-less than 7
3. Avg. salary	105\$00/day	120\$00/day
4. Crew Foreman	elected by group	designated by MDRP
5. Productivity in CRWT construction (m ³ /person/day)	0,69 m 3/day	?
6. Individual savings program	yes	no
7. Technical assistance	usually on daily bases by RAP extensionist	
8. Quality control	follow up by RAP personnel	?
9. When salaries paid	one week after last month worked	1 month after last month worked
10. Work Plan decisions	consensus between RAP Ext. and local	top-down from MDRP
11. Whose land treated	workers own dryland cropping areas	usually on state lands others
12. Where participants work	usually within 1km of home	usually away from home (3-6km walk)
13. Piece work allowed	only on micro basin construction	many jobs, but not all
14. Task best suited for	construction of CRWT	construction of large check dams

The RAP works better in some places and in some circumstances than in others but, overall, may be considered a success. It is certainly a better strategy for accomplishing work in soil and water conservation than the traditional work crews. It has the potential for continued community based support for projects, the willingness of members of the community to maintain the erosion control and water control structures in good repair on their own initiative, and improved agricultural and health practices.

5.3 Recommendations

The RAP should be continued and strengthened. This can be accomplished by:

- a. Continuing education and training in extension techniques;
- b. Expansion of the RAP into watershed areas where favorable conditions exist for their effective operation;
- c. Reduction or elimination of activities in watersheds where favorable conditions do not exist or where for other reasons (labor competition, for instance) the RAP faces serious handicaps.
- d. Provision for training members of the governing committee in the purposes and management of the individual savings plan with the goal of eventually establishing credit cooperatives in the committees served by the watershed project.
- e. Integration of the RAP into the National Rural Extension Service (or other appropriate agency) so as it will not be disbanded when support under the WDP terminates.
- f. Improvement of the presently used foot trails. Access to the area visited was difficult, often over rocky foot trails crossing rugged terrain. Members of the community must traverse these trails for necessities; education, medical attention, commercially produced provisions and in many cases, water.

These improved paths could, in most instances, follow current trails. When these trails cross stream beds a small check dam could serve as a bridge. Local materials and local labor should be used for this purpose.
- g. A replacement is needed for Mr. Silva, the RAP coordinator, when he returns to his duties at INIA early next year.

6. FOOD AID UNDER PL 480, TITLE II, SECTION 206

The Section 206 food aid input, which provides funds to pay unemployed rural workers for labor in watershed development work, is an example of innovative and unique programming to combine PL 480 Food for Development with USAID Development Assistance (DA). It represents the first time that a Section 206 program has been linked with a development assistance project to support a labor intensive field program.

The linking of PL 480 and DA activities resulted from the evaluation of a previous 3-year program (1982-84) during which watershed development and food aid programs operated separately.

6.1 Commodity levels and mix

Only beans and corn are grown in Cape Verde. Production of these since 1980 (Table 12) has varied greatly because of periodic drought.

Table 12. Levels of bean and corn production in Cape Verde, 1980-87.

Year	1980	1981	1982	1983	1984	1985	1986	1987
Beans(MT)	9,000	500	2,960	2,200	5,395	2,130	6,033	12,800
Corn(MT)	8,500	3,000	4,400	2,700	2,525	1,323	12,130	18,000

GOCV's estimates of individual consumption levels for beans, corn, rice, wheat, milk and edible oil are seen in Table 13. Table 14 projects food needs through 1990. The Section 206 input for 1985-88 was originally set at 15,000 metric tons (MT) of corn per year. That tonnage covered 35% to 45% of the national deficit for corn, depending on the crop year. The corn deficit in a good crop year, such as 1986, was about 33,000 MT. Note in Table 14 that corn needs increase about 10,000 MT between 1980 and 1990.

6.1.1 Commodity levels

In 1986 and 1987 the GOCV requested substitution of other commodities for U.S. corn (based on 15,000 MT/year) to help bring food aid (from all donors) in line with total needs. Actual deliveries under Section 206 were:

<u>Fiscal Year</u>	<u>Commodity</u>	<u>Metric Tons</u>
1985	Corn	5,039
	Rice	4,524
1986	Corn	10,116
	Wheat	4,973
1987	Corn	10,056
	Rice	2,974
	Beans	1,950 (extra)

Table 13. Estimates of individual food consumption (kg/person/yr). Source: Estatísticas Agrícolas, Ministério do Desenvolvimento Rural e Pesca, Setembro 1987.

<u>Commodity</u>	<u>Urban/Semi-urban Population</u>	<u>Rural Population</u>
Corn	80	180
Wheat	60	25
Rice	60	10
Beans	15	28
Edible oil	6	5
Milk (powered)	7.5	6

Table 14. Food needs projections for rural and urban populations based on Table 13 and population estimates from *Estatísticas Agrícolas*, 19876. The population for 1986 was estimated from 1980-1990 trends.

Urban	1980		Urban	1986		Urban	1990	
	Rural	Total		Rural	Total		Rural	Total
Population								
113,557	182,146	295,703	143,833	193,804	337,637	174,380	209,337	383,717
Food needs (MT) as:								
Corn								
9,085	32,786	41,871	11,507	34,885	45,392	13,950	37,681	51,631
Wheat								
6,813	4,554	11,367	8,630	4,845	13,475	10,463	5,233	15,696
Rice								
6,813	1,821	8,634	8,630	1,931	10,561	10,463	2,093	12,556
Beans								
1,703	5,100	6,803	2,157	5,427	7,584	2,616	5,861	8,477
Edible Oil								
681	911	1,592	863	969	1,832	1,046	1,047	2,093
Dry Milk								
852	1,093	1,945	1,079	1,163	2,242	1,308	1,256	2,564

Rice and wheat were substituted for corn on a value basis, based on the 15,000 MT of corn provided annually by Transfer Authorization 5608. Additional beans (2,000 MT) were approved for 1987, following a GOCV request for supplemental food aid.

6.1.2 Commodity mix

USAID was flexible in the commodity mix and responded to requests for change, many of which resulted from uncertain delivery dates of food aid from other donors. The U.S. alone seems to provide food in conjunction with a desired delivery schedule.

Stocks on hand at EMPA, including 1,950 MT of U.S. beans delivered in late October 1987, and the bumper harvest from the 1987 crop season, generated a surplus of beans for 1988. The 1987 bean crop yield was 12,000 MT, a level well above domestic needs.

The 1987 corn crop also produced a bumper harvest of some 18,000 MT. EMPA will continue to buy Argentine flint corn but 1988 supplies of white flint corn in coastal West Africa will be short because of weather problems there. While EMPA's carryover stocks of corn into 1988 look good they are faced with possible spoilage loss of a considerable tonnage of corn from West Africa.

Hindsight indicates that the U.S. should have stayed with corn as the commodity provided under TA 5608 and encouraged the GOCV to seek more reliable delivery of wheat, rice and beans from other donors. Crop harvest for 1987 reinforced that observation and make corn the best U.S. commodity for 1988, including corn as extra tonnage, if approved.

6.2 Reception, storage and handling of PL 480 commodities

All food aid for Cape Verde (except wheat, which passed directly to Moave, a Mindelo wheat miller) is handled by Empresa Publica de Abastecimento (EMPA), a large, efficient state enterprise. In 1986 EMPA handled sales of some 700 products amounting to an equivalent of about \$4.8 million. Cereals comprised 37 percent of imports. Food aid handled by EMPA in 1986 was equivalent to \$14.7 million (CIF value). Of that, U.S. food aid handled in 1986 accounted for \$3.1 million (CIF).

EMPA operates main reception and distribution centers at Mindelo and Praia. Those centers serve 11 districts (delegations or branches of EMPA) throughout the country. The Praia center, including warehouses and silos, and branches at Santa Catarina and Tarrafal were visited during the evaluation.

6.2.1 Reception of food aid

EMPA puts bulk corn directly into its silos at the ports of Mindelo and Praia. Other commodities arrive bagged and are put in warehouses in the port area. Quality tests are made on all commodities as they arrive and reception reports are sent to USAID within a month of commodity arrival. Reports for 1987 show:

Commodity	Discharged (MT)	Received sound (MT)	Loss (%)
Corn	10,292.45	10,056.50	2.20
Rice	3,004.4 0	2,973.95	1.00
Beans	1,956.37	1,949.72	0.03

Losses of beans and rice were caused by torn sacks. EMPA reconditions such commodities immediately after arrival in the warehouse. The high loss of corn in 1987 -- abnormal for EMPA-- was caused by wetting corn in the hold of the delivery vessel. Previous corn losses have been low.

Bulk corn handling is by clamshell (off the vessel's tackle) to a dockside hopper and then by dump truck to EMPA silos. Vessel discharge of bulk corn has given EMPA continuous problems because they have to put laborers into the hold to push corn to the clamshell. Discharge is slowed and port charges increase. The budget of the WDP provides for two small bucket loaders (Bobcat type) for each port. Those loaders would be hoisted into the vessel's holds to push corn to the clamshell.

While often discussed, the loaders have not been ordered. In 1985 the USAID Project Manager assembled data on bucket loaders (Case) and in early 1986 with the Regional Food for Peace Officer (RFPO) discussed the loaders with the Praia silos manager. In November 1986 the RFFPO and a different USAID Project Manager again discussed the bucket loaders and information on a vacuum discharge system as opposed to bucket loaders.

6.2.2 Storage

All EMPA warehouses inspected were clean, weather tight and well kept. No evidence of pest infestation or spoilage was seen. Stock records were current and a "first-in, first-out" system is followed. Teams of specialists from EMPA's Technical Service make periodic visits to warehouses, conduct training and assist with storage problems that occur. The Chief of the Technical

Office at Praia attended storage training in the U.S. He said that EMPA has very few storage problems with bagged commodities but on rare occasions when fumigation is required they lack tarpaulins and fumigants to do the job properly.

The Praia silos area was not clean. Recent shipments of bulk corn, including U.S. corn received un June 1987 contained above normal percentages of spoiled corn. The U.S. corn arrived wet and rotting in the vessel's hold. Several thousand tons of West African corn provided by another donor arrived infested, dirty and moldy. These cases resulted in unusually heavy dust deposits inside the silo and in several large piles of rotting, infested corn (unfit for humans) in the yard area around the silos.

The Project Paper budgeted for equipment and supplies to treat and protect PL480 commodities in storage. These were in addition to the 4 tractors noted above (6.2.1). There is no record of any request from EMPA for those items but during the evaluation visit to storage areas, a "needs list" was presented: sewing machines for the corn bagging, scales (0-100 kg) and computer system for managing warehouse stocks.

6.3 Accounting and use of local currency

The Section 206 transfer authorization provided for funds from sale of U.S. commodities "net of internal storage, transportation, handling and depreciation costs: to be transferred to the National Development Fund (NDF) by EMPA. The NDF is required to report quarterly to USAID on funds it has in the account or has disbursed to the WDP.

6.3.1 EMPA pricing and accounting

The receiving report prepared by EMPA for each commodity arrival includes a report on quality, which affects the sale price and consequently the NDF price -- the amount per kilogram deposited with NDF.

Beyond quality, EMPA uses a detailed form to determine storage, transport, handling and other charges and to set the sale price and the NDF price. For U.S. corn, (always graded as 2nd quality), the difference between the sale price and the NDF price reflects more than the handling costs and depreciation agreed on in the TA. Table 15 summarizes the pricing for 1985-87. The FAS and CIF values are from Bills of Lading. EMPA sales prices are from their forms.

The TA reads, "The GOCV will communicate in writing to USAID for approval of the proposed selling price of the commodity and any future proposed changes in that price." In no case has that been done. Therefore the NDF price, representing the funds to be deposited with NDF by EMPA, should have remained the EMPA selling

price less the allowable handling and depreciation charges. Those are 3,300 escudos/MT for corn and 2,710 escudos/Mt for beans, rice and wheat. Table 16 makes the comparison and shows that the NDF was shorted some 70,694,298 escudos.

In examining the pricing of beans and rice it was discovered that EMPA had paid customs duties on those commodities, which may account for much of the difference seen in Table 16.

