

PD - AAY - 227

WA 57701

SEP 12 1978

ACTION MEMORANDUM TO THE ASSISTANT ADMINISTRATOR FOR AFRICA

FROM : AFR/DR, ^{JW Koehring} ~~John W. Koehring~~

SUBJECT: Sahel Water Data Network - 625-0917 (Amendment)

Problem: Your approval is required to execute an additional grant of \$1,808,000 from the SDP appropriation to Agrhymet and the Government of Cape Verde for the purposes of strengthening the Regional Training and Applications center in Niger, and of incorporating Cape Verde into the Sahel Water Data Network project (625-0917). The additional funds requested will bring the total level of AID funding for this project from \$4,460,000 to \$6,268,000.

Discussion:

A. Description of the Project:

1. Project Purpose: The objective of this multi-donor project is to strengthen the agrometeorological and hydrological services in the Sahelian countries. The primary economic benefits of this effort are concentrated in the agriculture sectors of the participating countries, although important secondary benefits should accrue in the agro industrial, transportation and communication sectors as well as to the general population through improved weather forecasting, and storm warnings. The principal beneficiaries of this revision will be the government and people of Cape Verde who had not yet joined the CILSS/Club programming and funding mechanisms at the time the Sahel Water Data Network project was originally designed. This project amendment is in direct response to a CILSS request that the project be extended to spread benefits accruing from the project to all eight CILSS member states.

The underlying assumption of this revision is that improved meteorological, rainfall and groundwater data is required to properly plan and design the long range water management programs needed for increased agricultural production in Cape Verde. This project constitutes a significant move in that direction by assisting in the rehabilitation and carefully planned expansion of climatological, agrometeorological, and hydrological data measuring networks throughout the islands; by developing a capability to process and interpret these data; and, by involving user agencies in the collecting, interpreting and disseminating processes so that the outputs are directly beneficial to the farmers. Experts will be assigned to

Cape Verde by the World Meteorological Organization (WMO) to assist in the development of these services. Data measuring, processing and some telecommunications equipment will be provided by this grant.

In addition, this revision also provides funds to cover increased costs over the estimates in the PP made in 1975 for equipment and technical assistance.

2. Conformance to AID Country Strategy: The recently completed Agriculture Sector Assessment for Cape Verde noted on page 233 that a "major, indispensable effort to develop the institutional capability and a hydrological and meteorological data base" will be required to manage the water resources on the islands. This project, which is designed to achieve that objective, will be complemented by the proposed Watershed Management project and by the Rural Works project which is beginning to inhibit soil erosion. These three components are essential pre-conditions to the development of irrigated agriculture in Cape Verde.

3. Benefits: Benefits from the project will accrue to the entire Cape Verdian population through improved transport (improved weather for sea/air operations), to the fishing industry and for the design of water management projects necessary to improve agriculture production. One of the major benefits of this project will derive from data which should generate better placements and designs of water catchments to improve the management of water flows and increase ground water recharge. This, in turn, should assist increase irrigation capacity and farmers income.

B. Financial Summary:

1. The AID appropriated total of this amendment will be \$711,000 in FY 1978 and \$1,808,000 for the life of the project as follows:

	FY 1978			LOP		
	Original PP	Revised	CV	Original PP	Revised Total	CV
I. Technical Assistance	250	188	-	880	799	-
II. Training	33	73	15	289	516	81
III. Commodities	607	1,200	298	1,981	3,081.1	628
IV. Other	<u>100</u>	<u>250</u>	<u>70</u>	<u>1,310</u>	<u>1,871.9</u>	<u>70</u>
Total	990	1,711	383	4,460	6,268	779

2. Host countries and other donors contributions are as follows:

	<u>FY 1978</u>	<u>LOP</u>
Host Country (Cape Verde)	282	742
Other Donors	4,554	13,247

C. Social, Economic, Technical and Environmental:

1. The project is socially sound because it builds user agencies into the data collection, and dissemination framework. Moreover, the information derived from the project is to be made available at no direct costs to the rural population.

2. An initial environmental assessment for Cape Verde which is included in the Project Paper concluded that this project does not have a significant environmental impact. No further environmental analysis is necessary for this activity.

3. There is no issue in Cape Verde with respect to U.S. concerns for human rights.

D. Additional Data:

1. Project funding is provided under the SDP Section of the Foreign Assistance Act. The host country contribution of 25% of the entire cost of the project required under Section 110(a) of the FAA is, therefore, inapplicable. Since Cape Verde is a RLDC, that part of the amendment which finances goods and services to extend the project into Cape Verde will have Code 941 as the authorized source of procurement.

2. The project will be implemented by Agrhymet, the UNDP and WMO.

3. The NOAA, under a PASA, will continue to assist monitor the progress and problems of this project.

E. Committee Action and Congressional Notification:

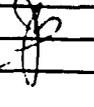
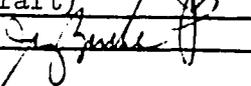
1. The project committee reviewed and approved the increases in cost estimated for the regional program on July 27, 1978 at which time the inclusion of Cape Verde into the Sahel Water Data network was reviewed and approved.

2. The Congressional Notification expired on July 7, 1978.

Recommendation: That you sign the attached PAF II and Initial Environmental Examination and thereby authorize the amendment to the Sahel Water Data network project.

Clearance:

AFR/DR/SFWAP:JRMcCabe (draft) 
AFR/DR/ENGR:FZobrist (draft) 

AFR/DP:FWTate subs FW
AFR/DP:CWard FW
AFR/SFWA:JKelly JK
GC/AFR:STisa (draft) 
AFR/SFWA:GMcArthur GMcArthur 

FR/SFWA:OJ [Signature] eg:9/9/78:AFR/DR/SFWAP [Signature] Graham

PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS PART II

World Meteorological Organization of the United Nations

Project: Sahel Water Data Network

Project No.: 625-0917

Pursuant to Part I, Chapter 1, Section 121 of the Foreign Assistance Act of 1961, as amended, I hereby authorize an Amendment of the Grant to the World Meteorological Organization of the United Nations ("WMO") of not to exceed Seven Hundred Eleven Thousand United States Dollars (\$711,000) to assist in financing the foreign exchange and local currency costs required for the Amendment to the project as described in the following paragraph.

This Amendment consists of financing the share of the United States in the increased costs of the Sahel Water Data Network Project, as approved by A.I.D. on May 23, 1976, and in providing technical assistance, training, construction of certain small facilities and equipment to extend the Sahel Water Data Network Project to Cape Verde.

I approve the total level of A.I.D. appropriate funding planned for this Amendment of One Million Eight Hundred and Eight Thousand United States Dollars (\$1,808,000), Grant, during the period FY 1978 through FY 1980, including the amount authorized above and an additional increment or increments of grant funding during such period subject to the availability of funds and in accordance with A.I.D. allotment procedures, thereby increasing the total amount of A.I.D. funding planned for the Project as amended, from \$4,460,000 to \$6,268,000.

I hereby authorize the initiation of negotiations and execution of the Grant Agreement by the officer to whom such authority is delegated in accordance with A.I.D. regulations and Delegations of Authority, subject to the following conditions, together with such other terms and conditions as A.I.D. may deem appropriate:

a. Source and Origin of Goods and Services.

Except for ocean shipping and motor vehicles, goods and services financed under this Amendment for the extension of the Project to Cape Verde shall have their source and origin in countries included in Code 941 of the A.I.D. Geographic Code Book or Cape Verde, except as

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A.I.D. may otherwise agree in writing. Ocean shipping financed under the Amendment shall be procured in the United States or Cape Verde; motor vehicles procured under the Amendment shall be manufactured in the United States. Other goods and services financed under this Amendment shall have their source and origin in accordance with the original grant.

b. Conditions Precedent.

Except as A.I.D. may otherwise agree in writing, prior to the first disbursement of funds under this Amendment for goods and services required to extend the Project to Cape Verde, or to the issuance of commitment documents with respect thereto, the WMO shall furnish to A.I.D., the following in form and substance satisfactory to A.I.D.:

1. Documentary evidence that goods and services financed under this Amendment shall be free from taxes, import duties and other such fees or levies that might otherwise be imposed by the Government of Cape Verde;

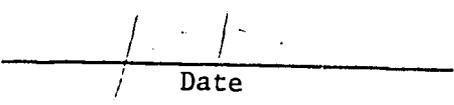
2. Documentary evidence that the authority, duties and activities of the meteorological service of Cape Verde have been extended to cover the needs of agriculture in Cape Verde.

3. A copy of an agreement with the Government of Cape Verde under which the Government of Cape Verde agrees to provide, or cause to be provided, adequately trained personnel and financial and other resources to operate and maintain the water data network installed in Cape Verde upon completion of the Project in Cape Verde.

c. Covenant.

The Grant Agreement shall contain a covenant providing in substance that equipment financed under the Amendment for the extension of the Sanel Water Data Network in Cape Verde shall not be furnished until facilities are available in Cape Verde and adequately trained personnel are assigned to such facilities in order to operate and maintain such equipment.


Assistant Administrator for
Africa


Date

AGENCY FOR INTERNATIONAL DEVELOPMENT
PROJECT PAPER FACESHEET

1. TRANSACTION CODE
 A ADD
 C CHANGE
 D DELETE

2. DOCUMENT CODE
 PP
 3

3. COUNTRY/ENTITY
 Sahel Regional

4. DOCUMENT REVISION NUMBER
 1

5. PROJECT NUMBER (7 digits)
 625-0917

6. BUREAU/OFFICE
 A. SYMBOL: AFR
 B. CODE: 06

7. PROJECT TITLE (Maximum 40 characters)
 Sahel Water Data Network

8. ESTIMATED FY OF PROJECT COMPLETION
 FY 8 1

9. ESTIMATED DATE OF OBLIGATION
 A. INITIAL FY 7 8
 B. QUARTER 4
 C. FINAL FY 8 0 (Enter 1, 2, 3, or 4)

10. ESTIMATED COSTS (\$000 OR EQUIVALENT \$1 -)

A. FUNDING SOURCE	FIRST FY 78			LIFE OF PROJECT		
	B. FX	C. L/C	D. TOTAL	E. FX	F. L/C	G. TOTAL
AID APPROPRIATED TOTAL	1,567	150	1,711	5,978	290	6,268
(GRANT)	(1,567)	(150)	(1,711)	(5,978)	(290)	(6,268)
(LOAN)	()	()	()	()	()	()
OTHER U.S.						
1.						
2.						
HOST COUNTRY	-	282	282		742	742
OTHER DONOR(S)	4,544	-	4,544	13,247	-	13,247
TOTALS	6,105	432	6,537	19,225	1,032	20,257

11. PROPOSED BUDGET APPROPRIATED FUNDS (\$000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. 1ST FY 78		H. 2ND FY 79		K. 3RD FY 80	
		C. GRANT	D. LOAN	F. GRANT	G. LOAN	I. GRANT	J. LOAN	L. GRANT	M. LOAN
1) SH	750S	873		1,711		1,328		939	
2)									
3)									
4)									
TOTALS									

A. APPROPRIATION	N. 4TH FY		O. 5TH FY		LIFE OF PROJECT		12. IN-DEPTH EVALUATION SCHEDULED
	Q. GRANT	P. LOAN	R. GRANT	S. LOAN	T. GRANT	U. LOAN	
1) SH					3,978		MM YY 03 80
2) FN					2,290*		
3)							
4)							
TOTALS					6,268		

13. DATA CHANGE INDICATOR. WERE CHANGES MADE IN THE PID FACESHEET DATA, BLOCKS 12, 13, 14, OR 15 OR IN PRP FACESHEET DATA, BLOCK 12? IF YES, ATTACH CHANGED PID FACESHEET.

1 = NO
 2 = YES

14. ORIGINATING OFFICE CLEARANCE

SIGNATURE: *Charles A. Wambler*

TITLE: IC Entente States

DATE SIGNED: MM DD YY

15. DATE DOCUMENT RECEIVED IN AID/W. OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION

MM DD YY

Table of Contents

	<u>Page</u>
List of Persons Contacted	i
Glossary of Terms	iii
Sahel Water Data	
PP Revision	
I. Recommendations	1
II. Project Summary	1
III. Cape Verde	2
A. Background	2
B. Description of the Project	4
C. Training.	9
Tables:	
1. Training Plan - Meteorologists/Hydrologists	11
2. Training Plan - Electronics Maintenance Technicians - Meteorological Section	12
Manpower Availability	14
D. Project Issues.	15
IV. Project Analysis.	16
A. Technical Justification for Project Inputs	16
Table: Equipment Implementation Plan (Arrival Schedule)	21
B. Cost Increases related to Original Project Objectives	
C. Organization of Meteorological Services, Government of Cape Verde	24
Table: Ministry of Rural Development, Office of the Minister.	26
V. Economic Analysis	28
Tables:	
I. CILSS Budget.	32
II. Proposed Budgetary Contribution - to Agrhymet--GOCV	33
VI. Other Donor	34
Tables:	
I. Contributions to the AGRHYMET Program by Donors Other than AID	36
VII. Social Soundness Analysis	37

Table of Contents

	<u>Page</u>
VIII. Financial Analysis and Budget	41
IX. Implementation Arrangements	44
A. Analysis of the Recipient's Other Donors and AID's Administrative Arrangements	44
B. Implementation Plan	45

Annexes:

1. Letter to Dr. D. Rijks from Joao Peireira Silva,
Minister of Rural Development, Republic of Cape Verde
2. Supplementary Budgetary Contribution for Support of
Trained Personnel in the Agrhymet Program
3. Copy of Airgram, Niamey TOAID A-09, May 2, 1978,
Subject: Sahel Water Data and Management (625-0917)
4. Initial Environmental Examination
5. UNITED NATIONS DEVELOPMENT PROGRAMME, Project of the
Government of Cape Verde.
6. Sahel Water Data and Management (611(A) Certification)
by Mission Director, USAID/Niger

List of Persons Contacted

Government of the Republic of Cape Verde

1. José Brito - Minister of Economic Coordination
2. Horácio Soares - Director, Department of Agriculture, Agrohydrology, Ministry of Rural Development
3. José Spencer Lopes - Chief, Division of Agronomy, Department of Agriculture and Hydrology, Ministry of Rural Development
4. José Enrique Vera-Cruz - Hydraulic Engineer, Ministry of Rural Development
5. Denis Fernando Pulli - UNDP-sponsored Hydrologist, Ministry of Rural Development
6. Aristides Querido Chaves Semedo - Hydrologist, Ministry of Rural Development
7. Aristides Texiera - Agronomist, Ministry of Rural Development
8. Celsa Estreda - Director of Meteorology, Sal Division, Ministry of Transport and Communications
9. Francisco Perreira - Chief, Accounting Division, Ministry of Finance
10. Luis Peres Atos Delgado - Meteorologist, and Deputy Director of Sal Division, Ministry of Transport and Communications
11. Char Lima - Chief, Aeronautic Meteorological Division, Ministry of Transport and Communications, Praia
12. Limo Público Menteiro - Delegate for the Tarrafal District

United Nations

1. Mrs. Ida Pacquen - Resident Representative, United Nations Development Program, Praia
2. Mr. H. Babau - Hydrologist, Sahel Water Data Program, World Meteorological Organization, Niamey
3. Mr. H. Vaccic - Meteorologist, World Meteorological Organization, Dakar, Senegal

Other

1. M. Henri Ballier - Chief of FAC, Dakar, Senegal
2. Mr. Johannes Van der Schterens - Chief of Technical Assistance, Netherlands Embassy, Dakar, Senegal
3. Peter Flemming - Chief of Agricultural Assessment Team, Contractor - American Technical Assistance Corporation, McLean, Virginia
4. Merrill B. Asay - Agricultural Development Officer, AID/Praia

Design Team

1. Roy A. Harrell, Jr. - Design Officer and Leader, USAID/Niger
2. William Sylvester Callahan - Meteorologist, National Oceanic and Atmospheric Administration, Department of Commerce, Silver Spring, Md.
3. Marcus Wesley Brooks - Meteorological Engineer, National Oceanic and Atmospheric Administration, Department of Commerce, Silver Spring, Md.

