

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D. C. 20523
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Batch 97

1. SUBJECT
CLASSI-
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Y-AP10-0000-G100

B. SECONDARY

Food production and nutrition--Water resources and management--Africa

2. TITLE AND SUBTITLE

Savanna regional water resources and land use project; project report, Jan.-June, 1978

3. AUTHOR(S)

(101) Tippetts-Abbett-McCarthy-Stratton, Engineers and Architects, New York

4. DOCUMENT DATE

1978

5. NUMBER OF PAGES

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6. ARC NUMBER

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7. REFERENCE ORGANIZATION NAME AND ADDRESS

TAMS

8. SUPPLEMENTARY NOTES (Sponsoring Organization, Publishers, Availability)

(Activity summary)

9. ABSTRACT

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PN-AAG-307

11. PRICE OF DOCUMENT

12. DESCRIPTORS

Central Africa
Hydrology

Land use
West Africa

13. PROJECT NUMBER

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14. CONTRACT NUMBER

AID/afr-C-1041

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SEMI-ANNUAL REPORT NO. 10

January — June 30, 1978

CONTRACT AID/afr-C-1041

Technical Assistance to

**INTERAFRICAN COMMITTEE FOR
HYDRAULIC STUDIES (C.I.E.H.)
B.P. 369
OUAGADOUGOU, UPPER VOLTA**

**SAVANNA REGIONAL WATER RESOURCES
AND LAND USE PROJECT**

**Project No. 698-0415
(formerly 625-11-120-712)
and Project No. 625-0926**

TAMS
Agricultural
Development
Group

INTRODUCTION

PROJECT GOAL

The over-all goal to which this project is to contribute is

"the rational development of water resources in the West African Savanna region as required for agricultural development, human and animal consumption, and with due consideration for the ecological effects of such development".

(From: USAID Noncapital Project Paper (PROP),
submitted March 17, 1972)

PROJECT PURPOSE

The purpose of this project is

"to assist CIEH, an African organization based in Ouagadougou, concerned with water resource development, to develop the capacity to analyse regional water requirements and formulate an action program to meet them, and to serve as central dissemination agent for water related information."

(From: Amendment No. 4 to the Grant Agreement
between USAID and CIEH, May 14, 1976)

SCOPE OF WORK

The scope of work charged to TAMS calls for this firm

"to provide the professional staff and related services to assist CIEH establish at its headquarters:

1. A documentation center, by providing:
 - a. assistance with the planning of, and procurement of equipment for said center;
 - b. for the institution of systems to acquire, process and disseminate documents pertaining to hydrology, land use, and other directly related information;
 - c. on-the-job and overseas training for CIEH staff, including programming and arrangements for the Participant Training of two documentalists, to be provided by CIEH, in either the United States or Canada for approximately eighteen months of service each.
2. A planning office, by providing:
 - a. assistance with the planning of and procurement of equipment for said office;
 - b. for the development of techniques to obtain, evaluate and synthesize documents and information for the Savanna region in order to identify gaps in information and specify proposals for further studies;

- c. an overall action program for the Savanna region including specific projects for submission to donor organizations for financing;
- d. on-the-job and overseas training for CIEH staff; including the programming and arrangements for the Participant Training of two hydrologists, an assistant hydrologist, and a land-use specialist, to be provided by CIEH, in either the United States or Canada for approximately twelve months service each".

(From: Modification No. 4 of the Contract
between USAID and TAMS, August 17, 1976)

PROJECT PROGRESS

PROJECT FUNDING

During the report period no Amendments to the Grant Agreement between USAID and CIEH were signed.

The following Modifications of the Contract between USAID and TAMS were signed:

Modification #9, previously #8 (December 1, 1977) for the purpose of establishing final and provisional indirect cost rates.

Modification #10, previously #9 (April 3, 1978) increased funds obligated under the contract by \$100,000 to \$1,597,000 to provide for land use/land cover maps of the Savanna Region.

Modification #11 (May 4, 1978) increased obligated funds by \$365,000 to \$1,962,000 to allow project operation to about August 1978.

In May 1978 agreement was reached for funding of specific project operations till September 30, 1978*. An additional \$199,006 will raise the obligated funds to a total of \$2,161,006.

In April 1978, TAMS refunded to USAID the amount of \$62,932. This payment was required because of audit adjustments for the period June 10, 1974 through December 1976.

* The current termination date of the contract between USAID and TAMS is September 30, 1978. At the time of publication of this report the possibility of an extension to December 31, 1978 was being explored by USAID.