Table 15. Summary of PL480 pricing (US\$/MT)

Commodity	Arrival Date	FAS Value	CIF Value	NDF Price*	EMPA Sale Price	World Market**
corn	9/85	132	217	124	180	261
rice	3/86	287	317			409
1st qual				400	507	409
2nd qual				270	363	409
Corn	8/86	87	172	124	180	219
Wheat	10/86	114	198	129	n/a***	237
Corn	6/87	78	162	124	180	209
Rice	7/87	165	285	270	363	323
Beans	10/87	463	599	429	643	637

*Converted at 70 est.\$;

**CIF plus EMPA charges; wheat not sold by EMPA

Table 16. Comparison of EMPA and NDF prices in escudos, 1985-87, with calculation of amount due NDF based on charges allowed by Transfer Authorization.

Commodity/Year	(A) NDF Price (kg)	(B) EMPA Selling (kg)	(C) Diff- erence (B - A)	(D) Charges allowed by TA	(E) MT	(F) Additional amount due to NDF* (C - D x E)
Corn 1985	8.7	12.6	3.9	3.30	5,039.4	3,023,640
Rice 1986 (1)	28.0	35.3	7.3	2.71	3,986.9	18,299,871
Rice 1986 (2)	18.9	25.4	6.5	2.71	536.9	2,034,851
Corn 1986	8.7	12.6	3.9	3.30	10,116.5	6,069,900
Wheat 1986	9.0	18.5	9.5	Wheat not handled by EMPA		
Corn 1987	8.7	12.6	3.9	3.30	10,056.5	6,033,900
Rice 1987 (2)	18.9	25.4	6.5	2.71	2,973.7	11,270,323
Beans 1987	30.0	45.0	15.0	2.71	1,949.7	23,961,813
Total due NDF						70,694,298

*Amount due NDF is difference between charges allowed by TA and those made by EMPA. Depreciation charge applies only to corn.

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When asked why food aid was not admitted duty free, the reply was, "Only corn is duty free."

An immediate evaluator's comment, when EMPA explained that it paid customs duties on the U.S. donated beans and rice, was that under the terms of a food aid agreement, all commodities should enter free of customs duties and other fees. A check on the TA, however, revealed that the usual language to require duty-free entry of food aid had been omitted. The TA did, however, include reference to AID Regulation 11, which requires duty-free entry of all Title II food aid. The WDP paper also provides for duty free entry of U.S. commodities.

Once EMPA sets the NDF price for a commodity, the EMPA procedure is to deposit that amount of sales receipts in the NDF. In theory EMPA makes periodic deposits to the NDF as sales progress. EMPA reports that, in practice, it makes advance payments against future sales. In fact, the U.S. Food Aid account with NDF was in a deficit condition during much of 1985, all of 1986 and in 1987 to date, because expenditures for watershed activities exceeded income from food sales.

The TA calls for the GOCV to submit a quarterly report on status and use of funds generated by depreciation charges allowed for port silos. No reports have been submitted. However, if depreciation charges are figured based on corn handled 1985-87, about \$210,000 (14.74 million escudos at 70 esc/\$) were generated to cover "construction of new storage or improvement of existing storage." In terms of warehouse construction and improvement, EMPA spent 17,605,436 escudos in 1985, 7,678,675 escudos in 1986 and estimates more than 100,103,465 escudos for 1987. New storage warehouses for 600 MT each were seen at Tarrafal and Santa Cruz. Tarrafal will add another 300 MT storage in 1988 and Santa Catarina will add a 1,500 MT new storage in 1988. It is obvious that the depreciation funds from U.S. corn are far over-subscribed. Wheat sales (1986) were not handled by EMPA. The wheat was consigned to EMPA but delivered to Moave, Mindelo, for milling and distribution. Only a NDF price was established, with no accounting for handling available. Wheat also had customs duties applied.

6.3.2 National development fund accounting

The NDF is a 3-person operation (director, assistant and secretary) controlling about \$10 million annually from sales of food from all donors. All funds go to the NDF account, from which the NDF head approves expenditures and provides separate accounting for individual donors. The TA requires NDF to submit quarterly statements to USAID on deposits and disbursements from the U.S. generated funds. No quarterly reports have been filed since the project started. When queried about reporting, the NDF head said she had not agreed to do quarterly reporting. She did, however,

have a copy of the TA on file. The last report by NDF was a 1984 annual report (closing out the former program), which was submitted December 17, 1985. During the evaluation interview the NDF head agreed to prepare annual reports for 1985 and 1986. USAID should receive those before the end of December.

6.3.3 Use of local currency

Even though NDF has not submitted required reports, the Bilateral Division, MPC, provided Annual Reports for 1985 and 1986 with global figures on Section 206 currency uses. Based on MPC data and DGCSFER reports, at mid 1987 the WDP had \$2.3 million more in local currency (and in food stocks held by EMPA) than had been disbursed. Deposits and disbursements from PL480 funds are summarized in Table 17. Some expenditures in 1984 were carried over to 1985 and used from the carryover amount. Previous project activities in the watersheds continued in 1985 even though the USAID technical assistance team was not on hand. That team arrived in January 1986.

Table 17. Summary of deposits and disbursements from National Development Fund for WDP, 1985-87.

Source/Calendar Year	Funds Generated*	Funds Disbursed**	Balance
Carryover 1984	52,468,425		
Corn 1985	43,842,780		96,311,205
Watershed Work 1985		176,861,000	-80,549,839
Rice 1986	121,780,610		
Corn 1986	88,013,550		
Wheat 1986	44,757,000		
Watershed Work 1986		207,125,000	33,123,635
Corn 1987	87,491,550		
Rice 1987	56,202,930		
Beans 1987	58,491,000		
Watershed Work 1987		99,023,100	70,038,745

*Tonnes multiplied by NDF price.

**From MPC reports in 1985-86 and DGCSFER estimate for first half of 1987.

There was much discussion during the evaluation about what costs were covered by local currency from PL480 sales. From the USAID side the TA is not clear. The intent in the early documentation of the project seems to be that the PL480 funds should be used mainly to hire unemployed rural workers to do watershed work. The TA language, is "to pay authorized costs."

What are authorized costs? Who authorizes? DGSCFER has continued watershed work as had been done under the former program when authorized costs were labor, drivers, extension workers, fuel, cement, equipment and spares, miscellaneous materials and office supplies. The Project Paper includes the language, "The GOCV will supply personnel at all levels in project implementation, office space, training and fuel for project vehicles." The project DA budget also proposed provision of 1,000 tons of cement but to date cement has been provided through local funding at about 7.5 million escudos/year.

NDF does not check vouchers from MDRP to see what should or should not be allowed. It approves payments based on a request received from MDRP's Department of Planning. USAID does not check vouchers covering local currency expenditures. While such a practice is not required, it is surprising that vouchers covering an equivalent of about \$6.9 million in local currency were not at least spot checked. This could have been an important task of the food aid monitor.

6.4 Program compliance

From the standpoint of the PL480, Title II, Section 206, the TA is the primary document used to judge compliance. As pointed out above (Table 17) the TA is not clearly worded in the area of uses of local currency. It is perhaps over-worked in the area of reporting.

6.4.1 Reporting

Reports agreed to in the TA and the status of their submission is as follows:

(a) Quarterly report on status of funds from depreciation:
NONE

(b) Annual report on composition of EMPA charges: NONE

(c) Semi-annual progress report on watershed work: Annual reports for 1985, 1986; semi-annual report for 1987.

(d) Quarterly report on funds by NDF: NONE

(e) Quarterly report on stocks: NONE

(f) Annual GOCV progress reports: 1985, 1986 submitted.

The TA creates some redundancy for reporting. For example, Section VIII A requires a quarterly report from the NDF and Section X requires the same from the GOCV. There is also ambiguity -- the requirement to report annually on EMPA costs and charges call for it "in a degree of detail that is determined by USAID." Does that mean that the GOCV can wait until USAID tells it what details are required?

What appears to be the ideal process for getting all reporting done efficiently -- and on time -- is found in the Project Paper. It provides for a national level inter-agency coordination group, which includes MPC, EMPA, NDF, MDR and USAID -- the key players in the reporting game. The Project Paper recommends a semi-annual one-day meeting of the Group and gives a sample agenda that neatly covers all required reporting. That Group's function should have been included in the TA and it could logically have been made the focal point for all required reporting.

If the Group meeting had been held, all involved would have been aware of such problems as deficit funding and customs payments soon after they occurred.

6.4.2 Self help measures

Three self-help measures are part of the food aid agreement:

(a) The GOCV will maintain its policy of establishing a selling price for PL480 corn equivalent to the world market price levels.

(b) A food consumption and income distribution survey will be conducted to identify those population groups most vulnerable to malnutrition, and to assess the impact of food price increases on these groups.

(c) An appropriate plan to be agreed upon by USAID and the Ministry of Rural Development will be completed for the phased development of the watersheds being developed under the WDP (No. 655-0013).

6.4.2.1 World market price levels

The performance of the GOCV on pricing of corn, and other commodities is seen in Table 15. Beans in 1987 sold above world market and rice in 1987 was above the world market. Corn, even with an assist from low FAS value and a favorable exchange rate in 1987, did not reach the world market level, indicating that an upward adjustment for corn is required for 1988.

6.4.2.2 Food consumption and income distribution

The GOCV has not yet submitted a scope of work for the required food and income survey and there is no indication that the survey can be completed by the end of 1988. This is another item that sort of "slipped into a crack." Regular meeting of the Coordination Group could have prevented that.

6.4.2.3 Phased development plan

Despite much discussion of planning, and the actual preparation of annual plans, little was accomplished toward the "phased development plan." There were recent meetings to discuss the first step, that of USAID and the GOCV agreeing on a format. It is doubtful, however, that the plan will be completed before the end of 1988.

The language of this self-help measure is weak, ambiguous and redundant. What is "phased" development of the watersheds? Hopefully, it could mean step-by-step development of each watershed in the project, with development to cover not only soil and water conservation, but also such things as improved agricultural practices, building of trails and roads, development of cooperatives, strengthening of extension services, improvement of education and health status and so on -- total agricultural and community development.

The timetable set for the planning effort was too ambitious. Planning, or the lack of it, is discussed in chapters later in this report and sheds some light on what might be a reasonable timetable.

6.5 Monitoring and supervision

Monitoring and supervision responsibility for project activities rest with a Project Manager on the USAID side and with the Chief, Bilateral Division, MPC and the Director, DGCSFER, on the GOCV side.

6.5.1 USAID monitoring and supervision

Since the start of project activities in 1985, USAID has had three different Project Officers -- two were direct hire employees and one a PSC employee (a Project Management Assistant hired 6 months ago). The project provided for a local hire employee to assist with all aspects of the PL480 input but that person was never hired.

The USAID project managers handled routine correspondence dealing with call forward of PL480 commodities, addressed ordering and delivery problems, and reported on commodity arrivals.

The USAID project managers were aware of the PL480 reporting deficiencies but there is no evidence that any concerted effort was made to correct them. Periodic personal appeals were made to MPC, but it was unable to provide all reports requested. There is no record of any semi-annual one-day conferences of the National Level Inter-Agency Coordination Group being held. Special Group meetings were held October 23 and November 6, 1987 to discuss the evaluation, which started November 16, 1987.

6.5.2 GOCV monitoring and supervision

The key person for GOCV monitoring and supervision of the PL480 activities is the Chief, Bilateral Division, General Direction of Cooperation, MPC. He serves as the gatekeeper for all reporting from the GOCV side, with all reports passing through his hands. Requests for information from USAID go to him and calls forward for PL480 corn come from him. He is also the person responsible for inter-agency cooperation and for calling and chairing the semi-annual conferences of the coordination group. Within the Bilateral Division, individuals are assigned geographically to work with the different donors. The U.S. portfolio, the largest one for food aid, is handled by the Chief of the Division in addition to other duties. He is obviously overburdened and unable to give attention to day-to-day activities such as reporting, commodity pricing and monitoring.

6.6 Accomplishments and problems

The accomplishments that will decide the success of the project are those in the watersheds where PL480 food has provided a key development resource. Accomplishments and problems on the PL480 side are detailed above in this chapter and summarized below as an immediate forerunner to recommendations.