Glossary of Terms

APT - Automatic Picture Transmission is a unit that receives images directly from meteorological satellites and prints out a weather picture.

CAC - Coordinating and Advisory Committee. A committee composed of representatives of the donors including representatives of UNDP, WMO, and the United Nations Sahel Office (an office established in 1973 to coordinate U. N. drought related activities), as well as the CILSS Technical Coordinating Committee. Chairmanship of the CAC will rotate among the donor members and WMO will furnish the secretary. The major functions include advising on the handling of donor funds and contributions, reviewing WMO program reports, plans and budgets, and advising on the establishment of technical advisory committees.

CILSS - Comité Permanent Inter-Etat pour la Lutte Contre la Secheresse au Sahel (Permanent Committee for the Control of the Drought in the Sahel). It is the African sub-regional grouping of drought affected countries in West Africa. With headquarters in Ouagadougou, Upper Volta, it includes Niger, Chad, Mali, Mauritania, Senegal, The Gambia and Cape Verde.

Educational levels adopted by WMO for meteorological/hydrological technicians:

- Class I - Degree studies leading to a Ph.D.; requiring at least six years of university study.
- Class II - Degree studies leading to a Master's Degree; requires at least four years of university study.
- Class III - Graduate level study above the undergraduate degree level.
- Class IV - Technical training taken beyond the secondary school level.

Net Radiation - A unit receiving weather images from a given meteorological area.

NOAA - The National Oceanic and Atmospheric Administration, an agency of the U. S. Department of Commerce concerned with all matters relating to hydrology, meteorology and oceanography operations and research, including the National Weather Service.

ORSTOM - Office of Technical and Scientific Research Overseas - A Paris-based multi-disciplinary quasi-government organization supported in part by the French government and devoted to field research in countries once ruled and/or administered by France. It is a leading source of data and expertise of hydrologic information in francophone Africa.

WMO - World Meteorological Organization, one of the specialized agencies of the United Nations, with headquarters in Geneva, Switzerland.

Sahel Water Data

PP Revision

I. Recommendations

1. That the Assistant Administrator approve contributions over a three-year period FY 1978-80, to the multi-donor regional program formulated by WMO, UNDP and CILSS for strengthening the agrometeorological and hydrological services in the Republic of Cape Verde, amounting to \$1,808,000 including additional funding for the Regional Training and Application Center located at Niamey, Niger. It is understood that the greater part of this amount will finance in-kind contributions such as equipment, experts, fellowships and materials--the same type of commodities being proposed for other participating countries. The management of the in-kind contributions will be governed between A.I.D. and the World Meteorological Organization (WMO), which is the Executing Agency for the project.

2. That all contributions to the program during Fiscal Years 1978-80 will be authorized by the Assistant Administrator, Bureau for Africa, on the Basis of established Agency programming and funding procedures and will be in accordance with the objectives and implementation arrangements set forth in this Project Paper.

II. Project Summary

This project revision describes the assistance proposed for U. S. assistance in Cape Verde and certain cost increases related to the project in general beginning in FY 1978 and ending in FY 1980. Total obligations amounting to \$1,808,000 are proposed. The primary intent for contributing to the ongoing multi-donor effort is to include Cape Verde, a CILSS country, to be served by regional projects administered by WMO, UNDP and CILSS whose primary object is to strengthen the agrometeorological and hydrological services in those countries, including a Regional Training and Application Center in Niamey, Niger. This project revision proposes that certain in-kind contributions for Cape Verde be financed beginning in FY 1978 (equipment, training fellowships, and a modest amount of building) with an additional amount requested for covering cost increases in the original Project Paper approved in FY 1976; i.e., data processing, telecommunications, weather radar and APT, publications, technical assistance by technicians from the National Weather Service of the National Oceanic and Atmospheric Administration (NOAA), Department of Commerce; operating costs, and administrative costs.

Section III. Cape Verde

A. Background

The Cape Verde Archipelago is situated in the Atlantic Ocean about 475 miles from the West African coastal mainland. It comprises ten islands and five inlets which are traditionally divided into two groups depending on the dominant direction of the winds. The northerly islands are called the Windward (Barlavento) and the easterly are the Leeward (Sotavento) group. The Windward group includes the islands of Santo Antao, Sao Vicente, Santa Lucia, Sao Nicolau, Boa Vista and Sal with the inlets of Branco and Raso which are situated between Santa Lucia and Sao Nicolau. The Leeward group comprises the islands of Maio, Santiago (in which the capital of Praia is situated), Fogo and Brava. They also include the three inlets of Grande, Luiz Garneiro and Sapado. The total area of the islands is 4,000 square kilometers.

The Archipelago in the greater part of the island chain is of volcanic origin. There are also plateaus with volcanic cones having steaming craters. For centuries the volcanos have given way to soil erosion caused by wind and rains. The island of Fogo, where the only major volcano is located, has the highest altitude (6,560 feet) of all the islands. The last recorded volcanic eruption took place in 1951. Numerous ravines can be found throughout the island chain. Natural springs appear during the rainy season and are used for irrigation.

Climatic conditions in Cape Verde correspond to those of the northern global inter-tropical zones of the African continent, while the general atmospheric circulation is influenced by local physiographic conditions. In the lower altitude areas, temperatures average over 68°F. The temperature in Mindelo is 73°F while in Praia, the capital, it is 75°F. In the higher altitude areas, the temperatures are lower, ranging from 64-68°F. September is the hottest month with the average temperatures being 75°F in Mindelo and 79°F in Praia. The coolest month is February when the temperature is 70°F in Mindelo and 72° in Praia. There is a substantial ocean effect on temperatures. The islands have a two-season climate; i.e., a dry season from November to July and a rainy season from August to October. The dry season is characterized by sea breezes and cooler temperatures while the rainy season is characterized by humidity and heat.

The last census in Cape Verde was taken in 1974 when the population was reported to be 294,000 inhabitants. Population density is about 50 inhabitants per square mile. The most populated towns on the islands are Praia, the capital, with an estimated population of about 20,000; Mindelo with 25,000; Fogo with a population of 35,000. The main populated islands include Santiago which has almost 50% of the population; Santo Antao (50,000); Sao Vicente (40,000) and Togo with 32,000. The people are mainly mestizo (a mixture of Caucasian and African) forming over 69% of the population. The rest are Africans and some Caucasians numbering about 900 in 1976. The main language is Creole, which is a mixture of African and Portuguese. The official language is Portuguese which is spoken by an estimated 38% of the population.

The Cape Verde islands were sighted and colonized by Portuguese navigators about 1460. In May 1460, explorers Diogo Gomes and Antonio da Noli, on one of their voyages were driven by winds and strong currents to an unknown island which they christened Santiago in honor of the patron of the day they discovered the island. The Portuguese occupied the island for over five centuries.

In 1956, Dr. Amilcar Cabral, together with party activists from the Guinea mainland, founded in Bissau the African independence party for Guinea and Cape Verde (PAIGC), the country's ruling party. In April 1974, the PAIGC began negotiations for the independence of the islands. In December 1974, a transitional administration headed by a Portuguese High Commissioner was established for the islands. The transitional government consisted of three Portuguese and three Cape Verdian ministers appointed by the PAIGC. On June 30, 1975, elections to the National Assembly were held and the PAIGC emerged as the dominant political party in the islands. On July 5, 1975, the islands became independent and Dr. Aristides Pereira, then the Secretary General of the PAIGC, was elected the President of an independent Cape Verde.

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B. Description of the Project - Cape Verde

The WMO/UNDP/CILSS program in agrometeorology and operational hydrology represents a long-range, broad-scale effort to upgrade the scope, quality and timeliness of meteorological and hydrological data acquisition in and among the countries participating in the program. With the proposed assistance to the Republic of Cape Verde, eight countries will be participating in the regional program. The program seeks to develop and strengthen African capabilities in the collection, interpretation and dissemination of such data for increasing the agricultural productivity and for improving agricultural planning.

The revised program, which already consists of seven "national projects," will aid the Republic of Cape Verde in the development and strengthening of water data networks in the islands, and will work in close collaboration with and receive the assistance of the complementary "regional project" through which a Training Center is located at Niamey. The Center will provide training for Cape Verde personnel, and as is the case with the existing countries, serve as a regional data-processing, dissemination and technical research institution.

The Cape Verdian addition of the program will serve as an additional "building block" for the regional program and assist in upgrading the national program in order that it can be on a level with the other participating CILSS countries. Specifically, the financing of the Cape Verdian program will (a) assist in the rehabilitation and carefully planned expansion of existing hydrological and meteorological data-measuring networks throughout the islands; (b) establish a communications network in the islands so that meteorological and hydrological data of all types can be reported, recorded and interpreted so as to assist planners who are charting Cape Verde's economic development programs; (c) develop, strengthen and expand both national and sub-national agrometeorological and hydrological services so they can operate and maintain both the existing and selected expanded services and networks, by providing, together with UNDP-trained personnel at all levels; (d) establish or strengthen the coordination of climatological and hydrological data at both the national and sub-national levels and install a capability to process and interpret the data in meaningful terms; and (e) involve the "user" agricultural agencies (livestock, agriculture, water and forests) in the processing, interpreting and disseminating of the data so that it can directly benefit agricultural planners and the farmers themselves.

The Cape Verdian addition to this existing regional project will mean that it will join a WMO/UNDP/CILSS program which has been in operation since 1975. Experts in operational hydrology and agrometeorology will eventually be assigned to Cape Verde by WMO to advise regarding the development of national services and networks. Under the project, a regional program headquarters has already been established at Niamey;

a program coordinator has been appointed and is in residence at Niamey; and training programs in agrometeorology and hydrology have been conducted since late 1975.

At the Coordinating and Advisory Committee meeting in Geneva in November 1977, the U. S. indicated its willingness to consider contributing an additional sum of money for the inclusion of Cape Verde in the existing regional program. At that time the United States indicated that its contribution would be largely in kind (equipment, technical services, fellowships) but that cash contributions to WMO (which is administering the program on behalf of all donors) could also be made if necessary. The actual nature of U. S. contributions to the Cape Verde program will continue to be determined by the program's priorities, as expressed by WMO and UNDP.* Major items include telecommunications, data processing (computers), surface hydro and meteorological equipment and training in the United States and at the Niamey regional center for Cape Verdians who are needed to operate and maintain the equipment and networks which have been placed in operation.

The justification for the various inputs proposed is contained in Section III of this revised PP. Basically, the proposed project is designed to the UNDP program valued at \$868,300 and the document with details is referenced below. The UNDP program, which has been underway since early 1978, will establish fifteen agrometeorological stations (see maps and charts contained in Annex 3 for the locale) and also proposes the establishment of eight hydrological stations. The proposed program is for AID to establish an additional seven hydrological stations bringing that total to fifteen. Maintenance, technical and operating personnel, to the extent not presently covered by the UNDP program, are also proposed for training. In addition, buildings will be needed to house some of the equipment proposed for purchase. No equipment will arrive in Cape Verde until there are personnel available to operate and maintain it and suitable buildings for housing the equipment and necessary spare parts. In visits to existing agrometeorological stations, the design team observed that only the station at Praia had a building suitable for housing equipment and spare parts. The remaining fourteen stations, which are listed below, had no buildings and as far as could be determined, no other external donor had agreed to undertake financing the construction of these buildings. The new agrometeorological/hydrological stations to be established and/or renovated are as follows:

I. S. Nicolau

A. Preguicia

B. Antonio Beyfe

*UNDP document entitled "Strengthening of Meteorological, Agrometeorological and Hydrological Services for the Government of Cape Verde, CVI/77/A/01/16, dated September 16, 1977

II. S. Antao

A. Ponte do Sol

B. Passagem

III. Ilha Brava

A. Sule Nom Saigem

B. Burma

IV. Fogo

A. Tongen

B. Sao Felipe

C. Cove Subria

V. Santiago

A. Santa Catarina

B. Praia

C. Picos

D. Tarrafal

E. Fegueira de Gao

F. S. Luis

The Cape Verdian input to the program, and the upgrading and strengthening of the existing program, will continue to involve a coordinated, regional approach which includes a number of parties on both the donor and African side. CILSS funding is now a feature of the program (see the CILSS budgetary contributions included as Table I of Section V. The entire U. S. contribution to the program is presented in Section VIII. Other donors' activities in the Cape Verdian context are summarized in Section VI.

There is no question but that the addition of Cape Verde with its many islands and lack of basic infrastructure will be a complex and a difficult one, covering a vast area geographically, three UN agencies (UNDP, WMO, and FAO) and at least two bilateral donors. But roles and responsibilities are clearly defined; WMO has done a most effective job

in serving as the executing agency for the programs in the seven CILSS countries, and the attitude on the part of both donors, recipients and the Government of the Republic of Cape Verde is a highly cooperative and positive one. The implementation of the UNDP project in Cape Verde is, to a large degree, on schedule. The WMO/UNDP/CILSS program continues to contemplate a major, long-term effort to rehabilitate, improve the technology and develop meaningful agricultural applications for a basic component of the development infrastructure of Cape Verde--the timely collection, interpretation and dissemination of water and climatological data.

This effort will involve substantial inputs by UNDP, CILSS, and the Government of Cape Verde. Indeed, as shown in Table IV of Section V, the CILSS budgetary contribution now amounts to \$342,000.

A large part of this contribution represents the cost of expanding the national meteorological and hydrological services to man the expanded data networks and to staff the national headquarters in each CILSS country where the data will be processed, interpreted and disseminated. Like the other CILSS countries working in the program, the Government of the Republic of Cape Verde has indicated in a project agreement with UNDP and WMO, certain institutional "self-help" measures which are necessary to assure that data acquisition makes a contribution to agricultural development. This includes measures to maintain a separate and distinct meteorological service designed not only to serve aeronautical needs but to serve agrometeorological requirements as well. The activities of the meteorological service must therefore be expanded to cover the needs of agriculture. In addition, the Government of Cape Verde will establish by mid-1978 a council for the interpretation and use of hydrometeorological data, which should assure that the data collected under the program can be rapidly utilized and disseminated. Finally, the Government of Cape Verde will participate with other CILSS countries in sharing its experiences, coordinating its efforts and exchanging all information.

Donor contributions under the program are being coordinated by WMO. External assistance will cover the following components of the Cape Verdian program:

<u>UNDP</u>	<u>Value</u>
15 agrometeorological/climatological stations	\$75,000
6 aeronautical stations	55,000
3 synoptic stations to be strengthened	10,000
40 rain gauges	4,000
8 limnographs for 8 hydrological stations	24,000
4 cableways	20,000

(continued)	
<u>UNDP</u>	<u>Value</u>
3 sets of current meters	\$ 6,000
100 staff gauges	1,000
4 weirs	8,000
20 rain gauges	2,000
3 rainfall recorders	3,000
1 compressor	1,000
Water quality laboratory equipment	5,000
Office equipment	No value given
Transport	12,000
Personnel	276,800
Training	331,300
Miscellaneous	27,000

The Design Team was advised by the Government of Cape Verde that no other external assistance has as yet been secured for the project. The Government of the Netherlands has under consideration some financing for the program in Cape Verde but the exact amount, types, etc. have not been finally determined. Discussions are now being held in The Hague concerning this matter. The main concern of the Dutch aid authorities is to assure that there is no conflict with or duplication of Dutch bilateral aid to Cape Verde. This aid is sizeable as can be noted in Section VI.

C. Training

1. Meteorological

a. UN Program

There are 6 long-term and 21 short-term fellowships planned as part of the UNDP/WMO program in Cape Verde. The location for the short-term fellowships is planned to be Niamey or Paris, whereas the location for long-term (Class I and Class II) fellowships will not be designated until the particular candidate has been selected. In addition, 5 Class III fellowships are planned as well as 4 hydrological technicians (Class III).