6.6.1 Accomplishments

The Section 206 side of the project delivered 25,212 MT of corn, 1,949.7 MT of beans, 4,391.7 MT of wheat and 7,497.5 MT of rice for use by the GOCV to help meet food consumption needs. Sale of those commodities provided about \$9 million in local currency to hire unemployed rural workers and cover other expenses for watershed development work. Except for 1985, when corn shipments were delayed because of storage problems, all commodities arrived on time. And despite a running deficit in the NDF local currency account (as a result of expenditures at a faster rate than EMPA sold food), there were no major problems with late payments of workers. The PL480 program also responded to essential GOCV food aid needs by being flexible in the commodity mix, providing beans, rice and wheat in addition to corn.

6.6.2 Problems

The major cause of the following list of problems was lack of management of the PL480 side of the program in terms of tracking commodity sales and local funds. The management shortfall was on both sides of the agreement, resting with USAID and with the Bilateral Division, MPC. Specifically, almost none of the required reporting on PL480 commodities and funds was done and uses of funds from PL480 sales were not tracked. As a result some charges that were MDRP's may have been paid from PL480 funds. For example, fuel was paid by local currency but the Project Paper provides for MDRP to pay fuel costs. In addition:

- (a) The indicative budget in the Section 206 program was set at levels below needs at the outset and the section on uses of local currency requires strengthening.
- (b) A key coordinating group was not activated.
- (c) A food aid monitor, who could have been a key to avoiding many of the problems cited here, was not hired.
- (d) The GOCV unit that deals directly with the project's PL480 side is under-staffed and over-burdened.
- (e) Work toward accomplishing the agreed upon Self Help Measures is behind schedule.
- (f) The Section 206 Transfer Authorization lacks essential language on duty-free status of food aid and PL480 commodities other than corn were subjected to customs duty.
- (g) Provision of U.S. dollar-funded commodities for the PL480 side of the project has not been formally discussed with the GOCV.
- (h) The PL480 side of the project is out of phase with the DA side because of extension of the Project Completion Date to June 30, 1990.

6.7 Recommendations

Recommendations related to the PL480 side of this evaluation must be considered in light of the major question of whether the WDP has been a success. There is no indication that any of the problems cited here for PL480 have negatively affected project activities and, in the light of a positive evaluation of the watershed work, revision and extension of the PL480 Title II, Section 206 program is warranted. Recommendations are:

- (a) USAID and MPC must take immediate steps to organize and activate the National Level Inter-Agency Coordination Group. The

Group should hold quarterly meetings during 1988 and should serve as the key to bringing reporting on all project activities up to date.

(b) USAID, MDRP and MPC should establish a list of allowable charges to PL480-generated funds prior to the start of 1988 work and a system for periodic checking of vouchers should be established.

(c) USAID or MPC, or both, should provide necessary staffing to assure monitoring of PL480 commodities and funds.

(d) The Section 206 Transfer Authorization should be amended prior to any call forward of PL480 corn for 1988. The amendment should include:

- 1) An increase of the annual level of corn to 20,000 MT to assist the GOCV in meeting food needs (increase of about 5,000 MT corn since 1984) and to provide funds to expand watershed work. The indicative budget in the TA should be brought into line with current needs.
- 2) Addition of two years (1989 and 1990) to the life of the PL480 program to bring local currency support into line with the DA funded project's new completion date of June 30, 1990.
- 3) The formation and functioning of the National Level Inter-Agency Coordination Group as a requirement of the agreement.
- 4) Clearer definition of, and new completion dates for, Self-Help Measures #2 and #3 and the addition of a new Self-Help Measure for 1989-90.
- 5) Renegotiated storage, transport and distribution costs allowable for EMPA and consideration of their "needs list."
- 6) Language that clearly details approved uses for local currency in the watershed development project.
- 7) Language to allow substitution of other commodities for corn when requested and to provide duty-free entry of all PL480 commodities.
- 8) USAID and MPC should take immediate steps to reconcile or recover funds in excess of charges allowed by the TA. Recovery should include customs duties paid during 1986 and 1987,
- 9) USAID should follow up on the provision of corn discharging machinery for EMPA.

7. PROCUREMENT OF COMMODITIES AND BUILDING CONSTRUCTION

7.1 Description and Summary of Activities

7.1.1 Rural Works Component Project Paper PP. 49-50 items 1-26.

Items 1-5. Heavy equipment (Backhoe, Dump Trucks and Dumpers). No problems were observed.

Items 6-8. Air compressor and Jack Hammers. This equipment has had very little use for lack of hoses of length needed (50 meters) and accessories.

Item 9. Cement mixers. This equipment has not been used. Mixing on the ground with hand tools is preferred. The quality of the mortar mix suffers as a consequence.

Item 10. Pick-up trucks. Given the terrain encountered, these trucks should be 4 wd instead of 2 wd. The wear and tear on the tires and transmission is excessive.

Items 11-12. 4 wd. vehicles and spare parts. No problems observed.

Item 13. Gabion tools. These pliers ordered for cutting gabion wire were much too light. Heavier pliers have been ordered. Come-alongs should have been included and are now on order.

Items 14-18. Hand tools. No comment. Heavy-duty, metal wheeled barrows are suitable for some work-sites and should be ordered for trial.

Item 19. Levels. Little use is made of them for lack of trained surveyors.

Item 20. Drafting tables and equipment. These items did not arrive. If they had, the project might have hired a draftsman to use them.

Items 21-22. Office furniture and garage tools. No problems observed.

Item 23. Cement (local procurement). Because of lack of control over work schedules and design and structures cement use has been problematic. Without control, too much cement is used and too much reliance for stability of structures is placed upon mortar and rock construction. Salt is often found in the sand and water. There is too little control over concrete mix components, mixing and placing process and subsequent maintenance of surface moisture (curing). Such poor control results in concrete of marginal strength and high susceptibility to rapid deterioration

caused by flowing, sediment-laden water.

Item 24. Gabions. The gauge (2.70 millimeters) and the dimensions (2m X 1m X 1/2 , 1 1/2m X 1m X 1m and 2m X 1m X 1m) are generally appropriate. The mesh size (8cm X 10cm) is generally appropriate, but some of smaller mesh (6cm X 8cm) would have allowed the use of smaller stones. Often such stones are available in quantity where large stones are not.

Item 25. PVC Pipe. These problems:

(a) Pricing. The lowest bid received was 75 percent above the estimated FOB unit price as specified in the PIO/C.

(b) Strength. The strength specified (150 lbs. per square inch) is double what is needed in most cases.

(c) Size. Most of the pipe needed is of 4" and 6" inside diameter. The 8" and 12" sizes specified in the PIO/C are not needed according to such present plans as exist.

(d) Material. The PVC pipe ordered is not flexible. Given the convoluted location in which the project takes place, an excessive number of elbows are required if PVC pipe is to be used. Furthermore PVC pipe is sensitive to the ultraviolet sun rays, and to avoid deterioration, must be buried. Polyethylene (flexible) pipe and aluminum pipe are suggested as appropriate to the site conditions in question, following proper installation. 5) Quantity. The Project Paper specifies 2 kilometers of pipe for \$5000. The original PIO/C was superseded and brought the total length to 25 kilometers and the price to \$187,000. The 1988 works program as listed in the bibliography to the present report specifies the installation of 12,360 meters of irrigation pipe. Detailed plans for the irrigation systems in which the pipe is to be used do not exist. The remaining 12,640 meters of pipe will be stored and used as needed on water harvesting projects.

Item 26. Re-Bar. No problems observed.

7.1.2 Hydrology equipment: watershed monitoring items 1-6

Item 1. The 10 recording rain gages have arrived and will be installed soon.

Items 2-5. These items have not arrived. Probably the float type water level recorders are not suitable given conditions in the areas of project work.

Item 6. The micro-computer and accessories have arrived but have not been installed yet. See Section 9 (Watershed Monitoring) of the present Report.

7.1.3 Extension equipment - No problems observed.

7.1.4 Building construction

The Project Paper specifies two office buildings (Project Outputs No. 12 p. 16). One office building has been completed and is in use, the other is under construction. The space (736 square meters) contains a complex of office, garage, warehouse, paved yard, generator housing, lavatory and well. Estimated completion date is March 1988.

7.2 Accomplishment and problems

The commodities listed for procurement under the rural works component of the Project Paper and in the revised PIO/C for the increased quantity of pipe will cost approximately 23 percent of the project's authorized total. The categories conform well in general with the work envisaged, but in some important respects the specific items are not suitable for conditions encountered in Cape Verde. The pick-up trucks are not suitable and the purchase of 6 cement-mixers does not conform to local preferences. The heavy equipment is inoperative half the time, indicating (1) the need for a low-boy to move it from work-site to work-site, (2) a maintenance truck to service the equipment at the work-site instead of at a central repair station as at present, and (3) the need for trained operators and maintenance men.

The local manufacture of gabions, even at a higher price, would probably be more economical because of conformity to specifications more clearly adapted to the needs of the structure in question.

Except for the float type water level recorders, the hydrology equipment appears suitable. It presupposes, nevertheless, the hydrologic monitoring system and the GOVC hydrologist assigned to the project as specified on the Project Paper "Watershed Monitoring Summary". Both the system and the hydrologist are lacking.

The revision of the PIO/C for pipe from 2 kilometers to 25 kilometers presupposes a major shift in the anticipated outputs. It anticipates an attention to irrigation systems which appears neither in the outputs, the verifiable indicators of the logical frameworks of the Project Paper, nor among the project outputs listed in the Transfer Agreement.

Irrigation systems are in conformity with project goal and purpose as stated. Their need and usefulness are not in question. Nevertheless, the evaluation mission believes that such changes must be supported by a memorandum of justification and by detailed plans for the use of the pipe. The advisability

of storing pipe for possible future use is not a legitimate consideration within the context of this project.

7.3 Recommendation

Purchase the following commodities:

1 low-boy for the transportation of heavy equipment with spare parts.

1 maintenance truck with equipment and spare parts.

100 all-steel wheelbarrows. 3 cubic foot capacity.

4 large blackboards.

1 slide projector.

8. WATERSHED MONITORING AND AERIAL PHOTOGRAPHY

8.1 Description and summary of activities

"Institutionalize a hydrological monitoring system" appears as a project output but the output does not appear in the Logical Framework. A Technical Analysis Summary of Watershed Monitoring areas with the following accomplishments within the project period:

- (1) Network of rain gauges set up on project and control watersheds;
- (2) Stream gauges stations for monitoring runoff;
- (3) Data collected and analyzed by GOVC hydrologist;
- (4) GOVC hydrologist assigned to project;
- (5) Technical assistance provided in field of hydrology;
- (6) Commodities procured for the foregoing;
- (7) Hydrologist/water resources engineer trained.

8.2 Accomplishments and problems

Accomplishments. Commodities have been procured.

Problems. Beyond commodity procurement, not one of the above has been realized to date. The reason is that the project does not have a hydrologist. Consequently neither the system envisaged nor the stations are functioning to provide the data for analysis. INIA, the agricultural research and training center, has a hydrology department but it gives no special attention to the project watersheds.

Annex 5 "Watershed Monitoring" in the Project Paper describes the needs and techniques of watershed monitoring sufficiently to explain the outputs envisaged and the means proposed to attain them. Nevertheless, the Annex 5 does not make a convincing case that the outputs proposed can be realized within the projects time-frame and the Cape Verdean capabilities assumed. The difficulty comes out on p. 165 under the heading Project Personnel and Training where the statement appears that the assignment of a full-time qualified and dedicated Cape Verdean technician "must" precede other inputs in the monitoring component. Antonio Sabino now studying for an MS in the U.S. will, presumably, be reassigned to the project as stated in the Watershed Monitoring Summary.

The next paragraph on the same page states that a hydrologist/

water resources engineer will be trained to replace the qualified and experienced individual. The training time required is stated at six years. Six years of training cannot fit into a four-year project.

The basic reason for the lack of progress in watershed monitoring is the correct Cape Verdean perception that it is peripheral to the main purposes of the project, which are:

- (a) rural employment
- (b) soil and water conservation through biological and mechanical approaches
- (c) improvement of crops through extension efforts.

The watershed monitoring proposed requires degrees of interest and expertise not presently available in Cape Verde and not possible to attain within the eight months of short-term technical assistance proposed.

8.3 Computer Enhanced Aerial Photography

The photography of the Island of Santiago is nearly complete. The data base these photographs will provide is potentially useful to the GOCV as well as to donor agencies for project planning and implementation, especially in the area of watershed management planning and coorelation of meteorological and hydrological monitoring data.

A recommendation that this work be extended to include the entire country is premature. Several questions are unanswered. What is the quality of the original photography? Will personnel be available to utilize the equipment and generate the information? Once the information is generated will it be used effectively? Specifically, will watershed monitoring actually be carried out?

The answer to these questions rests with the return from training abroad of Joao Lima, who is in the U.S. for short-term training in remote sensing and photo interpretation, and of Joao de Carvalho who will be working for a master's degree in remote sensing. If these studies are complete, and good use is made of the technology and the expertise that will then be available, it will be time to weigh the benefits of expanding the data base to the entire nation against the cost of doing so.

8.4 Recommendations

- (a) Since the project description includes research only incidentally, it is recommended that the watershed monitoring responsibilities and equipment be transferred to INIA.

(b) Delay further acquisition of aerial photography until the quality of existing photography has been evaluated, the feasibility of its use has been assessed, and the contribution to achieving stated project objectives has been reevaluated.

9. TECHNICAL ASSISTANCE

9.1 Description and summary of activities

9.1.1 Long-term

Technical assistance has been provided under contract with Sheladia Associates by the following persons:

Robert Pierce, hydrologist and team leader, 36 months beginning in January 1986 and ending January 1989.

Paul Theisen, forester, 24 months beginning January 1986 and ending July 1987 (subsequently extended to June, 1988).

James Webster, engineer, under contract to California Polytechnic Institute, 6 months, arrived January 1986 and left July 1986.

Nick Nikitas, engineer, replacement for Webster, 18 months beginning April 1987 and ending October 1989.

Thomas Gardiner, extension and community development specialist, beginning January 1986 and ending July 1987.

9.1.2 Short-term

F. D. Wilson, 3 months, flood control engineering specialist.

James H. Lenhart, one month, agricultural engineer.

L. Darrel Norton, one month, soil scientist.

Peter Klingman, two weeks, hydrological engineer.

Herbert Bedolfe, extension, 2 months.

John Belknap, computer training specialist, 7 weeks.

Ed Riegelman, geographer, 3 months.

Chuck Rosenfeld, remote sensing, 3 months.

Aspasia Theisen, community development.

9.2 Accomplishments and problems.

With the exception of the long-term engineering position, which at the outset was inappropriately filled, long-term technical assistance has proceeded smoothly, been timely and useful. This has generally been true of the short-term assistance as well.

10. LONG AND SHORT-TERM TRAINING

10.1 Description and summary of activities

The project paper (logical framework, p. 79) calls for six long-term participants in degree programs. At present two such participants are in the United States and two are ready to leave for the US to begin their studies. A fifth is now being funded by the current project, although originally sent by the previous Watershed Management Project.

Elsewhere, the project paper training plan lists five long-term training requirements. Half of the long-term training is concerned with data collection and analysis. The training plan also calls for 90 persons to receive short-term training in-country and one in the United States. The plan has changed in that the seven short-term programs provided or about to be provided are all in the United States.

10.2 Accomplishments and problems.

The long-term participant programs and candidates have been well chosen. Two coordinators have received short-term training in the United States. Results of their efforts are not yet evident. The third participant has not yet returned to Cape Verde..

10.3 Recommendations.

(a) There is a conspicuous lack of trained surveyors, topographers and draftsmen. Short-term training in these skills should be provided at a technical level in-country. For this purpose the project should employ an instructor.

(b) Although forestry and extension are critical elements for the success of the project, no provision was made in the training plan for these two fields except for extension short courses for RAP extensionists. Long and short-term training in these areas is needed.

(c) The sixth long-term degree participant program should be for undergraduate study in construction management.

11. PLANNING AND COORDINATION

11.1 Constraints to planning.

Among the constraints to planning are:

(a) Two members of the DGCSFER planning section helped write the 1988 plan of operations. At present one is in the United States on a participant program studying aerial photographic interpretation and the other is about to leave the present project.

(b) The chief of the Directorate calls for the coordinators to plan for only one year ahead. They justify their annual proposal by reference to the entire watershed rather than to the individual structures.

The requirement of self help Measure no. 3 for the preparation of a phased plan for development of each project watershed should be adhered to. Agreement between USAID and GOCV on a format for this plan is necessary.

11.2 Project implementation committee.

The Project Paper administrative analysis specifies a project implementation committee composed of representatives from 1. INIA, 2. USAID, 3. the Forestry, 4. the Soil Conservation, Forestry and Rural Engineering (DGCSFER) of the Ministry of Rural Development, 5. the Office of Underground Water (Junta de Recursos Hidricos) and 6. Farmer Support Program.

This committee does not exist. It appears that no one took the initiative for calling it into being. However, the technical assistance team has met frequently with the Office of Underground Water and occasionally with a representative of the FAO watershed project. Since April, 1987, as a consequence of the construction by the project of an office building at Achada Sao Felipe, the technical assistance team and the DGCSFER have occupied the same headquarters at Achada Sao Felipe and informal contacts are frequent with 3, 4, 5, and 6 above.

Coordination has been enhanced by DGCSFER director, who has adopted a stronger management role than did his predecessor. Contact between the project team and USAID has, of necessity, been frequent. Some exchange of information has occurred between technical assistance and INIA with regard to watershed monitoring.

All these interactions are desirable. However, they do not contribute except incidentally to the coordination of the activities of all these participants and to the exchange of information among them. While the creation of a project implementation committee would not necessarily assure coordination,

it holds the potential for bringing it about.

11.3 Meeting called by the Center for Agrarian Studies (now INIA)

Representatives of all (watershed) projects will share experiences. These meetings have not occurred.

11.4 Annual Plans of the Division of Soil Conservation, Forestry and Rural Engineering (DGCSFER).

The two most recent annual plans were available for inspection; the 1987 plan and the 1988 plan. Each department, Soil Conservation, Forestry and Rural Engineering prepares a list of activities it intends to carry out during the year. These are preceded by an introduction by the Director. The WDP occupies a prominent place in the 1987 plan with extensive and detailed sections dealing with the forestry program and the RAP (including soil conservation).

Although the WDP is not singled out in the 1988 plan, its activities are prominent in it.

No mention is made in either plan of the national five year rural development plan.

11.5 Relationship of project management structures to Ministry of Rural Development

The WDP has been incorporated into the agriculture sector of the second national development plan (1986-1990). Therefore, the project is considered an integral part of it. There are monthly meetings between personnel of the Division of Soil Conservation, Forestry and Rural Engineering and members of the technical assistance team.

11.6 Integration of RAP Into National Extension Service.

The following obstacles exist to the integration of the RAP into the national extension service.

(a) A reluctance to incorporate relatively untrained personnel into an organization that prides itself on its professionalism.

(b) Administratively, there is no personnel category into which the RAP extensions can fit. A new category and new regulations would have to be created.

(c) The incorporation of the RAP extensionists (about 23 people) will be costly, although their pay is lower than the pay of

professionally trained extension personnel. It is reported that some discussion of this action has taken place but no decisions have been reached. Administratively, the first step will be for the director for the National Extension Service to prepare a proposal for submission to the Minister of Rural Development.

While the obstacles to incorporation are substantial, the scope and effectiveness of the extension service would be increased by the use of village-level extension workers. Furthermore, the failure to merge with the national extension service may lead to the disbanding of a valuable human and organization resource.

The director of the extension service and his principal assistant should have an opportunity to observe the functioning of a successful village level extension program in an appropriate country.

It is reported that set-aside funds have been used for the training of RAP extensionists and of watershed coordinators and that the funds remaining will be similarly used.

11.7 Coordination of research and extension with soil and water conservation.

INIA is conducting experiments in soil and water conservation in the Ribeira dos Picos. INIA collaborates with DGCSFER by assigning to it Mr. Amadeu Silva, the general coordinator of extension for the RAP. Mr. Silva continues on the INIA payroll. The DGCSFER sends its employees to INIA for training in forestry. However, INIA does not have a forestry department.

Due to their urgency, the project chose to direct efforts towards the problems of food and work. The hope is that the soil conservation structures and planting will increase food supplies. The project has funded successfully such measures. Nevertheless, they are at present empirical and without a scientific base. Hence the urgent need for research and the means to diffuse the results.

For example in the next work season (January-July 1988) the community work fronts will build a large number of rock wall terraces to protect farmland from excessive runoff and erosion. The work fronts understand the construction, but the spacing is irrational. Given the propensity toward physical labor, achieving the greatest protection with a limited labor force has not been taken seriously. Nevertheless, labor shortages are increasingly influencing the pace of the project's works.

Another urgent matter of research is that of the measuring the efforts of structures and planting on the behavior of water. With more knowledge, watershed development plans undergo a continual adjustment toward the most economical use of labor and

materials. Heretofore the assumption has been that almost any structure or planting is worthwhile, an assumption that needs refining toward a more scientific base.

While thus recognizing the importance of research, the evaluation mission believes that it is the proper function of INIA and not the project. The mission therefore recommends that if a project in further support of INIA comes about it should include watershed monitoring and research.

The project funds 23 extension agents who work in the projects watersheds. The evaluation mission believes that they coordinated their activities well with the project's purposes. The mission recommends that their training include the vegetative aspects of soil and water conservation, both in the primary training and in refresher training held annually.

11.8 Reports

Section VI of the Transfer Authorization dated February 21, 1985 states (item D).

"A semi-annual report will be submitted to the GOCV on physical work completed on the above projects".

Annual reports on the directorate's activities are available for the years 1985 and 1986, and a report for the first semester of 1987. The reports cover all the directorates' activities, including those related to the project. Project accomplishments are not reported separately by semester and by total.

The reporting system is unsatisfactory in that the AID project manager does not have a report current within six months of the physical works completed as specified in the Transfer Agreement. The evaluation team believes that the AID Mission should convey to the GOCV its dissatisfaction with the project reports and should request separate semi-annual reports with semestral and total accomplishments as well as structural work.

Sheladia Associates should be required to report more clearly current and total accomplishment in such details as number of trees planted, number of extension visits made, number of cubic meters of gabions put in place, and so on. The purpose is to give a clear measure of the project's status. Once the format and timing have been accepted, AID should insist upon adherence to them.

12. BENEFITS AND COSTS

12.1 Benefits

The benefits of the WDP are numerous and important. Broadly, the activities undertaken by it contribute to the national agricultural resource base and thus to the solution of Cape Verde's most pressing and most critical problem. More specifically, benefits can be categorized as follows:

12.1.1 Human resources

The experience in managing and developing watersheds gained by individuals and institutions and the training provided under the project are laying the foundations for future beneficial activities which will contribute to the solving of the problems of agricultural production. The training supplied under the auspices of the project will not only enhance the lives of the individuals involved but also develop personnel more capable of confronting important social, agricultural and institutional policy issues.

12.1.2 Institutional resources

Each of the Cape Verdean administrative units (NDF, MPC, DGCSFER, EMPA, MDRP) that work on the project will enhance its expertise in relation to the goals of the project and to facilitate solving these problems in the future.

Of particular importance is the development of the innovative RAP under the auspices of the WDP and its predecessor which is proving to be a viable social mechanism for delivery of services to the rural population and thereby enhancing the quality of life.

12.1.3 Social and economic benefits

Jobs and income for unemployed residents of rural areas is provided through work on the community based work fronts. The total amount paid rural laborers is about 617,000 escudos daily, accounting for more than one half of rural employment on Santiago Island. These payments raised the level of living of workers and their families who otherwise would have no source of employment. Project policy favors the employment of the poorest of the poor.

The multiplier effect of these payments can be observed in the development of small businesses in the project area, in the self-employment of persons who sell goods to workers at the work fronts and in the consolidation of consumer cooperatives in several places where the project operates.