Two of the Class III candidates were selected in 1977 and will return from Niamey in August 1978 after completion of the first year of the course. The Government of Cape Verde plans to send 4 more Class III candidates this year. As is the case in other CILSS countries, qualified candidates for Class II and Class III training have proven to be very difficult to locate. For example, WMO requested 12 candidates for the academic year 1976/1977, but only 4 were finally selected. An additional 12 were requested for the 1977/1978 academic year but there were no qualified students. Recruiting for the UN training program in Cape Verde has been and will probably continue to be difficult because of the poor quality of local education at the secondary level, particularly in science and mathematics. The design team was told that for 80 candidates selected for training in Brazil (Class I level), testing revealed that none were qualified for either Class I or II training.

b. Proposed U. S. Assistance

The design team feels that there are some important omissions in the UNDP program in Cape Verde. In particular there is a need for additional professional training beyond the one Class I scholarship planned by UNDP in order to strengthen professional leadership potential. It is recommended that two more (1 Class I or Class II) be selected for training at U. S. universities in agro-meteorology and operational hydrology. The Ministry of Rural Development told the design team that candidates for Class II and III type training are relatively easy to find; however, the United Nations has found that there has been a shortage at this educational level as well.

Two 1-month fellowships should be offered for Class II graduates to provide expertise in APT photo interpretation, possibly at the National Environmental Satellite Service in the United States or at the Regional Center in Niamey.

The design team recommends that Cape Verde personnel currently receiving meteorological training in Niamey organize an "On-the-Job Training" (OJT) program in Praia upon their return for Class IV observers. A program

2

of this type would provide the nucleus for a staff of agrometeorological and hydrological (Class IV) observers to operate the first of the old stations to be refurbished and updated under the program. Selected personnel from this OJT program could later be sent to Niamey for Class III formal training.

2. Maintenance Training

a. UN Program

None of the planned U. N. fellowships have been specifically earmarked for equipment maintenance training, although it is intended that minimum maintenance will be performed by Class III hydrologic technicians on less sophisticated equipment.

b. Proposed U. S. Assistance

We should initially offer 3 18-20 month fellowships at a U. S. technical school. This training should begin as soon as possible. It would be followed by specialized training in the U. S. on major equipment to be purchased under the program. This would consist of 3 weeks of APT, 3 weeks on Surface Equipment, 2 weeks on Telecommunications, and 7 weeks ADP (possibly to be conducted in Niamey). The telecommunication training could possibly be done in Niamey as well.

The following tables have been developed after consultation with the Ministry of Rural Development and other government officials in Cape Verde. The types of training needed as well as the timing of that training is indicated. It should be noted that the training proposed complements that proposed by the United Nations, the only other major contributor to the program. The training specified represents the minimum numbers of personnel needed to carry out the functions listed and represents an effort to assure that the services in Cape Verde will be on a level with those of the other participating CILSS countries.

22

TRAINING PLAN1. (METEOROLOGISTS/HYDROLOGISTS)

<u>CLASS</u>	<u>1978</u> <u>MONTHS</u>	<u>1979</u> <u>MONTHS</u>	<u>1980</u> <u>MONTHS</u>	<u>TOTAL</u> <u>MONTHS</u>
Class I or II (2) U.S.	<u>3</u>	<u>27</u>	<u>24</u>	<u>54</u>
TOTAL	3	27	24	54

TRAINING PLAN

2 (ELECTRONICS MAINTENANCE TECHNICIANS - Class III)

	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>Totals</u>
<u>TYPE</u> <u>FELLOWSHIP</u>	<u>MAN</u> <u>MONTHS</u>	<u>MAN</u> <u>MONTHS</u>	<u>MAN</u> <u>MONTHS</u>	
Basic Electronics (In U. S.)				
2 trainees	6	24	6	36
1 trainee		12	6	18
<hr/>				
Specialized Equipment Surface (SSB, APT, ADP and Surface)				
3 trainees			12*	12
<hr/>				
Maintenance Totals	6	36	24	66

*Could possibly be accomplished in Niamey depending on timing;
otherwise these Special Training Courses will be in the U. S.

24

MANPOWER AVAILABILITY

o/a March 31, 1978

<u>TYPE OF SPECIALTY</u>	<u>NUMBERS</u>
Class I Meteorologists (Aeronautical)	5
Class I Agrometeorologists	3
Class II Meteorologists	9
Class III Meteorologists	6
Class IV Meteorologists/Observers	128
Repair Technicians	5

Source : Ministry of Transport and Communications,
Praia, April, 1978

*Some of these personnel may no longer be on the job as some were not paid during 1977 due to budgetary constraints within the Government of Cape Verde.

3. Hydrological Personnel

The design team proposes the addition of seven hydrological stations to complement the UNDP/WMO program. The existing UNDP/WMO program recommends the training of candidates staffing the seven stations being financed by the UNDP program. If additional stations are established, both maintenance and operating personnel will be needed. The following tables establish the minimum personnel requirements for this part of the program. In addition, personnel projections for the period 1980-85 (beyond the LOP for existing funding) have also been added. The design team was advised that no trained personnel for hydrological services are currently available.

Conclusion

Training plans have been developed based on the numbers of personnel who are essential for the operation and maintenance of agrometeorological and hydrological stations. The preceding tables illustrate the numbers, types, and locations where personnel should be trained. The Ministry of Rural Development has indicated its agreement with the training plans which will be financed by UNDP, WMO and those proposed for U. S. financing.

26'

D. Project Issues

The following issues have been identified by UNDP for the Cape Verdian addition to the program. They are discussed in other parts of this project paper and will only be summarized in this section. The U. S. delegation will plan to raise these issues at the next meeting of the Coordinating and Advisory Committee, now scheduled for November 1978 in Geneva.

1. Requirement for additional external donor assistance, estimated at \$5 million, to bring the Republic of Cape Verde to a level of trained manpower and equipment infrastructure commensurate with that of other CILSS countries participating in the program. UNDP/Praia has indicated its intention to seek additional funding from other donors, possibly Belgium and Switzerland. No results are known at this time.

2. Lack of available candidates for the program. The Government of Cape Verde currently has under discussion in its Council of Ministers a proposal to request UNESCO to provide teachers at the secondary school level so as to upgrade the existing educational base. If this program comes to fruition, the problem of finding qualified candidates for entry into some parts of the program may be resolved. The problem of finding qualified candidates is not unique to Cape Verde as the program is experiencing similar problems from all participating CILSS countries. However, as is the case with the other CILSS countries, no equipment deliveries will be made in Cape Verde until there are adequate numbers of trained personnel to operate and maintain the equipment purchased and delivered. The Government of Cape Verde has been made aware of this condition and is agreeable to having the United States participate on this basis. No equipment deliveries are scheduled before late FY 1979. By that time, an evaluation can be made by NOAA and AID as to whether there are adequate numbers of Cape Verdian trainees who are satisfactorily completing training courses either in Niamey, Europe or the United States who can upon completion of training operate and maintain the equipment proposed for procurement under the project. The Equipment Implementation Plan included in Section IV (Project Analysis) of this project paper provides the schedule for the procurement of equipment proposed for financing by AID.

For Classes II, IV and for the observers, figures in the table above represent a consensus of views between the design team and the Government of Cape Verde. It is doubtful that candidates can be made available by the Government of Cape Verde for all of the positions listed above.

NOAA technicians' estimates of the minimum amount of equipment needed to put the agrometeorological services on a par with those of the other participating CILSS countries are as follows:

	Cost estimate (\$000s)
1. Anemometer with recorder - 10	26.0
2. Rain gauge with recorder - 10	78.0
3. Rain gauge - classic type - 40	2.0
4. Thermometers - Set MAX/MIN - 10	.5
5. Water Level Recorders (Bubbler Gauges) - 10	80.0
6. Single Side Band Radios - SSB - 10	84.0
7. Engine Generators - 14	85.0
8. Barometers - Mercurial - 7	14.2
9. APT - 2	140. 109.0
10. Data Link - SAL - Praia	<u>54.0</u>
11. Automatic Data Processing	<u>57.0</u>
	532.7

614.7

As stated elsewhere in this project paper, these training and equipment needs are additive and complementary to those of the UNDP program which is included as Annex V to this project paper.

There are some stations which are presently supplying a limited amount of data to the Government. For example, the aeronautical stations at Sal, Praia and Mindelo are operational but are oriented primarily toward the needs of civil aviation rather than agriculture. The agrometeorological or climatological networks are less well developed and at present much of the day-to-day agricultural information is the result of aviation-supported observations. Coordination of meteorological information is weak, due in part to the separation of the two services in two different ministries.*

*The organization of the meteorological services is discussed in Part B of this Section.

. 28

Pure agrometeorological data is for all practical purposes non-existent and little is being done to interpret available aeronautical data in terms meaningful to agriculture. As a result there is no basis for data dissemination efforts to the farmer.

A report by the Ministry of Agriculture and Water on the agrometeorological network of Cape Verde states that more than fifty percent of the weather instruments must be replaced and that many of the stations are in disuse. This situation was verified by an on-site inspection of several stations. (A copy of this report is submitted as Niamey TOAID A-09 dated May 5, 1978.)

This program has long-term implications and the beneficiaries really fall into two categories. The direct beneficiaries are the cadre of technicians and specialists who will be trained and the ultimate beneficiaries, the thousands of farmers who comprise this target group which the program is intended to reach by increasing the agriculture productivity thus reducing the requirements the area would otherwise have for food imports.

To overcome the deficiencies in the existing agrometeorological and hydrological services, the first consideration should be the refurbishing, rehabilitating and recalibrating the instruments of the existing stations. (Maps showing existing stations are contained in Annex 4.) This should be done before adding significant numbers of additional stations. In addition, the activities of the meteorological services must be extended to cover the needs of agriculture. The hydrological services must also be strengthened to provide useful information for both agriculture and for the management of water supplies.

Second, consideration should be given to the use of APT to complement and supplement the data gathered by traditional methods. The APT system is recommended to supplement and complement the data being gathered by traditional network sources. This complementary information from satellites would be especially valuable for identifying, tracing and predicting the extent of rainfall associated with the "Intertropical Convergence Zone," that is, the coming of the rainy season. This equipment will provide real time coverage both day and night and from these pictures the amount of cloud coverage, surface winds and temperatures can be derived. The system will also provide a WEFAX capability over which weather maps of the northern and southern hemisphere can be received.

The use of weather radar in Cape Verde is questionable at the present time and should be reviewed in a later phase of project planning. If a weather radar is eventually procured for this project, its location should probably be on Sal Island, a location which may be unacceptable to the Ministry of Rural Development.

Third, it is important that the meteorological data be adapted and interpreted in terms meaningful to the agricultural planners and the

farmers themselves. For example, proper interpretation of data should provide accurate forecasts for the optimum planting time, thus reducing the risk of premature planting and the loss of seed.

This program has long-term implications for increasing the agricultural productivity of Cape Verde and thereby increasing farmer welfare and reducing requirements the area would otherwise have for food imports. However, it should be recognized that the program is a long-term undertaking which depends on increasing and replenishing manpower resources.

To implement a sound agrometeorological and hydrometeorological program, it is recommended that the following actions be taken:

1. Initiation of a major training program, designed to strengthen, staff and expand the meteorological services. (See Section IV.b.)
2. The rehabilitation of 8 existing data measurement networks together with the selection of 7 new stations. The selection of these new stations should be based on the location of existing stations, the need for good spatial coverage of the geographical area and the need to sample at critical locations.
3. The design and installation of a communication system comprised of 8 stations that will permit rapid transmission of data to a national center for analysis and relay to all users and for relay to the regional center at Niamey.
4. Preparation and interpretation of data in a form that can be readily assimilated and acted upon by both government users and the agriculturalists.
5. The development of new applications for the desired data and historical data through research and experimentation.
6. It is recommended that seven stations be added to the eight already recommended by the UNDP for a total of 15 new hydrology stations. These stations will be selected through coordination with the WMO Program Coordinator.

Due to the fact that there are no buildings to house either the proposed equipment inputs nor the spare parts to be provided with that equipment, it is proposed by the design team that the sum of be allocated for this purpose. Cape Verdian budgetary constraints preclude any large construction beyond the three sites noted below until 1981, which will be after the time the equipment proposed for AID financing is provided. Preliminary plans have been developed and estimates for construction are provided. Both plans and estimates have been forwarded to REDSO/W in Abidjan for 611(a) purposes. A recommendation for 611(a) certification has been made by REDSO/W.

The Ministry of Rural Development advised the design team on April 20, 1973 that a special budgetary request had been approved by the Council of Ministers committing the Government of Cape Verde to finance the construction of three agrometeorological hydrological stations. The structures approved by the Council for Government financing are located in Sao Jorge, Tarrafal (Santiago Island), and Cha das Caldeiras (Togo Island), and the value is \$74,000.

EQUIPMENT IMPLEMENTATION PLAN

(ARRIVAL SCHEDULE)

<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
<u>TYPE</u>	<u>TYPE</u>	<u>TYPE</u>	<u>TYPE</u>
Thermometers	Recording Rain Gauges	APT (1)	
8" Rain Gauges	Recording Wind	Bubbler Gauges	ADP
Barometers	Telecommunications Equipment		
	Power		
	Data Link		

B. Cost Increases Related to Original Project Objectives

(A) Equipment

Since the writing of the PP in 1976 which was primarily based upon an NOAA technical report completed in December 1975, substantial cost increases have occurred in the equipment items essential to the accomplishment of the original project objectives. Actual cost estimates were made during the feasibility study which took place in May 1975. Thus cost estimates are already three years out of date. In addition, the original PP did not fully incorporate NOAA existing cost estimates at that time in its project budget. For example, the PP budgeted weather radar and APT at \$190,000 while NOAA had projected \$200,000 for radar and \$50 - \$100,000 for APT. The result of these two factors combines in substantial cost increases as shown in the chart below. It should be noted that the revised PP cost estimates include equipment for Cape Verde and The Gambia.

<u>Item</u>	<u>1975</u>		<u>1978</u>	
	<u>\$000</u>		<u>Revised PP</u>	
	<u>Original PP</u>		<u>Including Cape Verde and Gambia</u>	
	<u>Units</u>	<u>Cost</u>	<u>Units</u>	<u>Cost</u>
Data Processing	7	703	9	1,000
Telecommunications	66	600	69	784
Weather Radar)	1)	190	2*)	496
Apt)	1)		3*)	218
Solar Radiation				
Units	33 40	150	40 33+19 recorders	222.5

* APT's for Cape Verde and Gambia only, as French are providing all others.

A final note on equipment costs relates to the inclusion of Cape Verde. The original PP proposed provision of hydrological and meteorological equipment to the various national systems. This funding was ultimately found to be duplicative of efforts by other donors for the 7 original member states of CILSS. Cape Verde has not received sufficient attention to its hydrological and meteorological networks and thus requires a fairly substantial equipment in part as was detailed on page 18 of this PP revision.

(B) Training

The original PP provided only a very modest amount of funding for participant training. This funding had been intended to provide training to three professionals and two maintenance technicians to work in the Regional Center at Niamey. The amount provided, \$89,000, needs to be increased by a total of \$15,000 to assure these trainees will receive appropriate training.