Better farming practices are promoted through the efforts of the

RAP extensionists. The strategy adopted for employment on community work fronts and on traditional work fronts which limits participation to one member of each family, assures that these benefits are spread among as many families as possible. The traditional or traditional work fronts together with the community based work fronts which are also funded by the project for work on soil conservation structures, employed 5,400 persons in 1987. Mean household size on Santiago Island is 5.6 persons meaning that in excess of 30,000 persons, nearly a third of the 1980 population of the island benefit directly.

The project promotes the social integration of rural communities through collaborative labor by members of the community on their own and their neighbor's land. It helps insure the viability of small farming communities by aiding agricultural production, discouraging migration to urban areas and by enhancing their natural resource base.

12.1.4 Environmental and agricultural

The project increases water supplies for drinking and household uses through greater infiltration. Erosion control through waterflow control structures, tree plantings and the seeding of vegetative covers contributes to the agricultural resource base by preserving and improving agricultural lands.

New cultivable acreage is created through the accumulation of silt behind check dams. Reforestation, afforestation and vegetative covers produce increased supplies of fuelwood and fodder and enhance soil fertility. Control of flash flooding protects agricultural land and physical structures built on it, including homes, from destruction.

Data are not yet available with which to quantify these benefits. Some are not quantifiable in any event. Yet there can be no doubt that improved farming methods, increased soil moisture and soil conservation, erosion control, improved yields and renewable sources of fuelwood and fodder and trained manpower bring with them significant economic benefits both in the short and in the long run.

12.2 Costs

Costs for 1985 and for the first half of 1987 appear in Tables 18 and 19.

In 1985 a total of US \$1,763,964 was spent directly on watershed development.

For 1987 a total of 2,172,529 was budgeted. By the end of June 65 percent of this amount had been spent. The work season for

Table 18 Watershed Development Project Costs, 1985

Category of Expenditure	Amounts
Labor	
Cape Verde Escudos	129,361,541
U.S. Dollars (a)	1,437,350
Materials	
Cape Verde Escudos	29,395,303
U. S. Dollars	326,614
Total	
Cape Verde Escudos	158,756,844
U. S. Dollars	1,763,964

Source: Ministry of Rural Development
(a) Converted at 90 CVE to US\$ 1.

Table 19 Watershed Development Project Costs Budgeted for 1987 and spent, 1st Semester 1987

Category of Expenditure	Budget	Spent 1st Semester	Percent Spent 1st Semester
Labor			
Cape Verde Escudos	124,517,000	82,875,253	66.6
U.S. Dollars (a)	1,831,132	1,218,754	
Materials			
Cape Verde Escudos	23,215,000	13,130,247	56.7
U.S. Dollars	341,397	193,092	
Total			
Cape Verde Escudos	147,732,000	96,005,500	65.0
U.S. Dollars	2,172,529	1,411,846	

Source: Ministry of Rural Development
(a) Converted at 90 CVE to US\$ 1.

community based work fronts ends in August, while traditional fronts continue until later, accounting for the heaping of expenditures in the first months of the year.

12.3 Conclusions

It is possible to say with confidence that project benefits exceed costs if we allocate the benefits from government expenditure of local currency funds to income generation. Of more interest, however, is the benefit/cost relationship between increased food and fodder production, increased water supply and reliability, and flooding reduction on one hand, and overall local currency and dollar technical assistance expenditures on the other.

Some of the direct and indirect benefit indicators include:

- * Forestry - Survival rate and growth increment of trees planted, a value assigned to firewood, poles, fodder and fruit projected from planted trees, soil conservation benefits attributable to catchment dams (caldeiras) constructed and surviving trees, and the benefits attributable to reduced pressure on fragile upper watershed areas.

- * Agriculture - Increased area of potentially productive soil accumulated behind various infrastructural works, yield potential from increased irrigation capability, crop yield increase attributable to nitrogen fixing cover crops and to organic matter from tree leaves and cover crops, and actual increases in crop and animal production from treated areas as compared to controls.

To achieve these desirable measures of benefits (costs are well documented) will require more thorough monitoring of the indicators mentioned and assistance from a resource economist well versed in calculating and monetizing conservation benefits.

Findings and Recommendations

From an overall perspective watershed management interventions have been successful. Refinements and alternatives are suggested, some represent opportunities created by successes during the past two years. The linking of PL 480 and watershed development activities has proved to be a cost effective mechanism for development project implementation. It is an assumption of the TR&D evaluation that the PL 480 program will continue and that watershed development activities with a strong food production component will continue to have a high priority with AID and the GOCV beyond the 1990 PACD of this project. The major findings and recommendations below should be considered by decisionmakers in USAID and the GOCV. The body of the evaluation contains more detailed commentary of potential interest to technical implementation staff.

1. **Future food production** - It is a stated goal of the Project to reduce chronic food shortages in Cape Verde. A measure of progress will be decreasing dependence on P.L. 480 food sales and a consequent decrease in the funds available to support watershed development activities. This leads to the need to identify and subject to benefit/cost analysis those interventions with readily identifiable production benefits which are in turn feasible under minimal subsidy, such as "djunta-mao" reciprocal labor arrangements. Soil stabilization structures and multiple use tree plantings now offer the opportunity to introduce crops, crop management practices and animal production techniques which will both result in further production increases as well as contribute to the conservation of the soil resource.

Recommendations -

- * Explore how the results of agroforestry and farming systems projects elsewhere in Sahelian Africa could be applied to take advantage of advances in soil and water conservation.

- * Take full advantage of opportunities to augment the use of irrigation in concert with improved crops and cropping systems. Irrigation to provide crop security during the normal planting cycle is generally more cost effective and socially equitable than dry season irrigation as a first step.

2. **Investments in the public interest** - Management of public lands in upper watersheds, flood control and prevention of salt water intrusion are all bonafide areas of public investment which farmers are unlikely to undertake because of

the cost and lack of associated direct benefit. Tree planting in upper watershed areas should be examined carefully from a benefit/cost perspective. Tree planting is logistically difficult and costly per hectare in remote areas. If survival rates are high, growth rates acceptable, and the products in demand, then such plantings may be justifiable. Generally this is not the case. The upper watershed area in need of vegetative cover for erosion control is so vast that tree planting will not make a dent in the problem - needed first is success in fuel and fodder production on-farm where people have a vested interest in seedling survival. Then education in non-destructive livestock management and fuelwood collection in upper watersheds can be more successful. A soil conserving cover can begin to reestablish itself with minimal intervention, and planting efforts concentrated on the optimum sites.

Recommendations -

- * Determine if an optimum distribution of effort is being made in the use of scarce funds and trained leaders between works that will always have to be government financed and those which have the potential of becoming profitable activities of individuals or local organizations.

- * In relation to the above recommendation - public works, such as roads having a diffuse benefit stream, should be performed by traditional work fronts, on a piecework basis if appropriate. Where benefits to individuals or groups within a defined community are evident, then community based work fronts should perform the work.

- * Assure that conservation strategies are in tune with site-specific land tenancy (renters may not favor improvements that could result in higher rents).

- * Assure that existing policies do not discourage project sponsored activities (if forest law states that trees are the patrimony of the state, then motivation to plant trees is dulled).

- * Assess whether women's capabilities and activities are being effectively supported and whether women are receiving equal pay for equivalent work.

3. Importance of Measurement - The section of this evaluation on watershed monitoring mentions that the return of an individual trained at the graduate level in hydrology is needed in order to install rain and stream gauges and analyze the resulting data. While true, the project could benefit from establishing simple measurement experiments without the need

for specialized training. The WDP represents a valuable model of conservation practices, organization of people and innovative use of P.L. 480 funds. These experiences should be shared, perhaps through the Club du Sahel network. However, to do so will require documentation of results.

Recommendations -

- * The use of marked stakes to measure soil erosion or accumulation in areas where conservation treatments have been applied, compared with untreated control areas.

- * A thorough sampling of tree seedling survival over time, noting the apparent cause of mortality - grazing animals, drought, thin soil or improper planting.

- * Trips to the field during major rainfall events to observe first hand the dynamics of water-borne soil movement and the effectiveness of erosion control measures. Field observations should be immediately compared with locally collected rainfall amount and duration data.

- * The location of rain gauges at nurseries or rural schools using a cooperating or paid recorder to establish a minimal information base, at least for major events.

4. **Watershed management planning** - It was found that the wide range of activities being implemented within the watersheds would yield a higher level of development benefits if activities were part of a more clearly defined watershed management program. Such a program would establish an appropriate sequence of activities, both geographically and in time, and an optimum level of emphasis that should be given to different tasks. A viable plan is based on a set of objectives rooted in a realistic assessment of what is physically, technically, socially and economically feasible.

Recommendations -

- * Using whatever maps and aerial photography available, have an experienced geomorphologist go into the field with WDP foresters and agronomists to identify problems and opportunities. The geomorphologist can rapidly apply battlefield triage to each watershed, indicating (a) what areas and processes are too costly to treat, (b) what areas are either not seriously degrading or which will recuperate with minimal intervention, (c) where to focus major project efforts in order to realize the most on-site and downstream benefits, and (d) what modifications in conservation techniques might be more effective.

* A thorough analysis of management options by a resource economist would assist greatly in providing additional criteria upon which to base WDP strategies for the future.

5. Planning and Coordination - An Interagency Coordinating Group was originally envisioned as being essential to efficient project functioning and accountability. It has been found that effective communication among government departments with respect to complementary programs would be valuable to the WDP.

Recommendations -

* The evaluation concurs with the decision of AID to encourage the convening of meetings of the Interagency Coordinating Group at least quarterly in order to provide the opportunity for information exchange.

* Coordination in the elaboration of WDP annual plans in the framework of the five year rural development plan would contribute to greater recognition and potential for continuity beyond the project PACD.

* John Lewis, in his rapid assessment of the WDP in December of 1987 notes that government programs are stretched to the limits of their resources in achieving their own goals, making extra efforts associated with integration of programs not feasible (p. 23). This perspective does not preclude exchange of information.

* Promote the coordination among donors to assure compatibility among projects and minimum competitive stress on GOCV counterpart personnel.

6. The Rural Assistance Program (RAP) - The RAP has been a highly successful, largely because of its flexibility, innovativeness and close linkages to the communities in which it works. Its 23 village level extension agents provided advice and guidance in the building of simple physical structures, nutrition, health, farming systems and aided in the management and supervision of community based work fronts that perform the labor on physical structures.

Recommendations -

* The evaluation team recommends that steps be taken to integrate the RAP into the National Extension Service. The reason cited is the real hazard that the RAP, which was created as part of the WDP, would be disbanded once the project is phased out.

* John Lewis' assessment advocates a opposite direction for integration (p. 26); the gradual absorption of RAP animators, as cooperative staff, into the community work fronts.

7. Cultural assessment - It has been found during the project that community-based work fronts are more productive than the traditional and that there is a widespread interest in tree planting by individuals. It is recommended that more be learned about those aspects of Cape Verdean culture directly relevant to the effective motivation of people to participate in subsidized conservation and production activities.

Recommendations -

* Assess the actual and potential role of women in rural life; providing fuel and water, animal management, crop production, household gardening, food processing and decision-making.

* Evaluate existing attitudes and practices in the management of livestock and forest/vegetation resources.

* Assess skills and experience in soil conservation, especially in the construction and maintenance of terraces.

* Determine the effect of land tenure; particularly share cropping, holding size and degree of fragmentation; on participation in conservation activities.

* Establish the importance of community organizations in carrying out conservation and maintenance activities.

8. Benefits and costs - It is possible to say with confidence that project benefits exceed costs if we allocate the benefits from government expenditure of local currency funds to income generation. Of more interest, however, is the benefit/cost relationship between increased food and fodder production, increased water supply and reliability, and flooding reduction on one hand, and overall local currency and dollar technical assistance expenditures on the other.

Recommendations -

* In forestry measure - Survival rate and growth increment of trees planted, values assigned to firewood, poles, fodder and fruit projected from planted trees, soil conservation benefits attributable to catchment dams (caldeiras) constructed and surviving trees, and the

benefits attributable to reduced pressure on fragile upper watershed areas.

* In agriculture measure - Increased area of potentially productive soil accumulated behind various infrastructural works, yield potential from increased irrigation capability, crop yield increase attributable to nitrogen fixing cover crops and to organic matter from tree leaves and cover crops, and actual increases in crop and animal production from treated areas as compared to controls.

* Contract a resource economist well versed in calculating and monetizing conservation benefits such as those mentioned above. The first task of the economist will be to design monitoring strategies to provide more accurate measures for end-of-project calculations. This recommendation is supported by John Lewis in his December report, p. 21.

9. Computer Enhanced Aerial Photography - The photography of the Island of Santiago is nearly complete. The data base these photographs will provide is potentially useful to the GOCV as well as to donor agencies for project planning and implementation, especially in the area of watershed management planning and correlation of meteorological and hydrological monitoring data. A decision to extend photographic coverage to include the entire country is premature. Several questions are unanswered. What is the quality of the original photography? Will personnel be available to utilize the equipment and generate the information? Once the information is generated will it be used effectively? Specifically, will watershed monitoring actually be carried out?

Recommendation -

* Delay further acquisition of aerial photography until the quality of existing photography has been evaluated, the feasibility of its use has been assessed, and the contribution to achieving stated project objectives has been reevaluated.

LESSONS LEARNED

1. That the Cape Verdean rural people have characteristics closely related to their cultural history which strongly influence what approaches to watershed development will be successful. An example is the reciprocal work system, djunta mao, and its influence on the success of the community based work fronts.

2. That conservation activities do have a significant positive effect on the production of food and feed, although it is predicted that further increases are feasible with modifications in cropping practices, crops and animal management, and use of irrigation where appropriate.

3. That watershed management planning can lead to more efficient use of funds, labor and materials. particular attention should be given to the appropriate interventions in upper watershed areas.

4. That monitoring of key natural processes that affect project activities, as well as the activities themselves, is a valid use of project funds and personnel. Most of the monitoring can be carried out without the need for sophisticated equipment or specially trained personnel.

13. OVERALL CONCLUSIONS AND RECOMMENDATIONS

From an overall perspective watershed management interventions have been successful. Refinements and alternatives are suggested, some represent opportunities created by successes during the past two years. The linking of PL 480 and watershed development activities has proved to be a cost effective mechanism for development project implementation. It is an assumption of the TR&D evaluation that the PL 480 program will continue and that watershed development activities with a strong food production component will continue to have a high priority with AID and the GOCV beyond the 1990 PACD of this project. The major findings and recommendations below should be considered by decisionmakers in USAID and the GOCV. The body of the evaluation contains more detailed commentary of potential interest to technical implementation staff.

1. **Future food production** - It is a stated goal of the Project to reduce chronic food shortages in Cape Verde. A measure of progress will be decreasing dependence on P.L. 480 food sales and a consequent decrease in the funds available to support watershed development activities. This leads to the need to identify and subject to benefit/cost analysis those interventions with readily identifiable production benefits which are in turn feasible under minimal subsidy, such as "djunta-mao" reciprocal labor arrangements. Soil stabilization structures and multiple use tree plantings now offer the opportunity to introduce crops, crop management practices and animal production techniques which will both result in further production increases as well as contribute to the conservation of the soil resource.

Recommendations -

- * Explore how the results of community forestry, agroforestry and farming systems projects elsewhere in Sahelian Africa could be applied to take advantage of advances in soil and water conservation.

- * Take full advantage of opportunities to augment the use of irrigation in concert with improved crops and cropping systems. Irrigation to provide crop security during the normal planting cycle is generally more cost effective and socially equitable than dry season irrigation as a first step.

2. **Investments in the public interest** - Management of public lands in upper watersheds, flood control and prevention of salt water intrusion are all bonafide areas of public investment which farmers are unlikely to undertake because of

the cost and lack of associated direct benefit. Tree planting in upper watershed areas should be examined carefully from a benefit/cost perspective. Tree planting is logistically difficult and costly per hectare in remote areas. If survival rates are high, growth rates acceptable, and the products in demand, then such plantings may be justifiable. Generally this is not the case. The upper watershed area in need of vegetative cover for erosion control is so vast that tree planting will not make a dent in the problem - needed first is success in fuel and fodder production on-farm where people have a vested interest in seedling survival. Then education in non-destructive livestock management and fuelwood collection in upper watersheds can be more successful. A soil conserving cover can begin to reestablish itself with minimal intervention, and planting efforts concentrated on the optimum sites.

Recommendations -

- * Determine if an optimum distribution of effort is being made in the use of scarce funds and trained leaders between works that will always have to be government financed and those which have the potential of becoming profitable activities of individuals or local organizations.

- * In relation to the above recommendation - public works, such as roads having a diffuse benefit stream, should be performed by traditional work fronts, on a piecework basis if appropriate. Where benefits to individuals or groups within a defined community are evident, then community based work fronts should perform the work.

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Recommendation

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14. COMPONENT-SPECIFIC RECOMMENDATIONS

Soil and Water Conservation

(a) The Directorate should have a technical section headed by a professional hydraulic engineer, preferably a Cape Verdean, who is responsible for the quality and scheduling of the coordinators' work. This person would be a counterpart to the project's hydraulic engineer. Antonio Sabino, now studying in the U.S. on a M.A. degree in hydrology and irrigation will probably assume this responsibility upon his return to Cape Verde. The duties suggested for this position include:

- 1) The allocation of new construction and maintenance in the watersheds.
- 2) The type of structures needed in the upper as opposed to the lower watersheds.
- 3) The types of vegetative controls needed.
- 4) The design of the structures.
- 5) Collection and analysis of hydrology, geology and soils data for each site.
- 6) Control and scheduling of materials, machines and labor.

(b) The AID project manager should be involved in the development of the annual work plan to ascertain that it reflects the objectives of the project paper and its amendments. The project should continue the building of appropriate pathways or roads in the watersheds areas.

(c) Technical recommendations for improving the quality of structures are as follow:

- 1) Greater use of convex dams.
- 2) Less reliance on concrete and greater use of gabion wherever a dam rests on soil rather than rock.
- 3) Dams with upstream sloping.
- 4) Dam wings sloping toward the spillway.
- 5) Longitudinal embankments covered by gabions.
- 6) Greater use of a double layer of gabions as aprons to dissipate the water force on the spillway.
- 7) Installation of graded filters on the upstream faces of caption dams to filter and collect sediment free ground water
- 8) Low gabion walls connecting opposite groins.

(d) More attention should be paid in the identification, measurement, protection, and putting into cultivation the arable land created behind the dams.

(e) Priority should be given to completing those structures under construction and to maintenance and repair of the others damaged.

(f) The employment as soon as possible of a mechanic-operator to

train Cape Verdeans in the operation and service of the heavy machinery and vehicles. This would reduce down-time on equipment by at least 25 percent.

Forestry Recommendations

Community forestry -

(a) Set objectives and targets according to a new approach directed to the development of community forestry which will promote the involvement of villagers in watershed conservation and train local leaders and the present staff of the forestry component in community forestry practices.

(b) Introduce family-operated nurseries along with encouraging private planting.

(c) Develop community forestry systems on farms in rainfed areas as well as in valleys.

(d) Introduce management plans tailored to specific groups of farmer's needs within a subwatershed on an experimental basis under the direction of local forestry committees.

(e) Develop applied forestry research oriented to community forestry development.

(f) Provide formal training at the M.S. and B.S. levels in community or social forestry.

(g) Seek introduction of land reform measures and modification of forestry legislation to support, motivate and involve villagers in watershed conservation.

Nurseries - An increased effort is needed to teach nursery operations and planning to the head of the nursery to increase their effectiveness and enable them to undertake the responsibility of seedling production. These plans should include timely seed collection, the species to be collected, the cleaning and storage of seeds, and the raising of an adequate number of seedlings for plantations and private planting.

Species Selection - A prime objective of the project is to reforest bare land as quickly as possible in order to protect the watershed. Although of less immediate benefit to the villagers, this objective gradually improves water quality, stabilizes steep slopes and moderates runoff. The restoration process is lengthy. Considerable attention should be given to the species that have proven hardy and are capable of being established on highly degraded land. Once an initial cover of hardy species is established other stages in the restoration process are possible.

Fruit and medicinal species - The forestry component has the capacity to provide for private plantings of fruit trees, medicinal trees and, possibly, plants which provide raw materials for cottage industries, for example, jatropha seeds for soap industries and opuntia for cosmetic industries. More research is required to evaluate species and if they are of sufficient benefit to be incorporated into project plans. However, the prime objectives of the forestry component to generate fuelwood and fodder should not be lost.

Laws affecting tree use - The implementation of management plans require the amendment of provisions of forest legislation to regulate the harvesting of forest products by villagers. Forest legislation presently excludes private landowners or communities from tree ownership and prohibits villagers from pruning and thinning trees on their own initiative. For these tasks legal authorization is needed. These rules have negative repercussions on the motivation of villagers and communities for planting trees.

Research - A community forestry field research plan and action to implement it are needed. Some preliminary silvicultural research is being conducted to test species in different ecological conditions. This work is a good start and a training exercise for future programs and should be continued.

Goals and targets in forestry - Project goals need to be more flexible. Consideration should be given to the organization of a pilot community forestry program to contribute to the development of rural communities. The goals behind this approach are to help communities establish a process of self-development through strengthening local institutions involved in conservation and forestry. Community forestry should be realistic with regard to present project capabilities. They should recognize that any significant improvements of ecological conditions and forest conservation will come from healthy trees established and cared for on bare land and from private tree plantings by farmers on their own land. Success will also depend on the adoption by field foresters of an extension and advisory role in their relations with farmers.

Technical operations - The present aim should be to support the permanent nurseries and to relocate some nurseries closer to plantation sites. A large number of small family nurseries should be established by renting private farm land and engaging family members as nursery laborers. This would expand seedling production, ease transportation problems, create employment and act as an extension promotion tool. Greater attention should be paid to:

(a) Preparing a nursery operations plan to include timing schedules for seed collection, seed treatment, soil mixtures ,

potting, sowing, caring for and selection of stock.

(b) Teaching nursery heads to make operation plans and enable them to obtain high quality vigorous stock.

(c) Obtaining good quality seed of suitable species and placing more reliance on well known species.

(d) Providing family nurseries with adequate materials such as plastic bags, seeds, fertilizers, watering equipment and technical assistance.

(e) Protecting nursery sites from animals such as goats and from seed destroying agents.

Protection - Promotion of the involvement of villagers in grazing control through community management organizations. Grazing control can have the multiple benefit of protecting tree seedlings reducing erosion, and contributing to increased animal production.

Private planting - In order to encourage private planting by farmers the following trials and demonstrations should be undertaken:

(a) Increase free seedling distribution for private planting. Technical assistance and training of villagers should be provided in site selection, planting methods and care after planting. Records of private planting should be kept by controllers and nursery heads.

(b) Develop agro-forestry systems as a sound use of farm lands, assessing the agro-forestry methods such as single tree planting, line or row plantings, group planting, home gardens and edge planting; improving these methods in terms of spacing, mixtures, intercropping multi-purpose species with annual and perennial crops and, management practices such as pollarding, lopping and coppicing; assessing sylvo-pastoral systems and introducing management systems such as stall feeding.

(c) The areas selected for these trials must be easily accessible to fulfill the demonstration purpose. Since the demonstration is on private land, the owners may either be convinced of the benefits of the planting or be given trees as incentives. Data on crops tilled with trees and without trees can be collected to show whether the combinations have any undesirable effects.

Forest management plans - Because grazing problems and the tendency of harmful methods of fuelwood harvesting by villagers contribute to deforestation, work should begin with the forest management of critical areas of the watersheds. The adoption of

a management plan for the forest area would serve two purposes:

(a) it would inform the local people and communities about the benefits of community forestry and provide a feeling of participation among the villagers, and

(b) regulate the use of forest resources.