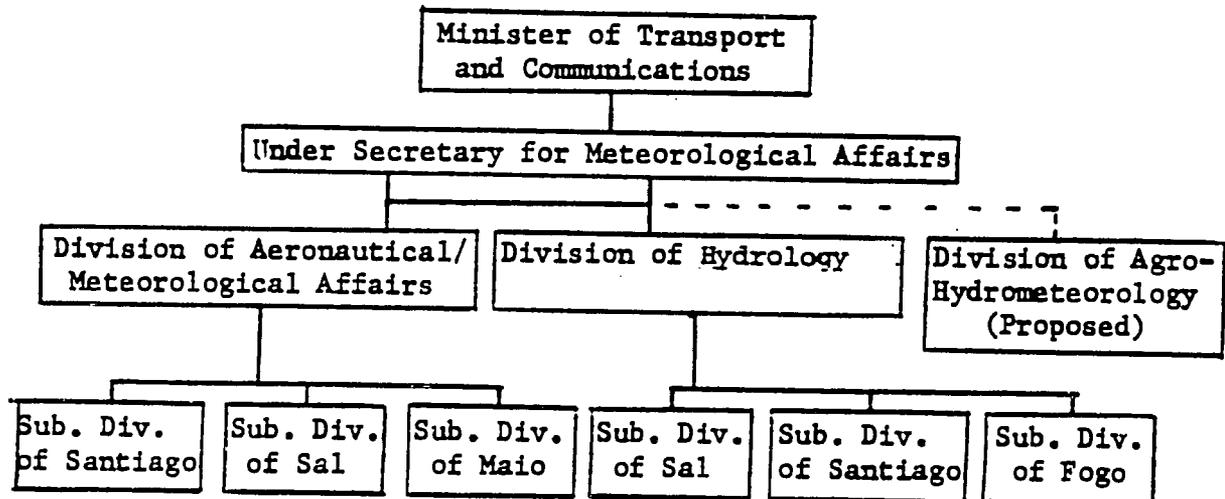
The PP established a suggested manpower level for the national governments (p. 61) and acknowledged that probably all of the Class I and many of the Class II professionals would need to be trained abroad. The PP did not however provide any funding for the training of any of the national projects manpower needs. This revision takes the opportunity to address a portion of that training requirement. The funding proposed below is intended to be supplemented by existing fellowships being offered by UNDP as well as training opportunities expected to become available from Dutch and Swiss sources. Thus the AID participation is limited to providing for 1/3 or the total minimum requirement for the national projects. This minimum has been established by NOAA in conjunction with WMO as one agrometeorologist and one operational hydrologist for each country thus totalling 14 fellowships. (Cape Verde training requirements are treated separately in this revision).

Funding totalling \$130,000 will assure that 5 trainees are provided three years professional training in either agrometeorology or operational hydrology. The exact mix of trainees will depend on the availability of candidates and the types of fellowships being made available by the other donors. It is believed that this increase in the training element of the project will assure that the national projects will be able to effectively interact with the regional center.

C. Organization of Meteorological Services, Government of Cape Verde.

Formal organized meteorological services for the Cape Verde Islands were established by the Portuguese in 1947. At the time of organization of these services, the emphasis was directed almost exclusively to the production and interpretation of aeronautical meteorological data. Due to the geographic locale of the Archipelago, particularly with reference to trade winds, the organization of the services has traditionally been a response to end-user demands. The ministry charged with supervision and control of this service is the Ministry of Transport and Communications.

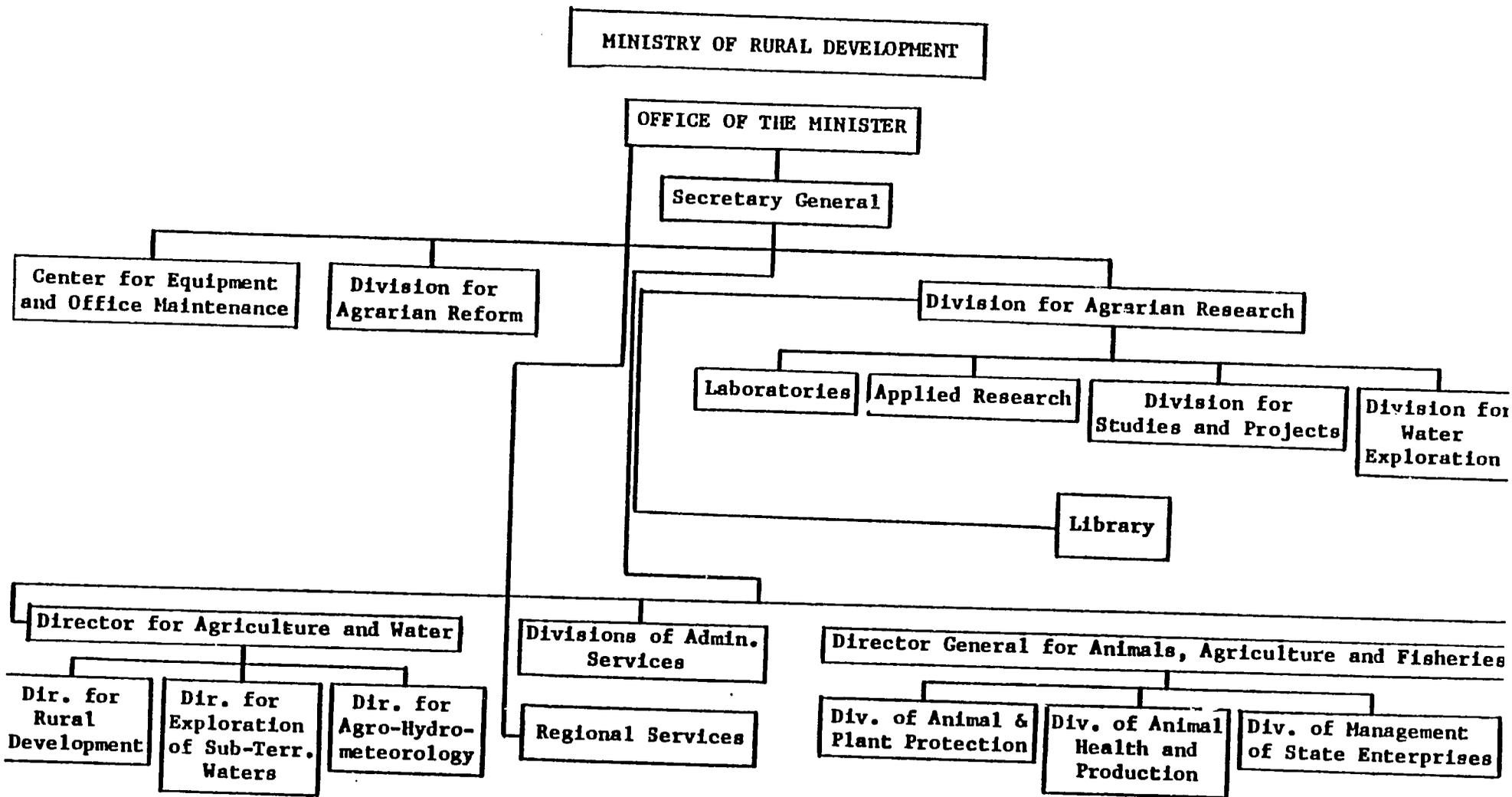
Agro-hydrometeorology as such is at present unserved by the meteorological organization within the Government. This omission can be demonstrated by the present organization of meteorological services given in the following organogram:



The solid line represents the authority of the Ministry of Transport and Communications as decreed in the Cape Verdian Government Reorganization Plan promulgated by Article 16 in late 1977. The dotted line indicates that the Division of Agro-hydrometeorology has not yet been moved from the Ministry of Agriculture and Water to the Ministry of Transport and Communications. According to some Cape Verdian authorities, the ostensible reason for the delay in implementation of this part of the reorganization plan is lack of adequate budgetary resources. Other officials, however, told the design team that the Minister of Rural Development did not feel that such a proposed reorganization should be implemented until the Ministry of Transport and Communications had produced a plan as to how such a service would operate under the auspices of that Ministry. The design team was advised that the Ministry of Transport and Communications had not yet produced such a plan.

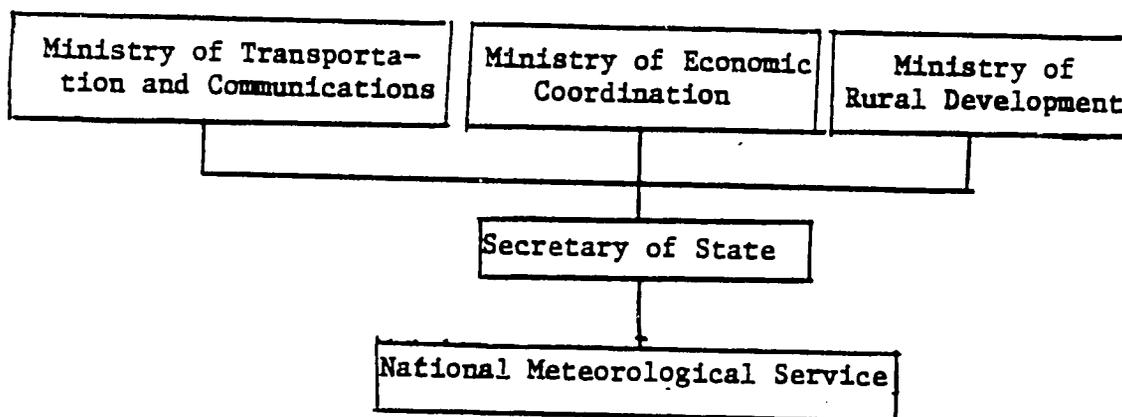
On December 28, 1977, the Ministry of Rural Development provided for the Council of Ministers a plan whereby the Division of Agro-Hydrometeorolo

should properly remain within that ministry. The proposed plan is currently being reviewed by the Cape Verdian Council of Ministers. The design team was advised that either this detailed project proposal by the Ministry of Rural Development or the proposal by the Ministry of Transport and Communications would, subject to availability of budgetary resources, be implemented in November or December 1978. The design team felt that the plan produced by the Ministry of Rural Development was more feasible and would serve to achieve the ends desired by the agricultural planners. This proposal is based on the organization plan and organogram shown on the following page.



Since March 1, 1978, the name of the Ministry of Agriculture and Water has changed to the Ministry of Rural Development

The reorganization plans are being considered by the Council of Ministers and a compromise plan has been developed and was forwarded to the Council in early April 1978. No action has yet been taken on that plan, but the proposed organogram now under consideration is as follows:



As proposed, the National Meteorological Service would coordinate, assimilate and direct all of the meteorological activities of the Cape Verdian Government. Cape Verdian Government officials told the design team that the proposed service would have no other duties beyond being a "service" organization. Even so, some of the ministries which would be involved in the compromise plan are showing themselves to be reluctant to surrender any of their present functions to the proposed new service. The design team was advised that no final decision will be made until later in 1978.

At the time of the visit by the design team, neither the Ministry of Rural Development nor the Ministry of Transport and Communications had designated a Permanent Representative to the World Meteorological Organization. The design team was advised that most communications were handled by the Resident Representative of the United Nations in Praia and the Ministry of Foreign Affairs. After receipt of communications by the United Nations Resident Representative, these were passed to the Ministry of Foreign Affairs which made distribution to appropriate ministries.

Economic Analysis

Cape Verde Water Data Network

The primary economic benefits of this component of the Sahel Data Network are concentrated in the Agricultural Sector with important secondary benefits to commercial and industrial sector activities supportive of agriculture. Benefits to fisheries, aviation, telecommunications and the general population through improved weather forecasting and storm warning are also important, though monetarily less important than those accruing to agriculture.

According to the recently published Cape Verde Assessment of the Agricultural Sector (ASA), Agricultural GNP in 1976, an average year, amounted to about \$31.3 million, including the value of commercial, industrial and service activities associated with agriculture. Actual farm level agricultural income probably amounted to about 1/2 this amount, with the remainder divided between the commercial and industrial sectors serving agriculture and their suppliers of inputs, many of whom are foreign. In balance it is likely that only about 80% of the retail value of agricultural output translates into national income. In very rough terms this would reflect an estimated 90% of the retail value of rainfed crops and 70% of the retail value of irrigated crops that translates into national income.

The ASA estimates that surface run-off and ground water sources could be utilized to bring an additional 6750 hectares of land under irrigation over the next 20 years. At current yields and prices (1) this increased production would have an annual gross value of \$59.5 million, yielding an increase of about \$41.7 million per year in net national income, about half of which would accrue directly to farmers. This would represent almost a threefold increase in agricultural output and income over current (1976) levels. This increase in income will require investments in ground water catchments, land reclamation, terracing, wells, irrigation, transportation and marketing infrastructure, research and operating inputs in addition to meteorological and hydrological data before it can be realized. It is not easy to separate out the unique contribution of the Water Data Network to this increase in income.

The underlying assumption of this project is that the ready availability of meteorological data will help Cape Verdian farmers manager their resources more efficiently and thereby increase their productivity and reduce their losses. Most of this increase in productivity will have to come from irrigated agriculture. The very short and unreliable rainy season in Cape Verde almost

(1) See Table V.3 in the ASA.

forces farmers engaged in rainfed agriculture to plant with the first rains regardless of long term weather forecasts. There is also little they can do to prepare for unusually heavy rains or flooding once their crops are planted. Only accurate forecasts of seasonal rainfall prior to planting time would do this. Unfortunately, the data network will not be able to provide this kind of long term information on any reliable basis. So even though rainfed agricultural production in Cape Verde increases from \$2.0 million in a bad year to \$24 million in a good year, this increase results from more rain rather than better weather information and better weather information will make little difference.

A different picture emerges with respect to irrigated agriculture. Improved meteorological rainfall and groundwater information coupled with planning and improved communication will result in estimated economic benefits to Cape Verdean farmers in irrigated agriculture and to the national economy and welfare of the islands. If farmers are enabled to increase their output from irrigated land by only 7 per cent above normal levels once every four years as a result of the data network, the increase in output would yield an Internal Rate of Return of 13.6 per cent on the combined investments of UNDP, AID and the GOCV as outlined in Table II. Clearly in terms of increased agricultural output on irrigated lands alone the project is economically justified.

Table I
Flow of Benefits

<u>Year</u>	<u>Hectares in Irrigation (1)</u>	<u>Net Income Value of Output</u>	<u>7% Increase Due to Data Network</u>
1978	1,850	11,405	-
1982	2,515	15,505	1,085
1986	3,420	21,084	1,476
1990	4,640	28,606	2,002
1994	6,330	39,024	2,732
1998	8,600	53,019	<u>3,711</u>
Total			11,006

(1) Project to gross at 8 per cent per year.

Table II
Flow of Costs

Source of Finance	\$ Per Year (000)					
	FY 77-78	FY 79	FY 80	FY 81	FY 82	FY 83-98
UNDP	237.3	278.4	260.2	46.2	46.2	-
AID	383	232	164	-	-	-
GOCV	<u>66.7</u>	<u>87.7</u>	<u>117.7</u>	<u>110.0</u>	<u>110.0</u>	<u>110*</u>
Total	687.0	598.1	541.9	156.2	156.2	110*

*Amount per year.

In addition to these benefits, accurate long term forecasting could avoid further waste associated with planting in areas subject to flooding or drought when weather extremes are anticipated. Once again, however, the ability of the data network to provide this kind of long term information is doubtful. More likely to be realized are benefits arising from the better design and placement of catchment areas to improve control of water flows and increase ground water recharge, thereby increasing the country's capacity to irrigate. The data network will also provide information on wind velocity, solar radiation and the time distribution of each. This will be very useful for the development of alternative energy sources, an item of top priority for the Government of Cape Verde.

Finally, there will be benefits for the general welfare of the populations as fishermen, airline companies and others are warned of dangerous storms, something which the lack of a communications network currently prevents. For example, weather forecasting should provide short term benefits to the 2,500 Cape Verdean fishermen who are harvesting resources within a 25 mile radius of the islands. Even within this area, according to a conservative estimate by CILSS in 1977, only 4,000 M/T or about 50% of the potential catch is being harvested. The unpredictability of the weather during certain months of the year is one of the constraints which more accurate forecasting in Cape Verde should help overcome. Weather forecasting could also benefit the small farmers in the short run by reducing certain crop and post harvest losses. Eventually this same communications network can plug into satellite communications systems and provide benefits far beyond weather prediction.

The relatively large number of weather stations is necessitated by the great variation in topography between and within the islands and the substantial differences in micro-climates which this causes. Water control needs to be area specific to avoid over-investment and under-investment otherwise there is a high risk of destruction of water control systems where these are inadequate to control seasonal water flow. The project, as current designed, allows for these differences.

Table I

Cape Verde Contributions to
CILSS Budget

(\$ equivalent)*

	<u>1977</u>	<u>1978</u> approved as available	<u>1979</u> budget proposed
Personnel	39,465	93,961	140,185
Materiel	6,896	9,914	40,147
Commodity Contributions	46,361	103,875	180,332
Investments (land, etc.)	16,900	12,069	To be decided

* \$1.00 is converted at 240 cfa

42

Table II

Proposed Budgetary Contributions - to Agrhymet -- GOCV

(In Cape Verdian Escudos)

<u>Item</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>Total</u>	<u>\$ Equivalent Total</u>
Personnel	1,223,600	1,962,801	2,667,300	5,853,701	169,672
Equipment	869,000	925,000	925,000	2,719,000	78,811
Consumables					
Agrometeorology	375,000	445,000	445,000	1,265,000	36,666
Meteorology	75,000	132,500	132,500	340,000	9,855
Non-Consumables					
Agrometeorology	80,000	125,500	125,500	331,000	9,594
Hydrology	165,000	242,500	242,500	50,000	
Miscellaneous and Contingency	65,000	234,938	362,607	662,545	19,204
TOTALS	2,852,600 (\$82,684)	4,068,239 (\$117,920)	4,900,407 (\$142,041)	11,821,246	342,645

U. S. \$1.00 = 34.5 Escudos

Source - General operating budget for 1978 published by the
Ministry of Economic Coordination, February 1978

Note: The fiscal year for the Government of Cape Verde is
analogous to the calendar year.

13

Section VI. Other Donor

By extension of the existing regional program, the World Meteorological Organization (WMO) will be the executing agency for the program in Cape Verde. In this position, it will have the principal responsibility for program coordination, implementation, and soliciting any additional needed financial resources from external donors. The responsibility for the program within WMO will continue to be the functioning of the Department of Technical Assistance in Geneva where a full-time desk officer will oversee and monitor day-to-day operations. That office will be responsible for providing the donors with financial and program reports, and setting the time for meetings of the Coordinating and Advisory Committee which is the main functioning body for coordination of donor activities.

The program coordination at the field level will continue to be carried out by the Program Coordinator and his staff who are based at the Regional Project Center in Niamey. In addition, the Program Coordinator has the responsibility of addressing questions of basic policy, matters pertaining to implementation, program direction, and preparing statements estimating the timing and amounts of financial requirements for the program. An African Co-Director is scheduled to arrive in Niamey in late 1978. Finally, WMO, through the Resident Representative of the United Nations in Praia, will serve as the key channel for articulating Cape Verdian perceptions and priorities to WMO headquarters, and to the various donors participating in the Cape Verdian segment of the program.

Netherlands

At the meeting of the Coordinating and Advisory Committee in Geneva in November 1977, the Netherlands Government representative made a financial commitment of \$150,000 for helping the program begin in Cape Verde. The Netherlands delegation stated that--like the other assistance already provided by the Netherlands to the existing regional program--this money would be provided in cash to WMO. There will be few restrictions as to what program elements the grant money from the

Netherlands should finance. In analyzing this assistance, the design team could find no potential for either overlap or duplication of effort. It is recommended that the Netherlands Government be approached by WMO to provide any additional external donor assistance which might be needed once the Cape Verdian program gets underway.

Federal Republic of Germany

The Federal Republic of Germany in February 1978 began executing a bilateral technical assistance project entitled "Integrated Rural Development for the Cape Verde Archipelago." The estimated value of

this assistance will be approximately \$1.5 million spread over a five-year period. A small part of this program includes five fellowships in practical on-the-job training in operational hydrology. The WMO project and the bilateral project of the Federal Republic of Germany should be monitored continually to insure there are proper cross linkages and no duplication of effort.

The European Development Fund (FED)

The European Development Fund is committed to providing the sum of \$3.5 million for hydrological development in Santo Antão and Santiago Islands. The basic purpose of this technical assistance effort will be to assist the Cape Verdians in using river water on a more rational basis. The FED program is also seeking to assist the Cape Verdian Government develop a program in operational hydrology but this project is only in the study stage. In discussions with FED representatives working on the program, the design team was told of potential linkages between the two programs and that every effort should be made to collaborate and insure that there is no duplication of effort. Finally, FED is considering a training program in river irrigation and development but no approval has yet been received from Brussels for this program. If such an effort does come to fruition, any resultant studies would be useful to the Regional Center in Niamey for research purposes.

Conclusions

The design team was advised that the principal responsibility for monitoring other donor activities in the rural development/agricultural/hydrological sector had been delegated to the Ministry of Rural Development in Praia. A special office has been established within that Ministry to deal with the various specialized agencies of the United Nations. An office will also be established in June 1978 for monitoring the activities of other donor agencies in this field. Cape Verdian officials feel certain that there is no potential either for duplication of effort or conflicts by external donors. WMO/Niamey officials feel that these actions by the Cape Verdian Government represent a seriousness of purpose matched by few of the remaining participating countries in the Agrymet program.

At the present time, there is no other donor program in Cape Verde which represents a duplication of effort with the Sahel Water Data and Management project; only the UNDP is making any direct contributions to the Agrymet program thus far. Given the coordinating efforts by UNDP and the Government of Cape Verde, there should be adequate coordination to avoid any duplication of activities.

Table I

Contributions to the AGRHYMET Program
by Donors Other Than AID

(Committed Contributions)
(by Calendar Year)

(\$)

	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>Total</u>
Belgium		2,084	65,200	130,000	125,000	92,000	414,284
France			1,000	62,000		15,000	78,000
Netherlands		160,750	842,500	1,174,000		632,000*	2,809,250
Niger			200,000	200,000**			400,000
Switzerland			15,500	111,000	165,000	100,000	391,500
UNDP***	<u>336,395</u>	<u>1,400,750</u>	<u>1,303,050</u>	<u>2,867,300</u>	<u>2,196,750</u>	<u>1,450,000</u>	<u>9,554,245</u>
Totals	336,395	1,563,584	2,427,250	4,544,300	2,486,750	2,289,000	13,647,279

*Funds which have not been earmarked for a specific purpose

**Includes land donated for the Regional Training Center

***Including the United Nations Sahelian Office allotment

Source: United Nations Resident Representative, Praia, Cape Verde
April 1978

-46-

Section VII. Social Soundness Analysis

A. The Population Overview - Cape Verde is a melting pot. Over 70% of the population is mixed (black and Caucasian); 29 percent is black and the remainder are whites, primarily Portuguese. Portuguese is the official language, yet Creole is the informal language of the people. The population of the Cape Verde Archipelago is estimated to be over 300,000 inhabitants. The population growth rate is estimated at 3.3% per annum, which is comparatively high when contrasted to Senegal and The Gambia. About 85% of the population lives in rural areas, although there is migration to the cities and towns, particularly on the islands of Santiago, Fogo, Santo Antao, and Mindelo. Population density on most of the islands varies between 60-80 inhabitants per square kilometer. The population is very young, with over 50% under 17 years of age. The job market is characterized by early entry, which means that there is little opportunity for full employment of the population and is one additional reason for the continuing outward migration.

The Archipelago subsists on fishing and subsistence farming. The fishing is done by a comparatively small number of artisan fishermen, who go to sea daily in rowboats, usually three men to a boat, using handlines. The remainder of the population grow maize and yucca on the steep, barren mountain slopes, which receive most of the rain that has fallen since the beginning of the drought in the late sixties. Together, they produce enough food to feed the families, but at the same time, the fishing catch has been depleted rather severely and the farming practices used have lead to extreme erosion of the slopes and high sedimentation in the stream beds of the valleys below.

The eventual objective of this project is to provide the Cape Verdians with a capacity for gathering, processing and disseminating hydrological and agrometeorological data so that agricultural productivity can be increased. Furthermore, a secondary purpose of the project will be to involve the staffs of the agricultural planners in the Cape Verdian Government to learn to formulate their water data needs, in interpreting the data in terms of the agricultural and livestock systems of the country, and in suggesting a proper format for data dissemination. It should be noted that the success of the program does not assume or require the introduction and adaptation by the farming population of new technologies. Rather the program involves employing both traditional and new technologies to provide better water data to the farming, fishing and herding population of the Archipelago. By utilizing the data generated and collected by the project, they should be able to increase their productivity using their present husbandry and farming practices.

The introduction of the "early warning system" should mitigate the consequences of future droughts. As with other benefits, this too will depend on the establishment of a more functional and reliable data

network than presently exists in the Archipelago. That data also must be reported both to the national headquarters at Praia and to the Regional Center in Niamey. Once this data is in the hands of the Cape Verdian government planners, officials, farmers, and fishermen, they should be able to adapt and take measures to soften the impact of future adverse climatic fluctuations.

B. Income Distribution - Definitive data concerning income distribution is difficult to obtain particularly since independence. A Portuguese Government study conducted in 1973 surveyed 100 households, in several of the islands, reported that only 35 of the 100 samples were sufficiently complete to permit any analysis. The 35 households analyzed reported that 225 persons shared a total reported income of 200,615 escudos per month or an average of 5,762 (\$170 per month). However, the Portuguese state that the sampling touched only the middle and upper income groups. Monthly expenditures generally are allocated for food, rent, water, clothing, and medical services in that order.

C. Beneficiaries - The intended beneficiaries of this part of the regional program fall into two major categories: (a) those CILSS technicians and specialists who will be trained under the program; and (b) the farmers and herders of Cape Verde itself, all of whom compose the target group to which the program is ultimately directed and which it intends to reach. Estimates of the mean annual income in Cape Verde are difficult to obtain but recent figures indicate approximately \$120.

With respect to the trainees: due to the scarcity of Cape Verdian technicians throughout the entire government services, and considering that some of those participants sent for training will drop out due to lack of motivation or adequate academic background, there is a total training target for Cape Verde of 7 participants in the professional category. Even given the fact that Cape Verde already has some 156 specialists, most of these should probably be exposed to a period of retraining in order that the program initiated in Cape Verde can be on the same level as that of other Sahelian countries participating in the program. Most of the training under the program can and should take place in Niamey at the Regional Center in order that the social conditions and linguistical problems can be minimized. Nevertheless, all of the Class I and most of the Class II technicians should be trained abroad. The Class IV technicians, sub-professional personnel who observe, record and transmit the data, can be trained on the job. Furthermore, a major purpose of the project will be to involve the staffs of the various agencies specializing in agricultural development throughout the Cape Verde islands in order that they can be assisted in formulating their water data needs, in interpreting data in terms of the agricultural system existent in the most important islands of the country, and in suggesting the proper format and means of data

dissemination. Finally, there will be the involvement of the agencies concerned with the actual dissemination of the data (national radio services, technical publications, etc.). Thus the program will actually effect, through the training program, joint planning and various implementation activities, over 200 Cape Verdian personnel at various levels in the Government. This group represents probably the most important group which is essential to the program's larger purpose.

The ultimate beneficiaries of the program in Cape Verde are, of course, the farmers and herders who make up some 90% of the population of the islands. The objective will be to increase their productivity and output by providing them with timely, accurate, and readily understandable weather information so that they may improve their on-the-farm practices and enhance productivity. The exact means of distributing the information to the farmers is presently being developed on a country-by-country basis by WMO and will be presented for consideration to the next Coordinating and Advisory Committee meeting now scheduled for November in Geneva.

More accurate information about run-off from normally dry gullies from upstream river sources will help irrigation farmers plan the preparation of their seed beds and to strengthen dikes and rock dams so as to minimize soil erosion. It should be stressed that the success of the project in Cape Verde does not assume nor require the introduction or adaptation by the farming population of new technologies. Rather, the program will provide better water data to the farming population in the islands, thereby enabling them to increase their productivity while using their present farming practices as well as improve their health and physical well-being.

Another aspect of the program which will directly benefit the Cape Verdian farmers will be the introduction of an "early warning system" to mitigate the consequences of future droughts. As with other benefits in the program, this too will depend upon the establishment of more functional and reliable data measurement networks and the reporting of that data from various points in the islands to Praia and to the Regional Center in Niamey. Such data can then be quickly correlated with historical records, and with special climate-crop studies that are being planned, to permit farmers to obtain more accurate rainfall outlooks, and thus permitting them to adapt and take those measures necessary to soften the impact of adverse climatic fluctuations.

The Republic of Cape Verde is composed of two types of islands: flat, sandy and dry such as Sal, Boa Vista, Maio, Santa Luzia; and the more humid mountainous ones such as Sao Vicente, Sao Nicolau, Brava, Santo Antão, Fogo and Santiago. The entire country is extremely poor in terms of capital required to develop its very modest natural resource base.

The country is rich, however, in eager-to-work, able human resources. A Portuguese ethnographer living in Cape Verde told the design team that there are more Cape Verdians entering the monetized economy at a younger age than anywhere else in the Portuguese overseas territories. He added that Cape Verdians have a higher number of able-bodied workers than most parts of West Africa. In light of this, the investment in agrometeorology, equipment, hydrology and training should have a significant impact on the economy.

D. Role of Women - The traditional role of women in Cape Verde is that generally identified with women throughout West Africa. When considering the role of women in the Republic of Cape Verde today, it is necessary to review the factors which developed it in the past and which sustains that role as it is today:

--The Portuguese colonial structure instilled the idea of women's role being confined primarily to the home.

--Lack of adequate water and power has made household chores more difficult and time-consuming.

--Uninterrupted child-bearing has required the mother to stay at home to rear the children.

--Periodic droughts, recurring throughout the history of Cape Verde, have contributed to the economic instability of the society, limiting the possibility of women participating in any meaningful way in the economic system.

The independence of Cape Verde in 1975 has created a need for the productive participation of all parts of society in the development of the country. Women, especially, could benefit by being able to plan and participate in agricultural production on a more rational basis. As one of several donors, the U. S. can exert influence for seeing that greater attention is given to this subject, particularly by encouraging the participation of women trainees in the program at all levels.

Women play an important part in West African agricultural activities generally, and due to the absence of men from the islands, cultivate their own fields in addition to the normal duties of rearing children.

VIII. Financial Analysis and Budget

The project budget is laid out in tables 1 and 2 of this section using the following assumptions:

1. Prior funding, i.e. FY 76 and FY 77 is treated as historical. Any variations between the original PP and actual utilization is not analyzed, and not presented unless it has implications on budget projections in the FY 78-80 period.
2. Prior year funding is not broken down into local cost/foreign exchange components.
3. Funding attributable to Cape Verde activities is presented as a separate column but is not additive to the overall budget request.
4. The increase/decrease column permits ready analysis of the variations of cost between the original PP and this amendment.