Management committees - At present, community based work fronts whose members perform labor for a daily wage in building physical structures and tree planting, operate within the project area. However, this organization is not yet committed to the maintenance and repair of the structures build on their land. Community participation should be broadened to include other members of the community and local leaders on a management committee. The formation of forestry committees require plans which will lead to concrete benefits from the management of forest resources. Therefore, in promoting involvement in watershed conservation, priority should be given to making these plans and committees functional during the remainder of the project.

Forest policy - More training is needed for extensionists, mid-level supervisors (foremen, nursery heads, forest watchers and local leaders) in community and forestry issues. Training should also be provided for coordinators and controllers.

A new policy supporting community forestry activities should be formulated that would adopt simple procedures for the transfer of forest lands to any village with terms and conditions for reforestation and forest management prescribed that would ensure that villages or communities receive equitable benefits.

Rural Assistance Program Recommendations

The RAP should be continued and strengthened. This can be accomplished by:

- a. Continuing education and training in extension techniques;
- b. Expansion of the RAP into watershed areas where favorable conditions exist for their effective operation;
- c. Reduction or elimination of activities in watersheds where favorable conditions do not exist or where for other reasons (labor competition, for instance) the RAP faces serious handicaps.
- d. Provision for training members of the governing committee in the purposes and management of the individual savings plan with the goal of eventually establishing credit cooperatives in the committees served by the watershed project.

e. Integration of the RAP into the National Rural Extension Service (or other appropriate agency) so as it will not be disbanded when support under the WDP terminates.

f. Improvement of the presently used foot trails. Access to the area visited was difficult, often over rocky foot trails crossing rugged terrain. Members of the community must traverse these trails for necessities; education, medical attention, commercially produced provisions and in many cases, water.

These improved paths could, in most instances, follow current trails. When these trails cross stream beds a small check dam could serve as a bridge. Local materials and local labor should be used for this purpose.

g. A replacement is needed for Mr. Silva, the RAP coordinator, when he returns to his duties at INIA early next year.

P.L. 480 Recommendations

Recommendations related to the PL480 side of this evaluation must be considered in light of the major question of whether the WDP has been a success. There is no indication that any of the problems cited here for PL480 have negatively affected project activities and, in the light of a positive evaluation of the watershed work, revision and extension of the PL480 Title II, Section 206 program is warranted. Recommendations are:

(a) USAID and MPC must take immediate steps to organize and activate the National Level Inter-Agency Coordination Group. The Group should hold quarterly meetings during 1988 and should serve as the key to bringing reporting on all project activities up to date.

(b) USAID, MDRP and MPC should establish a list of allowable charges to PL480-generated funds prior to the start of 1988 work and a system for periodic checking of vouchers should be established.

(c) USAID or MPC, or both, should provide necessary staffing to assure monitoring of PL480 commodities and funds.

(d) The Section 206 Transfer Authorization should be amended prior to any call forward of PL480 corn for 1988. The amendment should include:

i) An increase of the annual level of corn to 20,000 MT to assist the GOVC in meeting food needs (increase of about 5,000 MT corn since 1984) and to provide funds to expand watershed work. The indicative budget in the TA should be brought into line with current needs.

ii) Addition of two years (1989 and 1990) to the life of the PL480 program to bring local currency support into line with the DA funded project's new completion date of June 30, 1990.

iii) The formation and functioning of the National Level Inter-Agency Coordination Group as a requirement of the agreement.

iv) Clearer definition of, and new completion dates for, Self-Help Measures #2 and #3 and the addition of a new Self-Help Measure for 1989-90.

v) Renegotiated storage, transport and distribution costs allowable for EMPA and consideration of their "needs list."

vi) Language that clearly details approved uses for local currency in the watershed development project.

vii) Language to allow substitution of other commodities for corn when requested and to provide duty-free entry of all PL480 commodities.

viii) USAID and MPC should take immediate steps to reconcile or recover funds in excess of charges allowed by the TA. Recovery should include customs duties paid during 1986 and 1987,

ix) USAID should follow up on the provision of corn discharging machinery for EMPA.

Procurement Recommendation

Purchase the following commodities:

1 low-boy for the transportation of heavy equipment with spare parts.

1 maintenance truck with equipment and spare parts.

100 all-steel wheelbarrows. 3 cubic foot capacity.

4 large blackboards.

1 slide projector.

Watershed Monitoring Recommendation

Since the project description includes research only incidentally, it is recommended that the watershed monitoring responsibilities and equipment be transferred to INIA.

Long and Short Term Training Recommendations

(a) There is a conspicuous lack of trained surveyors, topographers and draftsmen. Short-term training in these skills should be provided at a technical level in-country. For this purpose the project should employ an instructor.

(b) Although forestry and extension are critical elements for the success of the project, no provision was made in the training plan for these two fields except for extension short courses for RAP extensionists. Long and short-term training in these areas is needed.

(c) The sixth long-term degree participant program should be for undergraduate study in construction management.

APPENDICES

APPENDIX I

**EVALUATION TEAMS, TECHNICAL ASSISTANCE TEAM AND USAID
PERSONNEL IN CAPE VERDE**

Evaluation teams

Two evaluation teams were fielded for the evaluation of the WDP; one by USAID, one by the GOCV. Their composition and responsibilities follow:

**U.S. Agency for International
Development**

John Saunders, Team Leader
Extension and Community
Development Specialist

Leonidas Vega, Forestry
Specialist

Henry Kernan, Soil and Water
Conservation Specialist

Walter Rockwood, PL 480 Program
Food Aid Specialist

Government of Cape Verde

José Luis Rocha, Team Leader
Bilateral Relations & Food
Aid Specialist

Carlos Monteiro, Extension
and Community Development
Specialist

Manuel Delgado, Forestry
Specialist

Daniel Horta, Soil and Water
Conservation Specialist

Elizabeth Silva, Economist

Technical assistance team

Sheladia Contract

Robert Pierce, Team Leader, Hydrologist
Paul Thiesen, Forester,
Nick Nikitas, Engineer, under Oregon State
University sub-contract

USAID/Praia

José S. Goncalves, Watershed Development
and Food Aid Project Manager

APPENDIX II

SCOPE OF WORK

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ARTICLE III - STATEMENT OF WORK

A. Evaluation Design - The mid-term evaluation shall be a formative or process evaluation. Specifically, the evaluation design shall make use of a multimethod strategy to collect and analyze data from a comprehensive perspective to assure that the broadest possible picture of the project is obtained. Both quantitative and qualitative data shall be used to provide a comprehensive assessment of the project as well as to interpret evaluation data in such a way as to clearly indicate future directions in the course of project implementation.

B. Levels of Analysis - The evaluation shall analyze the project based on its logical framework and from various levels including institutional, management and operational levels. The evaluation shall look at the level of institutional and organizational development to date to determine the relative importance GOCV accords the project within the broader context of watershed development on a national basis. At the management level, it will assess the level and adequacy of management guidance and support provided by AID, GOCV, project coordinator and the technical assistance contractor and subcontractor. Finally, the evaluation shall look at the operations level to determine the adequacy and performance of project implementation in the field. By means of a thorough review of project documentation, reports and field visits to project sites, the effectiveness of structures and measures taken to conserve and develop soil and water resources at the project designated watersheds will be assessed.

C. General Statement of Work - Under the terms of this scope of work the Contractor shall perform the following tasks:

1. Assess and quantify where possible the level of project completion as compared with objectives established in the Project Paper;
2. Assess the quantity and quality of project outputs as compared to those stated in the Project Paper;
3. Assess the level of timeliness of project task completion and identify its impact on overall achievement of project objectives;
4. Assess the level of project implementation performance with respect to quantity, quality and timeliness of project inputs and outputs;
5. Assess the overall level of project implementation performance to date in terms of its compliance with the terms of the bilateral agreement;

6. Make specific recommendations based on study findings for policy, management and operation actions to assure the successful attainment of project objectives.

D. Specific Duties - To obtain necessary data, the evaluators shall perform at least the following tasks:

1. Meet with appropriate members of the following ministries, institutions and organizations to assess overall project coordination, management and implementation:
 - Ministry of Rural Development and Fisheries
 - Ministry of Planning and Cooperation
 - Ministry of Finance
 - National Development Fund (NDF)
 - EMPA
 - Directorate General of Soil and Water Conservation and Renewable Energy
 - USAID/Praia
 - Sheladia Associates (Field Office)
 - Oregon State University (Subcontractor)
 - Other Organizations, as appropriate
2. Review at least the following types of pertinent project plans, studies, reports and communication documents:
 - Project Agreement Documents
 - Project Paper
 - Project Reports
 - Background (and other relevant) Reports
 - Internal and External Communication Documents
3. Make visits to a representative sample of project sites to observe the soil and water conservation structures built and other measures taken to date:
 - Assess quantity and quality of the following:
 - * Contour furrows
 - * Rock stabilizing terraces
 - * Check dams
 - * Subterranean catchment dams
 - * Channel stabilization groins and embankments
 - * Miscellaneous structures
 - Assess the soundness of structures built:
 - * Appropriateness of design and site location
 - * Appropriateness of materials used in terms of terrain conditions
 - * Present condition of structures

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- Assess the quantity and appropriateness of biological measures taken:
 - * Number of trees planted
 - * Other vegetative cover measures taken
- Assess the level of maintenance measures built into the program in terms of:
 - * The degree of attention paid to maintenance in comparison to construction of SWC structures.
 - * Maintenance built into the program or performed on an ad hoc basis.
 - * Methods and procedures on monitoring and periodic surveys to determine structure condition.
 - * Repair of structures done to original design and materials or are efforts made to improve structure design or material limitations.
 - * The level of community participation in the maintenance of SWC structures and measures.
 - * Steps taken to create greater community involvement in SWC measures.
- 4. Assess the role and effectiveness of the rural assistance program (RAP) in project designated areas with respects to:
 - The type and appropriateness of technical assistance provided in the field;
 - The types and effectiveness of technical assistance provided to farmers in the watershed areas;
 - The level and appropriateness of assistance provided in the area of soil and water resource utilization;
 - RAP agents' role in the construction and maintenance of SWC structures and biological measures;
 - The quality and appropriateness of SWC structures built and/or maintained in RAP project areas as compared to those in non-rap areas;
 - Steps taken to integrate RAP into the national extension service;

- The anticipated obstacles in achieving full integration of RAP into the National Extension Service.
5. Assess the level of coordination of research and extension in soil and water resource utilization in terms of:
- The AID-supported network of field agents and a separate food crop research project linked in implementation;
 - The degree to which the research project offers training opportunities to the rural assistance field agents;
 - The degree to which the research personnel have access to farmers through the field agents;
 - The use and the proposed use of the set aside fund for extension training and coordination.
6. Describe and assess the steps taken to institutionalize a hydrological monitoring system in terms of:
- The level and appropriateness of short-term technical assistance provided;
 - The level and appropriateness of hydrological training undertaken;
 - The level of commodity support to improve the collection and analysis of hydrological data;
 - The level of cooperation and coordination between the project's hydrological monitoring system and the sahel regional agreement in data collection and analysis;
 - The level of cooperation with other GOCV agencies and institutions with similar objectives.
7. Assess the level of progress in meeting long and short-term training objectives as described in the training plan in terms of:
- The number, level and specialization of long-term U.S. degree participants in soil and water conservation-related disciplines;
 - The number, quality and type of short-term training provided in the various soil and water conservation areas; and

- The integration of trained participants in the watershed development project.
8. Assess the role of the technical assistance team (contractor) in the development of watershed development plans with respect to:
- The development and refinement of the annual rural development plans;
 - Progress made in the development of a comprehensive master plan for watershed development in the designated project areas.
9. Determine progress made in the construction of two office buildings and storage areas to meet the expanding watershed development needs in terms of:
- The buildings' construction and completion schedules;
 - The quality and appropriateness of buildings constructed or under construction; and
 - The cost/effectiveness of buildings constructed or under construction.
10. Assess the project management structure and organizational development to determine the following:
- Relationship of project management structure to MDRP;
 - Relationships of project management to USAID, the technical assistance team and interacting GOCV institutions;
 - Adequacy of project management and administrative staffing;
 - Adequacy and appropriateness of project technical staffing by functional areas;
 - Role played by the technical assistance team in project implementation;
 - Appropriateness and relative cost/effectiveness of the current technical assistance strategy with respect to project implementation needs;
 - Suggested alternatives for a technical assistance strategy after termination of the present technical assistance contract.
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E. PL-480 Issues - Review and assess PL-480 program implementation in Cape Verde with respect to the following questions:

1. Required reports are properly prepared and are submitted on a timely basis.
2. Program reporting requirements are realistic in terms of GOCV institutional and human resources limitations.
3. Adequate accounting is maintained over the arrival, storage, shipment, and distribution of the donated commodities; including the establishment of a separate account for PL-480 commodities.
4. Proper facilities exist for storage and handling to ensure ultimate distribution of the commodities in good condition.
5. Proceeds from sales of commodities are accounted for and used only for approved program expenses.
6. Commodities unfit for human consumption are promptly reported and disposed of by approved methods.
7. The amounts of local currency generated have been sufficient to pay the stipulated number of project workers.
8. Adequate supervision is being provided to the program.
9. Commodities and proceeds are flowing as planned.
10. Are funds being transferred from EMPA, NDF and MDRP to make worker payments on a timely basis?
11. Determine the level of program compliance with the terms of the transfer authorization and grant agreement.
12. Recommend specific guidance for a next phase (FY 88-92) PL-480 Title II, Section 206 program, or other type program, as appropriate.