TABLE 1

	ACTUAL		FY 78				FY 79				FY 80				TOTAL			
	FY 76-77		Original PP	New	CV	Inc.	Original PP	New	CV	Inc.	Original PP	New	CV	Inc.	Original PP	Total New	CV	Total Increase or Decrease
	Proposed	Actual																
I. Technical Assistance																		
Technicians	230)	185	150)	188	--	-62	200	218	--	18	100	208	--	108	680)	799	--	-81
Engineering Consultants	100)		100)												200)			
II. Training																		
Center (Niamey)	200	216						20		+20					200	236	--	+36
U.S.			33	73	15	40	28	98	42	+70	28	109	24	81	89	280	81	+191
III. Commodities																		
Training Equipment	58	58	40	--	--	-40	40	--	--	-40	40	--	--	-40	178	58	--	-120
Solar Radiation	150	183.5	--	39	17	39	--	--	--		--	--	--		150	222.5	17	+ 72.5
Data Processing	378	353.6	225	547	51	322	100	100	--	--	--	--	--		703	1000.6	51	+297.6
Telecom	500	330	100	317	134	217	--	137	--	137	--	--	--		600	784	134	+184
Weather Radar and APT			190	196	--	6	--	280	--	280	--	238	140	238	190	714	140	+524
Hydro and Met Equip			50	96	96	46	50	105	105	55	50	--	--	-50	150	201	201	+ 51
Power Generators								85	85	85					--	85	85	+ 85
Publications	4	2	2	5		3	2	5		3	2	4		2	10	16	--	+ 6
IV. Other																		
Construction	(500	820	--	150	70	150	--	--	--		--	--	--		500	970	70	+470
Air Conditioning	(60	--	60	--	60	--	60		120		+120
Operating Costs							140	140	--	--	250	250	--	--	390	390	--	--
Data Dissemination							80	80	--	--	70	70	--	--	420	391.9	--	- 28.1
Admin. Costs	170	141.9	100	100		--		32				22				234		
WMO		110		70				48								157.9		
NOAA		31.9		30														
TOTAL	2290	2290*	990	1711	383	721	640	1328	232	688	540	939	164	399	4260	6268	779	1808

* FY 76-77
Plus 200
Provided
by Special
Action Memo

BUDGET BREAKDOWN ON FOREIGN EXCHANGE/LOCAL COST BASIS

	Prior Year Total	FY 78		FY 79		FY 80		TOTAL	
		LC	FX	LC	FX	LC	FX	LC	FX
I. Technical Assistance		--	188	--	218	--	208	--	614
II. Training		--	73	20	98	--	109	20	280
III. Commodities		--	1200	--	712	--	242	--	2154
IV. Other		150	100	60	220	60	320	270	640
TOTAL		150	1561	80	1248	60	879	290	3688*
									3978
									2290
									<u>6268</u>

*Prior funding of \$2290 not broken down

Section VIII. Implementation Arrangements

A. Analysis of the Recipient's Other Donors and AID's Administrative Arrangements

1. Recipient

a. The Regional Project. There should be no additional modifications needed at the regional project level with the exception of upward budgetary adjustments. The budget is detailed in Section VIII. Two Cape Verdian participants are already in training at the regional center in Niamey and upon their return in mid-1979 will form the nucleus of the Cape Verde program.

b. The National Project in Cape Verde. The Government of Cape Verde has signed a two-year project agreement with WMO and UNDP which includes the elaboration of administrative and implementing arrangements. The agreement specifies the training requirements and how they will be met. The Government of Cape Verde agrees to provide suitable candidates for training and will assign them to the program upon their return from training. The Government of Cape Verde has also agreed to provide various modes of support to the project activities on the Archipelago and to make a budgetary allotment. Finally, the Cape Verdians are to appoint a full-time project director. The United Nations Resident Representative in Praia advised the design team that such a person is in the process of being appointed. Other personnel additions will be made in 1979 when the first Cape Verdian participants return. It is expected that by that time, WMO will have advisors residing in Praia.

No serious implementation problems are expected with respect to either the regional or the national program in Cape Verde, other than there is a paucity of qualified Cape Verdian candidates available for training and insuring that no equipment arrives prior to the time that there are qualified national personnel to operate and maintain it.

c. Regional Coordinating Arrangements. CILSS will remain in charge of coordinating the overall responsibilities for the participating governments' participation in the execution of the program. The Secretary of the Committee was, in January, elected to continue as the Director of the Niamey Center. CILSS has established a Technical Executive Committee which has as one of its main functions assuring that CILSS contributions to the program are made available as needed, establish standards for the training of the counterpart staff, advise on external inputs required for implementation of the program, and review the general progress of the program and advise on future operations. Representatives of the Executive Committee have already visited Cape Verde and discussed the program with Cape Verdian officials. A follow-up meeting is expected when the experts nominated by WMO have arrived in Cape Verde.

B. Implementation Plan

As in the ongoing program, the United States will continue to look to NOAA as the technical advisor and agency for keeping AID currently informed on the progress and problems regarding the U. S. contribution to the program. Under the PASA with NOAA, NOAA will continue to submit bi-monthly reports which cover the progress and problems concerning the program. These regular reports can be supplemented by special reports which can cover any particular problem requiring urgent attention. In addition, NOAA can utilize its special communications link with WMO/Geneva, which in turn can request information from the Program Coordinator based in Niamey.

The other primary means for monitoring the project lies with USAID/Niger which has a member of its program office staff monitoring the day-to-day activities of the program. In this role, the Mission Director can depend on the backstopping of AID/W, and can also call on the Mission Directors in other CILSS countries. A detailed plan as to how the Mission will carry out its responsibilities under this new arrangement was developed during the course of the meeting of the Coordinating and Advisory Committee meeting in Geneva in November 1977. Regarding the Cape Verde segment of the program, USAID/Niger can ultimately rely on the CDO in Bissau for assistance.

Communications with Cape Verde initially may be difficult. During the initial stages of project implementation, communications with the Niamey Regional Center and with WMO/Geneva can be made via Dakar, Senegal. The Government of Cape Verde has a telecommunications link with the Republic of Senegal, and the design team recommends a Sal-Praira link to support better communications.

In regard to the implementation of the program as a whole, A.I.D. will continue to exercise its monitoring responsibilities through its participation in the Coordinating and Advisory Committee. NOAA will continue to assist A.I.D. in this function as a NOAA official will normally be included in the U. S. delegation to the Committee's meetings. As discussed elsewhere in this paper, the Coordinating and Advisory Committee has broad functions for keeping track of the execution of the program including a review of donor contributions, WMO program execution reports, WMO plans of action and budget reports, and reviewing the work of any technical advisory committees established by the CAC. The Executive Committee of CILSS has now mandated that the CAC will meet at least once a year at the time following the bi-annual meeting of the Executive Committee. In addition, should a problem of particular concern arise, A.I.D. can always ask WMO to call a special meeting of the CAC to deal with that problem and make recommendations for its resolution. The U. S. itself can call such a meeting if such a request is supported by two other donors.

Unofficial Translation

January 10, 1978

Dr. D. Rijks
Coordinator for the WMO Program
in the Sahel
Niamey

The purpose of this letter is to respond to your letter 190/R dated November 29, 1977 in which you acknowledged the application of the Republic of Cape Verde to join CILSS and to participate in the Agrhymet program. I have the honor to inform you that the Government of the Republic of Cape Verde accepts the UNDP Program developed and signed in October 1977 for a duration of five years and will contribute 8,707,500\$ for this purpose. I have the honor to inform you that Mr. Horácio Soares has been requested by me and my government to represent the Ministry of Rural Development in carrying out the activities concerning the participation of Cape Verde in the Agrhymet Program.

I understand that the contacts have started between you and Mr. Soares concerning details of implementation which will be carried out during the project. My Government is also contacting CILSS concerning these general matters.

Sincerely,

Joao Pereira Silva
Minister of Rural Development
Republic of Cape Verde

Supplementary Budgetary Contribution*
for Support of Trained Personnel
in the Agrhymet Program

(In Gape Verdian Escudos)

	<u>1978</u>		<u>1979</u>		<u>1980</u>	
	<u># of Months</u>	<u>Escudos(\$)</u>	<u># of Months</u>	<u>Escudos(\$)</u>	<u># of Months</u>	<u>Escudos(\$)</u>
<u>Meteorology</u>						
Class I	18	15.600	-	-	12	92.650
Class II	44	375.000	39	368.000	60	625.000
Class III	115	798.000	148	1,162.200	9	45.200
<u>Agrometeorology, Climatology</u>						
Class I	2	20.000	12	62.500	9	704.000
Class II	-	-	3	35.000	-	-
Class III	3	12.000	6	61.000	35	325.000
Class IV	6	14.500	6	18.500	6	20.200
<u>Hydrology</u>						
Class I	-	-	12	155.750	12	161.500
Class II	2	31.615	2	18.500	6	71.700
Class III	3	18.607	9	15.650	12	63.500

*Passed at a Special Meeting, Council of Ministers,
 March 10, 1978

Projection 1980-85

Hydrological Section					Projected <u>1985-90</u>
Cape Verde	(A) Headquarters - <u>Praia</u>				(B) 1 Class I
	1 Class I				

	Praia 1 Class II				São Nicolau or St. Anizo 1 Class II
Praia 4 Class III	Fogo 1 Class III	Boa Vista 1 Class III	St. Antão 2 Class III	São Nicolau 1 Class III	
15 Class IV	3 Class IV	5 Class IV	8 Class IV	3 Class IV	

(A) This class I is specialized in network management.

(B) This class I is specialized in the mathematical model.

----Possible for 1980-85

Agrhymet Niamey

Oct. 77

Oct. 79

2 Class III

78 2 Class III 80

80 2 Class III 82

82 2 or 3 Class III 84

80 1 Class II 82

Agrhymet Niamey or
Polytechnic-Lausanne

UNCLASSIFIED

For each station check one ACTION

DATE SENT

DESTINATION
ACRON
INFO

TO - AID/W WORLD A-09 X
 Embassy Praia USAID A-01H X
 US Mission Geneva (for World Met. Organization) U.S. Mission Geneva
 Embassy Misca U.S. Mission Misca

DATE SENT
May 5, 1978

FROM - AID/High

SUBJECT - Sahel Water Data and Management (625-0917)

REFERENCE -

(Washington for AFR/DR Graham pass 200A)

On the attachment are listed the agro-meteorological and hydrological stations located in the Republic of Cape Verde. This list was compiled by the Ministries of Transport and Communication and Rural Development at the request of the PF design team which visited Cape Verde in April. After the compilation of the list was completed, the Government convened an interministerial meeting for (a) the purpose of examining the status of each of the stations listed; and (b) to make recommendations as to what should be planned for each of the listed stations. Those stations which will be used during the subject project have been noted on the attachment. Other stations which will be upgraded, merged, or retained will be financed with either Cape Verdian resources or with funds from other donors.

We hope that this information will be helpful during the forthcoming PF revision review which is to be submitted to AID/W in mid-May.

AID
AMB/DCI
Cairo

Attachment: List of Hydrological/Meteorological Stations in the Republic of Cape Verde

PAGE 1 OF 1

APPROVED BY PROG: R.A. Marshall:mp	OFFICE USAID/PROG	PROJECT NO. 225	DATE 5/2/78	APPROVED BY Walter Sharvin Acting Director, Walter Sharvin
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Hydrological/Meteorological Stations
in the Republic of Cape Verde

<u>Island</u>	<u>Name of Station and/or Place</u>	<u>Estab- lishment</u>	<u>Status</u>	<u>Proposed Plans</u>
I. Santiago	Praia	1948	In active use	Will be retained and upgraded
	Cruzalinho	1952	In active use	Will be retained
	S. Jorge dos Orgaos	1952	In active use	Will be retained and upgraded by Gov't of Cape V.
	Toindada	1955	In active use	Will be retained
	Ansonada	1955	In active use	Will be retained
	Serra Malgueta	Unknown	In active use	Will be retained
	Chambon	Unknown	In active use	Will be retained
	Monta Chota	1944	Unused	To be abandoned
	Sri Voz	1944	Unused	To be abandoned
	Pico Antnio	1943	Unused	To be abandoned
	Alto da Joao Gotos	1945	Unused	To be abandoned
	Escola Agro Pico	1946	In active use	To be retained and upgraded
	Posto Experimento São Agrícola	1946	Unused	To be abandoned
	São Jorge	1949	In active use	To be retained and upgraded
	Ponta dos Orgaos	1949	Unused	To be abandoned
	Serra do Montanha dos Orgaos	1949	Unused	To be abandoned

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<u>Island</u>	<u>Name of Station and/or Place</u>	<u>Date of Zetab- Lightson</u>	<u>Status</u>	<u>Proposed Plans</u>
	Barrad Montaria Abaixo	1950	Unused	
	Zunco Zandaira	1951	Abandoned	
	Alto da Figueirinha	1952	In active use	To be merged with other stations
	Lavaba Poo Pau	1952	In active use	To be retained
	Enciso	1953	Not in use	To be abandoned
	Ribeirao Unna	1954	Not in use	To be abandoned
	Ribeirao Gato	1973	In active use	To be retained
	Monte Medicinas Sala	1959	In active use	To be merged
	Cabo Novo Ponta da Vassou	1933	Not in use	To be abandoned
	Acidade Fatima	1958	Not in use	
	San Praia	1958	In active use	To be upgraded
	Pinga Mal	1959	In active use	To be upgraded
	Joao Ventura	1959	Abandoned	
	Igreja de S. Miguel	1959	Abandoned	
	Catalo Roxo de S. Miguel	1955	Abandoned	
	Monte Raico	1955	Abandoned	
	Flamingoa Pedro Foz de Loo	1958	In active use	To be upgraded
	Acidade do Monte	1959	In active use	To be merged
	Chancelo Acada	1957	In active use	To be retained
	Alto da Jcau Gocce	1959	Abandoned	

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<u>Island</u>	<u>Name of Station and/or Place</u>	<u>Date of Establishment</u>	<u>Status</u>	<u>Proposed Plans</u>
	Micoe-Fralosa	1939	Abandoned	
	Assomada	1941	In active use	To be retained
	Box Estrada	1958	In active use	
	Achada Alcin	1963	In active use	To be merged
	Serra da Malagusta	1965	In active use	To be retained
	Ribeira da Barca	1941	In active use	To be retained
	Figueira dos Naus	1942	Abandoned	
2. Yogo	Achada Vora	1951	In active use	To be retained
	Achada Furna	1950	In active use	To be retained
	Rocho	1950	In active use	To be retained
	Cova Figueira	1952	In active use	To be merged with other stations
	Cova Cabais	1958	In active use	To be retained and upgraded--will be part of Agchymet Project
	S. Domingos	Unknown	Abandoned	
	Espia	1950	In active use	To be retained
	Kaijoni	1957	In active use	To be retained
	Kocnda	1953	In active use	To be retained and will be a station in Agchymet Project
	Agraja	1959	In active use	To be retained
	Sao Felipe	1952	Abandoned	
	Paris	Unknown	Abandoned	

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<u>Island</u>	<u>Name of Station and/or PLANT</u>	<u>Date of Estab- lishment</u>	<u>Status</u>	<u>Proposed Plans</u>
	Monte Branco	1959	In active use	To be retained
	Pau Cartola	1961	Abandoned	
	Ribeir. de Ilha	1931	In active use	Will be retained
	Sao Malipa	1949	In active use	Will be retained and will be upgraded as a part of the Agribusnet Project
	Monte Vilha	Unknown	Abandoned	
	Monte Capado	1960	In active use	To be retained
3. Maia	Calheta	1966	In active use	To be merged
	Caçambulho	1961	In active use	To be merged
	Vila do Maio	Unknown	Abandoned	
4. S. M. Jau	Cabe Calicho	1967	Abandoned	
	Cacheco	Unknown	Abandoned	
	Calafiao Campo	1961	In active use	To be retained
	Calafiao Posto	1963	In active use	To be retained
	Monte Alto	1964	In active use	To be retained
	Praia Branca	1965	In active use	To be merged
	Vila da Ribeira Branca	1967	In active use	To be merged
Ilheus	Cusco	1977	In active use	To be merged
	Campo dos Montas	Unknown	Abandoned	
	Furna	Unknown	Abandoned	

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<u>Island</u>	<u>Name of Station and/or Flag</u>	<u>Date of Estab- lishment</u>	<u>Status</u>	<u>Proposed Plans</u>
	Sala Nos Saigun	1957	In active use	To be upgraded and used as a part of the Agrhyment Project
	Barras dos Amigos	1962	In active use	Same as above
	Nova Sintra	1963	In active use	To be merged with other stations
6. São Vicente	Miradolo	1972	In active use	To be retained
	Mato Inglês	1963	In active use	To be merged
	Pada Verde	1958	In active use	To be merged
7. São	Repargo	1952	Abandoned	
	Pedro da Louca	1963	Abandoned	
	Santa Maria	1972	In active use	To be upgraded
8. Nos Vista	Fuente Vicente	1963	In active use	To be retained
	Fundo das Vigasinas	1953	Abandoned	
	Focacama Velha	1940	Abandoned	
	Sol Red	1931	In active use	To be retained
9. Santo Antao	Ponte do Sol	1953	In active use	To be retained and made part of the Agrhyment Project
	Paseogun	1956	In active use	Same as above
	Ilha da Cruz	1961	In active use	To be upgraded
	Sagodos	1964	In active use	To be upgraded
	Terrafal do Monte Drigo	1941	In active use	To be merged with other stations
	Vila da Maria Pia	1941	In active use	To be merged with other stations