ARTICLE IV - REPORTS

The contract evaluation team shall be responsible for producing two reports. The first is a draft report to be provided while the team is still in-country and left with USAID/Praia prior to the team's departure from Praia. The contract team leader shall be responsible for coordinating the writing of the draft report and he shall integrate each team member's section into a succinct and cohesive report draft.

from USAID and the GOCV, the draft report shall be submitted within 30 days for final writing and editing. Following the incorporation of the appropriate comments and suggestions, a succinct and clearly written final report shall be produced and submitted to USAID/Praia no later than 30 days following the submittal of USIAD's commented report draft. The principal team leader shall have editor-in-chief authority in the writing and editing of the final report. A suggested outline for the final report follows:

- An Executive Summary
- A brief description of the study approach, data collection methods and procedures, data analysis and problems encountered
- A thorough discussion of the study findings, supporting data and analysis
- Summary and conclusions identifying project performance and future directions
- Recommendations directed at policy, organization, management, and project day-to-day field operation

Twenty copies of the final report shall be submitted to USAID/Praia for review and approval within 60 days after the principal evaluation team departs Cape Verde. The final report should strive for brevity, succinctness, clarity and should present data in an illustrative and appealing format.

ARTICLE V - RELATIONSHIPS AND RESPONSIBILITIES

The Project Manager for this evaluation is the Project Management Assistant, USAID/Praia. The evaluation team will work under the direction of the Project Management Assistant, and under the general direction of the Agricultural Development Officer and the AID Representative, USAID/Praia.

The Evaluation Team - Two evaluation teams will be employed in conducting the mid-term evaluation. The contractor's team of three specially selected consultants from the United States will be chiefly responsible for the evaluation mission and its outcome. Additionally, one USAID food aid specialist provided by REDSO/WCA will work closely with and as a member of the contract evaluation team. A counterpart team of Cape Verdean experts will also be assembled locally to work alongside the principal evaluation team to provide assistance in the collection and analysis of data. The two evaluation teams are designed to compliment one another and will work jointly and cooperatively to assure the highest quality product possible. The teams will also draw input from AID/Praia, AID/W and REDSO/WCA evaluation and design staff.

Team Composition - The contractor's team will be composed of one expert in each of the following technical areas:

- Economist, Chief of Party
- Watershed Management Specialist
- Forester

APPENDIX III

CAPE VERDE WATERSHED DEVELOPMENT - (655-0013)
LOGICAL FRAMEWORK

LOP Funding - \$5.5 million (DA)
\$7.0 million (PL480)
PACD - 9/10/88

NARRATIVE SUMMARY	OBJECTIVELY MEASURABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS																		
<p><u>Goal:</u> 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 purposes - Increased agricultural production within project watersheds 	<p>GOCV and International Donor Reports on food production</p>	<ol 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 agricultural production 																		
<p><u>Purpose:</u> To develop and protect the soil and water resources of the project-designated watersheds</p>	<p><u>End of Project Status:</u></p> <ol style="list-style-type: none"> 1. Watershed Development plans accepted and used by GOCV 2. Data-based justification of agriculture strategy developed 3. Community-based system for maintenance exists for SMC structures. 4. Report to determine investment potential of watersheds complete 	<ol style="list-style-type: none"> 1. Project Evaluations 2. Land use maps 3. USAID reporting 	<ol style="list-style-type: none"> 1. Farmers will invest more in agriculture on secure land. 2. Project watersheds have potential for increased agricultural production. 																		
<p><u>Outputs:</u></p> <ol style="list-style-type: none"> 1. Physical SMC structures 2. Water Resources Monitoring System (Data collection & Analysis) 3. Support system for rural assistance workers (extension) 4. Refined watershed development plans 5. Trained personnel 	<ol style="list-style-type: none"> 1. Aerial photos analyzed 2. 6 long term degree participants 3. Physical structures complete <ul style="list-style-type: none"> - 7,500 has contour furrows - 1,000 has rock-stabilized structures - 2,600 check dams - 10 subterranean dams - 4,000 m. embankment groins - 1,000 person days in vegetative measures per year 	<ol style="list-style-type: none"> 1. Project Evaluation 2. USAID/GOCV reports 3. Financial Records (EMPA, MLP, FND) 4. Contractor reports 	<ol style="list-style-type: none"> 1. SMC technology appropriate for Cape Verde 2. Local labor exists in sufficient supply. 3. Interagency cooperation realized 																		
<p><u>Intermediate Output:</u> Deployed rural labor force</p>	<ul style="list-style-type: none"> - local currency expended in a timely fashion 																				
<p><u>Inputs:</u></p> <ol style="list-style-type: none"> 1. U.S. <ol style="list-style-type: none"> A. PL 480, Title II, Section 206 (local currency for salaries) B. Development Assistance <ol style="list-style-type: none"> 1. Technical Assistance 2. Training 3. Commodities 2. GOCV <ol style="list-style-type: none"> A. Personnel, office space, recurrent costs, etc. B. Training of rural assistance workers. 	<p><u>Part I</u></p> <ol style="list-style-type: none"> A. Budget <ol style="list-style-type: none"> 1. PL 480 (see Financial Breakdown) \$7.8 million 2. Development Assistance \$5.5 million 3. GOCV contribution \$1.1 million 	<p><u>Part II</u></p> <ol style="list-style-type: none"> B. Scheduling (millions) <table border="1" data-bbox="1349 1197 1614 1340"> <thead> <tr> <th>Year</th> <th>DA</th> <th>PL 480</th> </tr> </thead> <tbody> <tr> <td>1984</td> <td>1.611</td> <td>--</td> </tr> <tr> <td>1985</td> <td>2.0</td> <td>1.95</td> </tr> <tr> <td>1986</td> <td>1.5</td> <td>1.95</td> </tr> <tr> <td>1987</td> <td>.389</td> <td>1.95</td> </tr> <tr> <td>1988</td> <td>--</td> <td>1.95</td> </tr> </tbody> </table>	Year	DA	PL 480	1984	1.611	--	1985	2.0	1.95	1986	1.5	1.95	1987	.389	1.95	1988	--	1.95	<ol style="list-style-type: none"> 1. Approval and funding of DA and PL480 assisted components occurs in a timely fashion 2. USAID/Prata Project officer position is refilled promptly.
Year	DA	PL 480																			
1984	1.611	--																			
1985	2.0	1.95																			
1986	1.5	1.95																			
1987	.389	1.95																			
1988	--	1.95																			

LOGICAL FRAMEWORK

APPENDIX IV

PERSONS CONTACTED BY EVALUATION TEAM

Government of Cape Verde

Baptista Andrade, Joao National Rural Extension Service

Batalha Lopes, Humberto Assistant Coordinator of Extensionists,
Rural Assistance Program

da Silva Soares, Horácio Director, National Institute for
Agricultural Research

Delgado, Manuel Forester, Ministry of Rural Development and
Fisheries

Frederico, António Head of the Concelho in Tarrafal

Gonçalves, José Project Manager, WDP and PL 480, Agency for
International Development, Cape Verde

Horta, Daniel Hydraulic Engineer, Ministry of Rural Development

Monteiro, Carlos Extension Agronomist, Ministry of Rural
Development and Fisheries

Rocha, José Luis Head, Bilateral Cooperation, Ministry of
Planning and Cooperation

Rodrigues, Estevao National Institute of Cooperatives

Silva, Amadeu Watershed Project Coordinator for the Ministry of
Rural Development and Fisheries

Silva, Elizabeth Agricultural Economist, Ministry of Rural
Development and Fisheries

Vera-Cruz, José Head, General Directorate for Forestry, Soil
Conservation and Agricultural Engineering, Ministry of Rural
Development and Fisheries

USAID/Cape Verde Personnel

Luche, Thomas Country Representative, Agency for International
Development

Marcarian, Victoria University of Arizona, Food Crops Research
Project Agronomist

Long-Term Contractor

Nikitas, Nick Soil and Water Conservation, Sheladia Associates

Pierce, Robert Hydrology, Sheladia Associates Team Leader

Thiesen, Paul Forester, Sheladia Associates

Other

At least 50 persons were interviewed during field visits to the watersheds including RAP extensionists, members of community based work fronts, members of governing and community committees, workers and others.

Cardoso, Placido Technical Office, EMPA, Praia

Chaves Samedo, Aristides Watershed Coordinator

Concecao, Adriano Department of Finance, EMPA, Praia

de Leethavwer, Eddie FAO Forestry Officer

de Sousa Pinto Frederico, António Coordinator

dos Santos, Manuel Controller - Sao Miguel

Duarte Silva, Aida Department of External Trade, EMPA, Praia

Fernandes, Maria Amelia Department of Stock Management and Distribution, EMPA, Praia

Fortes, Fatima Head, National Development Fund, Praia

Gonçalves, Manuel Agostinho Controller - Sao Tomé/Portete

Leal Tavares, Sérgio Controller - Cumba

Lopes, Laurenço Regional Delegate, EMPA, Tarrafal

Maricao, Daniel Manager, EMPA Silos, Praia

Mascarenhas, Orlando Director General, Empresa Publica de Abastecimento (EMPA), Praia

Mendes dos Reis, José Elías Coordinator

Moreira, Maria Manuela Nurseyman - Cumba

Pacote, M. Controller em Ponta de Forno

Reis Brito, José David Coordinator

Silva, Raul Regional Delegate, EMPA, Sta. Catarina

Tavare, Albertina R. Nurseryman - Picos (Jusante)

Field Personnel of WDP:

Chaves Semedo, Aristides Coordinator

da Silva, Amadeo António Project Manager of PAR

de Carmo Rodriguez, Maria Nursery Foreman, M. Faleiro

de Santo, Pedro Forest Watcher, Cumba

de Santos, Manual Controller, San Miguel

Landim, Cirilo B. Nursery Foreman, Flamenges

Mendes Dos Reis, José Elías Coordinator

Moreita, Maria Manuela Nursery Foreman, Cumba

Pacote, M. Controller, Ponta de fundo

Reis Brito, José David Coordinator

Tabares, Alberina R. Nursery Foreman, Picos (jus)

Tabares, Sergio Leor Controller , Cumba

APPENDIX V

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APPENDIX VI

TRAINEES

Long-term, now in the U.S. seeking degrees:

dos Anjos, Carlos B.S. physical geography

dos Reis, Eduardo B.S. hydrology

Sabino, António Masters hydrology and irrigation

Long-term, scheduled to depart for the U.S. in the near future:

Brito, José D. B.S. water resources engineering

de Carval, Joao Masters, remote sensing

Short-term technical training in the U.S.:

Cardoso, Plácido grain storage and marketing

Dias, Carolino water management and runoff

Fernandes, Amélia grain storage and marketing

Fortes, Julio farming methods

Frederico, António water management and runoff

Lima, Joao aerial photography, remote sensing

Lima, Maria farming methods

APPENDIX VII

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