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<u>Island</u>	<u>Name of Station and/or Piece</u>	<u>Date of Etab-lishment</u>	<u>Status</u>	<u>Proposed Plans</u>
	Pazo Dias	1945	In active use	To be merged with other stations
	Agua das Caldeiras	1957	In active use	To be merged with other stations
	Mica	1940	To be abandoned	April 30, 1978
	Porto Novo	1945	In active use	To be merged with other stations
	Mbar ao Fuzio	1956	In active use	Same as above
	Bardo Forno	1961	In active use	Same as above
	Boca da Coruja	1961	In active use	Same as above
	Cho da Arroz	1956	In active use	Same as above
	Chosho	1966	In activation	Same as above
	Gorda	1964	In active use	To be retained
	Vajo Domingos	1957	In active use	To be retained
	Garra Espgheiro	Unknown	Abandoned	
	Corano	1961	In active use	To be retained
	Janela	1964	In active use	To be retained
	Cha de Alacrin	1957	In active use	To be retained
	Samborua	Unknown	Abandoned	
	Joao Afonso	1964	In active use	To be merged with other stations
	Gagoa	1968	In active use	Same as above
	Manoel Joslha	1960	In active use	

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<u>Island</u>	<u>Name of Station and/or Place</u>	<u>Date of Estab- lishment</u>	<u>Status</u>	<u>Proposed Plans</u>
	Rincao da Cima	1966	In active use	To be retained
	Rabo Civerato	1957	In active use	To be retained
	Vila de Ribeira Grande	1966	In active use	To be retained
	Monte da Sol	Unknown	Abandoned	

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INITIAL ENVIRONMENTAL EXAMINATION

Project Country: Sahel Regional (Cape Verde)

Project Title : Sahel Water Data Network

Funding : FY(s) 1978-80 \$6,268,000

Period of Project: 3 years

IEE Prepared by: Roy Harrell: USAID/Niamey
James Graham: ADDW

[Handwritten signatures: Roy Harrell and James Graham]

Environmental Action Recommended: Negative determination

Concurrence:

[Handwritten signature: Jay Johnson]

Jay Johnson, Mission Director, USAID/Niamey

Assistant Administrator Decision:

APPROVED

[Handwritten signature]

DISAPPROVED

DATE

[Handwritten date: 7/17/78]

Initial Environmental Examination

A. Project Activities

The drought which began in the Sahel in the early seventies has attracted international attention. Although periods of protracted drought have been experienced before in the Sahel, their impact has seldom been so serious in terms of human and economic disaster. Most of the Sahelian countries of West Africa are poor in terms of natural resources and the incomes of most of the people are based on subsistence agriculture. Such agricultural activities are very sensitive to drought conditions. The current drought in Cape Verde began in many of the islands in 1967, thus the magnitude of the drought here in comparison to the rest of the Sahel has been many times greater. The magnitude of the disaster in Cape Verde has caused the Government of Cape Verde to look for ways to mitigate the effects of droughts in the future. Inasmuch as weather is a major problem of the conditions in Cape Verde today, the Government sought the assistance of the World Meteorological Organization in helping farmers in the Archipelago to ameliorate the effects of the drought by participating in the Sahel Water Data project. The project, which already involves seven countries, has the following purposes:

Acquisition of a better information base that includes the extent, variation and quality of water resources on both national and regional levels.

Delivery of this information to the decision-maker (from government officials to small farmers) in a usable and timely manner.

In order to implement these purposes, WMO/UNDP and CILSS have developed programs which consist of eight national projects designed to develop and to strengthen national water data networks and services and a complementary regional project through which a Regional Training and Application Center at Niamey has been established for training national technical personnel such as Cape Verdians. Later, the Regional Center at Niamey will serve as a center for data processing, dissemination, and technical research institution as well. Like Cape Verde, the national projects are the building blocks of the program. With the assistance of the project personnel, Cape Verde will (a) rehabilitate and expand its national hydrological and meteorological data measuring networks; (b) establish a communications network so that the data can be reported from the various islands to a primary center at Praia; (c) develop, strengthen and expand the Cape Verdian agrometeorological and hydrological services to operate, staff, and maintain the networks as well as staff the national headquarters at Praia; (d) establish or strengthen the coordination of climatological

and hydrological data; and (e) involve the user agricultural production agencies (livestock, water and forests) in the processing, interpreting and dissemination of the data so that it can directly benefit planners and the users themselves. The location of the various agrometeorological and hydrological stations is shown on the accompanying maps (see Annex 4) and is included as a part of TOAID A-07 dated May 5, 1978.

B. Land and Water Forms

Soils in the Republic of Cape Verde are typical of much of the tropics. A good part of them exhibit leaching and consequent low fertility characteristics. Overforaging, intensive cultivation and lack of abundant rotation practices have exacerbated the problem, particularly since the beginning of the drought. Frequently, the soils are deficient in micro-nutrients and demonstrate aluminum toxicity which reduces the crop and enterprise possibilities. There are some fertile alluvial valleys, particularly on the islands of Santiago and Fogo which offer distinct development possibilities and are the focus of much proposed governmental intervention. However, these sites are relatively small in comparison to the total land area.

Water, particularly since the beginning of the drought, is a constant problem. Water is most prevalent during the July-December period, but is extremely erratic. The water table is at its most constant during this period. In some years, annual precipitation on some of the islands may be fairly evenly distributed throughout the twelve month period; in others, the total yearly amount can occur during a period of several hours.

C. Human Geography

Salient features of the population as to size, structure and social problems is detailed in the body of the PP amendment. As the project is primarily research and data oriented and will have little or no import on the human geography of the area.

Recommendation

An Environmental Assessment nor an Environmental Impact Study is not recommended as a result of this project intervention.

Direct Changes Within Project Area

A. Natural Resources. Would the implementation of this project in Cape Verde require or eventually cause:

1. reduction to the standing mass of vegetation, including the associated animal populations? No.
2. significant changes to either the rates of use or the stocks of non-renewable natural resources? No.
3. significant alteration of periodicity of flow, storage or location of waters? No.
4. significant modification of capacity to buffer short-term climatic variations? No.
5. extensive alteration of surfaces, including soil character? No.
6. changes in air quality? No.
7. modification of traditionally significant micro-climates? No.
8. alteration of soil susceptibility to accelerated erosion? No.
9. modification of locally significant nutrient cycling flows? No.
10. interruption or destruction of specific places or routes which are of strategic biologic significance? No.
11. intervention in the traditional agricultural or other systems which have as their basic stock unique assemblages of biota? No.

B. Socio-economic Conditions immediately linked to potential environmental changes.

Would the implementation of this project require or eventually cause significant:

1. replacement of local land use systems of proven sustainability? No.
2. changes in the number and distribution of human population? No.
3. change in source and composition of food supply such as would alter the nutritional status of the local population? No.
4. change in physical conditions which might affect the transmission of diseases of man, animal or plants? No.
5. changes which alter either the potential of environmental hazards or the social capacity to cope with them? No.
6. transformation of uses of land which may be of ethnic or cultural significance? No.
7. modification of resident capacity to utilize and distribute locally available skills, information or materials? No.
8. change in the rates and quantities of concentrated energy usage? No.
9. probability that wastes from the proposed activities will be fully used, contained or properly managed? No.
10. adoption of technology which would alter the scale and the intensity of agricultural land use? No.

C. Indirect Consequences

For areas and sectors outside the immediate concern of the Sahel Water Data project, are there significant probabilities that:

1. within Cape Verde, will it be perceived that the resources or long-term options of one ethnic group or national class are being traded off for the benefit of another? No.
2. changes to habitats will affect the capacity of certain ethnic groups to maintain a reasonably diverse and self-regulating population of plants and animals? No.
3. alteration of lands heretofore considered of marginal productivity will have their capacity to provide a broad array of ecosystem services (such as watershed, nutrient cycling, water quality, aesthetic satisfactions, or minor products) substantially improved? No.
4. that there will be changes to the availability, qualities, flows and consumption of water? No.
5. there will be a change in the nature, quantities, containment and cycling routes of waste products, including agricultural byproducts? No.
6. there will be changes in the capabilities of people to protect themselves from hazards such as diseases? No.
7. The locations chosen for infrastructure development will alter the values of lands so as to cause changes in intensities of use which in turn alter ecological viability? No.
8. there will be a change to regional relationships of resource allocation which would require either changes to or coordination with another project? No.
9. there will be changes in food supply and distribution patterns which would create new meanings for nutrition, health and/or poverty levels? No.

10. given the circumstances of technology and regional social conditions, will this proposal be perceived as using the natural resources in a conservative and efficient manner? Not applicable.
11. alterations of landscape will affect the character of places which have significance to the history, ethnic identity, aesthetic well-being or cultural continuity of the Cape Verdian peoples involved? No.
12. the commitment to commercial energy-content inputs will alter social structures, marketing conditions, political dependencies, agricultural systems and resource availabilities through changes in land conditions? Not applicable.
13. the project will assist people to organize sustainable health services and technology in relation to changes in environmental conditions (such as diet, disease vectors, sanitation, shelter)? No.
14. the institutions developing from the Sahel Water Data project will have continuity of environmentally aware participant involvement in supervision and monitoring? Yes.

15. the developments sought will contribute to the establishment of incentives for conserving natural resources in Cape Verde? Yes, the conservation and enhancement of natural resources is one of the indirect objectives of the proposed interventions.
16. the project will create changes which may embroil the Republic of Cape Verde in either a national or international controversy? No.

Conclusions

Like the existing regional project, the proposed project in Cape Verde does not have large environmental impacts. It does not lend itself to many viable alternatives. The selection of data stations in the Archipelago is based primarily on the existence of existing stations, considerations of the need for good spatial coverage of the entire Archipelago and, in some instances, the need to sample climatological and hydrological conditions at certain critical locations. The new stations in Cape Verde will be small structures which will house sensors for collecting and transmitting data. The structures which will be constructed will, for the most part, be no larger than a one bedroom house. The stations will be monitored twice daily by non-live-in personnel or they will be completely automated. They will also be removed from major population centers. Few if any effluents will be released to air or water. Given the lack of significant environmental impacts from these small structures, there is no reason to consider alternate sites based on this type of consideration.

The potential environmental impacts of the program appear to be minimal. A more detailed environmental assessment is not required.

Project of the Government of
Cape Verde

PROJECT DOCUMENT

Title: Strengthening of Meteorological, Agrometeorological
and Hydrological Services

Number: CVI/77/.../A/01/16 Duration: 5 years

Primary function: Institution building

Sector: Science and Technology

Sub-sector: Meteorology and Hydrology

Government Implementing Agency:

Executing Agency: World Meteorological
Organisation (WMO) in
association with FAO

Estimated starting date: October 1977

Government inputs: 3.707.900 (Escudos)
UNEP inputs: 858.300 (US dollars)

Signed: _____
on behalf of the Government

Date: _____

on behalf of the Executing Agency

Date: _____

on behalf of the United Nations
Development Programme

Date: _____

PART I. LEGAL CONTEXT

This Project Document shall be the instrument referred to as such in Article I, paragraph I, of the Assistance Agreement between the Government of Cape Verde and the United Nations Development Programme, signed by the parties on 31 January 1976.

The Government Implementing Agency shall, for the purposes of the Standard Basic Agreement, refer to the Government Co-operating Agency described in that Agreement.

PART II. A. Development Objectives

When preparing the UNDP assistance programme for the period 1978-1981, the Government of Cape Verde identified four main objectives:

- hydrogeological exploration;
- development of fisheries;
- transport and communications;
- soil protection and conservation and protection of crops.

The project is directly related to these objectives through its activities as follows:

- pluviometric and hydrological studies in connexion with groundwater recharge;
- meteorological forecasting for fisheries;
- meteorological forecasting for aeronautical purposes at Sal and other airports;
- studies of surface runoff in relation to soil erosion;
- provision of agrometeorological warnings for crop protection.

PART II. B. Immediate Objectives

1. The recent drought has brought to light the fragility of the ecological system of the Sudano-Sahelian zone by its disastrous effects on the economy of the countries and the welfare of the population. It is known that droughts have occurred in the past and can be expected to occur again in the future.

2. In order to ensure optimum development of agricultural production it is necessary to undertake a survey, which should be as comprehensive as possible, of the surface water resources available in the country in order that these resources may be used to the utmost. In this work, the Meteorological and Hydrological Services have a vital role to play.
3. The information provided by these Services is essential for determining the optimum period for sowing. Experience has shown that farmers, anxious not to miss this period, often undertake sowing before the rainy season is fully established. Seeds sown under these conditions germinate and wither due to lack of sufficient moisture. Re-sowing is then necessary and a large quantity of seed is thus wasted. Pest control operations also require precise meteorological information for the application of pesticides. For flood retreat cropping and for irrigated crops, hydrological and climatological information is required and these Services should be in a position to provide such information. Other aspects of agriculture for which such information is also needed are crop diversification and extension as well as planning hydraulic schemes.
4. The combination of strong gradients and heavy rainfall intensities (up to 570 mm in 24 hours) on the more fertile of the islands (Sao Tiago, Sao Nicolau, Pogo and Santa Antao) causes heavy erosion of the fertile topsoil.
5. The geographic location of the archipelago in the trade-wind zone and the relatively high altitudes above sea-level are responsible for a great variety of micro-climates ranging from the fairly humid climate of North/North Easterly exposure at altitudes between 500 and 1,000 m to nearly desertic conditions under lee conditions at sea-level. A better understanding of these micro-climates is a prerequisite for development planning in the areas concerned.
6. As in the other CILSS countries, the Meteorological Service was established to serve aeronautical needs. Agrometeorology is not sufficiently developed; the data required for aeronautical purposes do not meet, or only partially meet, agrometeorological requirements. The activities of the Meteorological Service must therefore be extended to cover the needs of agriculture. With this in view, WMO will establish close collaboration with FAO in order to ensure that rational use is made of new information and data in agricultural circles. It will also be necessary to strengthen the Hydrological Service to enable it to provide useful information for agriculture and for the management of water supplies.

10

7. The Government has embarked on a large scheme with the support of USAID calling for the construction of 1,500 weirs and dams to help control soil erosion. These works will also result in alluvial deposits in which infiltrated water will remain accessible through wells. At present, these works are erected on a purely empirical basis and without adequate knowledge of real hydrological conditions. Detailed studies of some of these works will be required in order to improve their planning and yield.

8. A consultant mission was carried out under USAID recently. Among its conclusions is a recommendation to strengthen the Meteorological, Agrometeorological and Hydrological Services to enable them to provide the supporting data required to evaluate development projects currently under consideration. In its initial phase, the WMO project will enable the Meteorological and Hydrological Services to strengthen networks of observing stations, to train staff and to provide practical advice to users on the scheduling of agricultural activities as well as short-term agrometeorological and hydrological forecasts. The project is, thus, part of the overall CILSS/WMO Programme for the development of observing station networks and for strengthening data processing facilities as well as to improve the availability for users of short-term forecasts throughout all CILSS countries. A Regional Training Centre to train the staff required for the Programme is also being established. It will in addition establish co-ordination of activities at a regional level.

PART II. B. Outputs

It is expected that through its activities the project will produce the following outputs:

- (a) trained staff and improved networks (for quantitative information refer to paragraph II. F.);
- (b) advice to users in the form of data and studies.

Although quantification is difficult, the following explanations are relevant:

- information for aeronautical purposes
some meteorological information is already available at the airports of Sal, Praia and Mindelo. The strengthening of these stations is planned for the period July-October 1973 and will result in better quality and quantity of the information for aviation. The same applies to the other aeronautical meteorology stations on the other islands. Information will become available throughout the duration of the project as soon as these stations are installed;

21

- fishing

some meteorological forecasts are already available but are not used in this domain. The strengthening of the meteorological network will provide more reliable forecasts and better data dissemination is expected to permit their use;

Agriculture - land protection

this project includes the issuing of agrometeorological bulletins and warnings of unusual bad conditions (drought, strong winds, torrential rain or invasion of parasites). This information will, however, only be available at the end of the current project and will be dealt with mainly in the second phase. Land protection aspects are covered by a UNDP/FAO project which will be the main user of this kind of data; in addition, natural salinity of the waters along with increase in salinity caused by irrigation are important problems in the climatic conditions of Cape Verde. Water quality measurements will be carried out on irrigated land as well as in coastal zones exposed to salt-water intrusion to define their salinity. A small laboratory will be established and personnel trained for this purpose;

Groundwater

the project does not specifically cover this aspect as a UNDP/UNOTC project is being carried out. The project will nevertheless provide rainfall and hydrological information necessary for a better understanding of groundwater recharge and, through study of accumulated data and that furnished by the new stations planned, its more rational use. This data will be used jointly by the above-mentioned UNOTC project and this project.

PART II. F. Project activities

1. Project activities will begin in October 1977 when six fellowship-holders will be sent to the Centre for Training and Applications of Agrometeorology/Operational Hydrology (AGREMET) in Niamey. Training will be carried out throughout the project, aided by fellowships. It is foreseen that 27 candidates will be trained as technicians or engineers.

2. The training of observers will be effected by project experts as soon as they arrive (foreseen July 1978). These observers will be chosen from Rural Development staff as far as agroclimatological and hydrological stations are concerned. Meteorological observers will be recruited by the Government following the criteria applicable to this level of personnel.
3. Officer training will be effected at the regional AGREMET Centre in Niamey through fellowships. Bilateral fellowships have also been offered to the Cape Verde Government, particularly in the field of hydrology. This is the reason why the project does not foresee senior officer training in this field.
4. Pending the arrival of the project experts, lists of equipment for the establishment or strengthening of stations will be prepared by experts from the AGREMET Centre during a mission in August/September 1977. It is also foreseen that the equipment will be available when the experts arrive to enable them to proceed with its installation.
5. As soon as the first stations are established, i.e. towards December 1978, the experts will work on the accumulated data; they will check, and analyze and then proceed to its publication. This activity will continue throughout the duration of the project.
6. The hydrological expert will take part in the calibration of existing weirs as this exercise has never been effected. He will organize the collection of data on solid transport and bed sediment. He will select three representative drainage basins; equip them and establish water balances. Priority will be given to basins upon which the Government is contemplating dam construction.
7. It should be noted that the existing telecommunications structure between the various stations and between the islands will permit centralized data collection in real time without difficulty.
8. As mentioned earlier, the project falls within the scope of the AGREMET Programme. Experts are available at the Centre and will be able to visit the Cape Verde Islands and advise on specific questions such as: instrument maintenance, data processing, telecommunications, etc., as required.
9. Upon the return of the fellowship holders and following practical training under the project experts, the experts' activities will progressively be taken over by national staff.

81

PART II. G. Inputs

1. Government inputs

These inputs are defined in the tables at Annexes I to III to this document. Essentially they consist of:

- provision of fellowship candidates;
- provision of consumables (diagrams, fuel for vehicles, office supplies, etc.);
- payment of expenses for installation of instruments provided through outside assistance;
- publication costs;
- salaries of national staff.

2. External inputs

These inputs are defined in the tables at Annexes IV to VI to this document. They consist of:

- an expert in meteorology from July 1973. This expert should have general meteorological training and have wide experience in the applications of meteorology to aeronautics and agriculture;
 - an expert in hydrology with wide experience of hydrology in mountainous areas;
 - twenty-seven fellowships, totalling 660 months;
 - the required instrumentation to strengthen the stations at Sal, Mindelo and Praia;
 - the required instrumentation to equip 15 agroclimato-logical stations, 6 aeronautical stations, 3 limno-graphical stations and 60 rain-gauging stations;
 - office supplies to equip the central service; this should include calculating machines; vehicles to ensure supervision of the project stations;
- it is also foreseen that radiation measuring equipment be provided under the AGREMET Programme; this material does not appear in the project budgets.

PART II. H. Preparation of Work Plan

1. The attached bar-chart indicates the timetable of the various activities (see Annex VII).
2. A detailed Work Plan for the implementation of the project will be prepared by the senior expert assigned to the project in consultation with the national authorities concerned. This will be done at the start of the project and brought forward periodically. The agreed upon Work Plan will be attached to the Project Document as Annex I and will be considered as part of that document.

PART II. I. Preparation of the Framework for Effective Participation of National and International Staff in the Project

The activities necessary to produce the indicated outputs and achieve the project's immediate objective will be carried out jointly by the national and international staff assigned to it. The respective roles of the national and international staff will be determined by their leaders, by mutual discussion and agreement, at the beginning of the project, and set out in a Framework for Effective Participation of National and International Staff in the Project. The Framework, which will be attached to the Project Document as an annex, will be reviewed from time to time. The respective roles of the national and international staff shall be in accordance with the established concept and specific purposes of technical co-operation.

PART II. K. Institutional Framework

1. This project falls within the wider scope of the Programme for the strengthening the Agrometeorological and Hydrological Services of the Sahelian countries and establishment of a Centre for training and applications of agrometeorology/operational hydrology, better known as the "AGREMET Programme". The Conceptual Plan and the Implementation Programme of the AGREMET Programme define the relationship between this project and the Programme.

2. The Government of the Republic of Cape Verde intends to study the possibility of creating a national Meteorological Service which would be independent and would re-group all activities concerning aeronautical meteorology, climatology, agrometeorology and hydrology. This re-grouping, the need for which has already been felt, has not been possible due to the lack of national officers. Since the project foresees the training of these officers, this question could be studied and a solution may be found. The project experts will be able to assist the Government in this study as necessary.

PART II. L. Prior Obligations and Prerequisites

1. Prior Obligations

There are no prior obligations for the approval and implementation of the project.

2. Prerequisites

(a) Government

Although it does not constitute a prior obligation, the provision by the Government of candidates for fellowships remains an essential condition for the success of the project. Any delay in the fellowship programme given in the table at Annex V will cause a delay to the project as a whole. The Government is aware of this aspect and will do the utmost to find qualified candidates in good time;

All the maps, documents and statistical information available in Cape Verde which will be required by the project have already been placed at the disposal of the mission formulating the present request;

(b) Executing Agency

Immediately following the formal agreement of the Government to the present request, WHO will submit it to the members of the Co-ordinating and Advisory Committee of the AGREEMENT Programme to obtain the funds required. The Ministry of Co-operation of Cape Verde will be kept informed of WHO's actions in this connexion.

PART II. M. Future Assistance

As in the case in the other Sahelian countries which are supported by the AGRHYMET Programme, this project only covers the first installation phase. Once the personnel has been trained; the network installed and the central service institutionalized, the operational phase can begin. The Conceptual Plan and the Implementation Programme of the AGRHYMET Programme give details of this operational phase.

During the evaluation mission foreseen in July/August 1980 future assistance will be defined and budgets worked out.

PART III. SCHEDULES OF MONITORING, EVALUATION AND REPORTS

PART III. A. Tripartite Monitoring Reviews; technical reviews

The project will be subject to periodic review in accordance with the policies and procedures established by UNDP for monitoring project and programme implementation.

PART III. B. Evaluation

1. The project will be subject to evaluation, in accordance with the policies and procedures established for this purpose by UNDP. The organization, terms of reference and timing of the evaluation will be decided by consultation between the Government, UNDP and the Executing Agency concerned.

2. In order to determine the future assistance required by the Government, a special evaluation mission will be carried out in July/August 1980. This evaluation mission will be undertaken by the Government, UNDP and WHO and will also include the donor countries who have contributed or are liable to contribute to the project.

PART III. C. Progress and Terminal Reports

The senior project expert will submit six-monthly reports on the progress of the project in January and July each year. Periodic reports on the situation will be submitted in April and October. The last report will be replaced by the final report.

PART IV. BUDGETS

Budgets covering the Government contribution and external funding are given in the tables at Annexes I to VI to the present document.

85

Government contribution
(in Escudos)

Country: Cape Verde
 Project Number: CVI/77/.../A/01/16
 Title: Strengthening of the Meteorological, Agrometeorological and Hydrological Services

	<u>Total</u>	<u>1 9 7 7</u>	<u>1 9 7 8</u>	<u>1 9 7 9</u>	<u>1 9 8 0</u>
Personnel	5.847.900	243.300	1.186.000	1.750.800	2.667.000
Equipment	2.512.000	-	672.000	920.000	920.000
Miscellaneous	340.000	-	32.000	136.000	180.000
Total	8.707.900	243.300	1.890.000	2.806.000	3.767.000

Details of the Government ContributionNational Personnel

(in Escudos)

	<u>Total</u>	<u>1 9 7 7</u>	<u>1 9 7 8</u>	<u>1 9 7 9</u>	<u>1 9 8 0</u>
	<u>months</u> \$				
<u>Meteorology</u>					
Class I	-	-	-	-	-
Class II	18 198.000	-	-	3 33.000	15 165.000
Class III	126 1.260.000	9 90.000	36 360.000	36 360.000	45 450.000
Class III	441 3.219.300	21 153.300	108 788.400	144 1.051.200	168 1.226.400
	585 4.677.300	30 243.300	144 1.148.400	183 1.444.200	228 1.841.400
<u>Aerometeorology, climatology, central service</u>					
Class I	-	-	-	-	-
Class II	15 165.000	-	-	3 33.000	12 132.000
Class III	36 360.000	-	-	6 60.000	30 300.000
Class IV	-	-	-	-	-
	51 525.000	-	-	9 93.000	42 432.000
<u>Hydrology</u>					
Class I	27 345.600	-	3 38.400	12 153.600	12 153.600
Class III	40 300.000	-	-	6 60.000	34 240.000
	67 645.600	-	3 38.400	18 213.600	46 393.600
<u>Total</u>	703 5.847.900	30 243.300	147 1.186.800	210 1.750.800	316 2.667.000

Note: When the services reach the level of optimum activity, the total annual salary budget will be of approximately 5,432,000 Escudos.

Details of the Government contributionEquipment

(in Escudos)

	<u>total</u>	<u>1 9 7 7</u>	<u>1 9 7 8</u>	<u>1 9 7 9</u>	<u>1 9 8 0</u>
<u>Consumables</u>					
Agronomy, meteorology	1.240.000	-	360.000	440.000	440.000
Hydrology	312.000	-	72.000	120.000	120.000
	1.552.000	-	432.000	560.000	560.000
<u>Non-consumables</u>					
Agronomy, meteorology	320.000	-	80.000	120.000	120.000
Hydrology	640.000	-	160.000	240.000	240.000
	960.000*	-	240.000	360.000	360.000
<u>Miscellaneous</u>					
Publications	120.000	-	-	40.000	80.000
Unforeseen expenses	228.000	-	32.000	96.000	100.000
	348.000	-	32.000	136.000	180.000
<u>Total</u>	2.860.000	-	704.000	1.056.000	1.100.000

* Cost of equipment installation (local constructions)

External contributions

(in US dollars)

Country: Cape Verde
 Project Number: CVI/77/.../1/01/16
 Title: Strengthening of the Meteorological, Agrometeorological and Hydrological Services

	<u>Total</u>	<u>1 9 7 7</u>	<u>1 9 7 8</u>	<u>1 9 7 9</u>	<u>1 9 8 0</u>	<u>1981/82</u>
	<u>months</u>	<u>months</u>	<u>months</u>	<u>months</u>	<u>months</u>	<u>months</u>
10. <u>PERSONNEL</u>						
11. <u>Experts</u>						
11.01 Meteorologist	30 134.400	- -	6 25.200	12 52.800	12 56.400	- -
02 Hydrologist	30 134.400	- -	6 25.200	12 52.800	12 56.400	- -
11.99 Sub-total	60 268.800	- -	12 50.400	24 105.600	24 112.800	- -
13. <u>Travel official business</u>	8.000	-	2.000	3.000	3.000	-
19. <u>Component total</u>	276.800	-	52.400	108.600	115.800	-
30. <u>TRAINING</u>						
31. <u>Individual fellowships</u>	331.300	8.400	47.500	87.800	95.200	92.400
40. <u>EQUIPMENT</u>	253.200	50.000	70.000	70.000	43.200	-
50. <u>MISCELLANEOUS</u>	27.000	-	9.000	12.000	6.000	-
99. <u>TOTAL</u>	868.300	58.400	178.900	278.400	260.200	92.400

Details of Fellowships

Annex V

	Total		1977		1978		1979		1980		1981		1982	
	m/h	8	m/h	8	m/h	8	m/h	8	m/h	8	m/h	8	m/h	8
31. INDIVIDUAL FELLOWSHIPS														
01 Aeromet. Class II	24		3		12		9							
02 Aeromet. Class III	24		3		12		9							
03 Aeromet. Class III	24		3		12		9							
04 Aeromet. Class III	24				3		12		9					
05 Aeromet. Class III	24				3		12		9					
06 Aeromet. Class III	24						3		12		9			
07 Aeromet. Class III	24						3		12		9			
08 Hydrological technician	24		3		12		9				9			
09 Hydrological technician	24		3		12		9							
10 Hydrological technician	24						3		12		9			
11 Hydrological technician	24						3		12		9			
12 Meteorology Class I	36				3		12		12		9			
13 Meteorology Class II	24		3		12		9				9			
14 Meteorology Class II	24				3		12		9					
15 Meteorology Class II	24						3		12		9			
16 Meteorology Class II	24								3		12		9	
17 Meteorology Class III	24				3		12		9				9	
18 Meteorology Class III	24				3		12		9					
19 Meteorology Class III	24				3		12		9					
20 Meteorology Class III	24						3		12		9			
21 Meteorology Class III	24						3		12		9			
22 Meteorology Class III	24								3		12		9	
23 Meteorology Class III	24								3		12		9	
24 Central Services III	24		3		12		9						9	
25 Central Services III	24				3		12		9					
26 Central Services III	24						3		12		9			
27 Central Services III	24								3		12		9	
29. Grand total	660		21		104		103		103		129		96	

8.



EMBASSY OF THE
UNITED STATES OF AMERICA

Annex 6

May 23, 1978

Sahel Water Data and Management
(611(A) Certification)

I, Walter J. Sherwin, Acting Principal Officer, Agency for International Development, in Niamey, Niger, do certify that in my judgment, the requirements of 611(A) of the Foreign Assistance Act have been met.

The basic units of construction to be financed by U. S. source funding are small structures to be used for the housing of meteorological equipment and supplies in various parts of Cape Verde. These plans and cost estimates have been reviewed and certified by engineers from REDSO/W. In addition, a REDSO/W engineer has visited the majority of the sites selected for the buildings.

A copy of the engineer's memorandum to this office is attached.

Walter J. Sherwin
Walter J. Sherwin
Acting Mission Director

Attachment: Engineer's memorandum
(Ralph E. Barnett, REDSO/W
April 24, 1978)

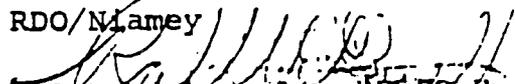
UNITED STATES GOVERNMENT

Memorandum

Mr. J. Johnson, Mission Director

DATE: April 24, 1978

RDO/Nlamey


Ralph E. Barnett, REDSO Engr

CT: 611-A Certification for Sahel Water Data Management Project
No. 625-0917 for Cape Verde Islands

Having reviewed the drawings, cost estimates and having visited the majority of the sites (I am accepting Roy Harrell's word on the terrain for the location of three of the small buildings) I concur in your issuance of a 611(A) certification for this project.