STAFF

TAMS Staff permanently assigned to the project:

Dr. John Buursink, Project Manager	Jan 1 - June 30
Mr. Robert Koester, Documentalist	Jan 1 - May 22
Mr. James Robertson, Hydrologist Planner	Jan 1 - June 30

CIEH counterpart staff assigned to the project:

Mr. Ali Krissiamba, Documentalist	Jan 1 - June 30
Mr. Kodjo Ativon, Hydraulics Engineer	Jan 1 - June 30
Mr. Georges Sola, Assistant Hydrologist (in training in USA)	Jan 1 - June 30
Mr. Francis Paré, Draftsman	Jan 1 - June 30

TAMS staff supporting the project in New York on part-time basis:

Ms. Sara Guthrie, Project Coordinator	Jan 1 - June 30
Mr. Barrie Heinzenknecht, Head Environmental Planning	Jan 1 - June 30
Ms. Emily Candelmo, Documentalist	Jan 1 - June 3
Mr. Domingo Isasi-Diaz, Chief Draftsman	Jan 1 - June 30

EarthSat staff carrying out project work (#625-0926) in Washington, D.C.:

Mr. David Thibault, Officer-in-Charge	May 15 - June 30
Mr. Donald Garofalo, Project Manager	May 15 - June 30
Mr. William Brooner	May 15 - June 30

TAMS staff participating in the Project in Ouagadougou on TDY basis:

Mr. Stanley Glynn, Civil Engineer (CIEH Lome Meeting)	Feb 8 - Feb 14
Ms. Emily Candelmo, Documentalist	June 4 - June 30

Cooperating Country Nationals permanently assigned to the project:

Mr. D.K. Matthias, Bilingual Secretary	Jan 1 - Apr 7
Ms. Bintou Maïga, Secretary	Jan 1 - June 30
Mr. H.B. Minoungou, Equipment Operator	Jan 1 - June 30
Ms. G.A. Ouédraogo, Library Assistant	Jan 1 - June 30
Ms. A.W. Ouattara, Library Assistant	Jan 1 - June 30
Mr. Y.J. Azoungoungou, Chauffeur/Messenger	Jan 1 - June 30

Other personnel assigned by TAMS for specific project tasks in Ouagadougou:

Mr. Peter Wright, Technical Assistant	Jan 1 - Feb 7
and	June 4 - June 30
Ms. W. Luché, English language tutor for Mr. K. Ativon	May 26 - June 30
Mr. Christopher Lewis, Technical Assistant	June 19 - June 30

WORK PROGRESS

Below is a list of Project Reports thought necessary to achieve the objectives set for the CIEH Planning Office in its work on the Savanna Region of West and Central Africa.

- Volume 1. Savanna Resources - Report
- Volume 2. Savanna Resources - Mapfolio
- Volume 3. Savanna Resources - Appendices
- Volume 4. Savanna Resources - Study Proposals
- Volume 5. Existing Water Use of the Savanna Region
- Volume 6. Existing Land Use of the Savanna Region
- Volume 7. Water Requirements in the Savanna Region
- Volume 8. Proposals for Water Resource Development Projects.

At the end of the report period, Volume 1, 2, and 3 were being printed in New York. Volume 4 was prepared for printing. Volume 5 was in draft form at CIEH. Work on Volume 6 started in May 1978 and is scheduled for completion in the fall of 1978. Some initial research was done on Volume 7 during the report period. No work was done on Volume 8.

The CIEH Documentation Center continued its regular program. With a much reduced acquisitions program, work focused on eliminating some of the cataloging backlog. Plans were made for the establishment of a subject index system and actual implementation was begun in June 1978.

PROBLEMS ENCOUNTERED

The lack of project funds early in the report period and the availability of limited funds at a later date required much time in planning and replanning project priorities.

RECOMMENDED SOLUTIONS

No basic problems came up during the six months period, that have not been reported upon before, requiring recommendations for their solution.

STATUS OF THE WORK

The status of project work is reported upon in this section and accomplishments are discussed under the following two headings:

- Institutional Elements
- Technical Elements

A flow chart of work follows as Figure 1.

INSTITUTIONAL ELEMENTS

For a comprehensive account of CIEH's organization and program of work and the institutional requirements necessary to accomplish these tasks, one is referred to a report prepared by Mr. M. Gagara, Secretary General of CIEH in April 1978 presented as Appendix A.

1. Functions of Planning Office and Documentation Center

In the previous semi-annual report (#9) three functions were defined for the Planning Office. During the report period the Planning Office was primarily engaged in Synthesis of Information (Function 1).

Again, in the previous semi-annual report (#9) three functions were defined for the Documentation Center. During the report period the documentation Center carried out all three functions: 1) Acquisitions, 2) Processing, and 3) Information Dissemination.

2. Staffing Requirements

The staffing requirements for CIEH's Planning Office and Documentation Center were set forth in semi-annual report #9.

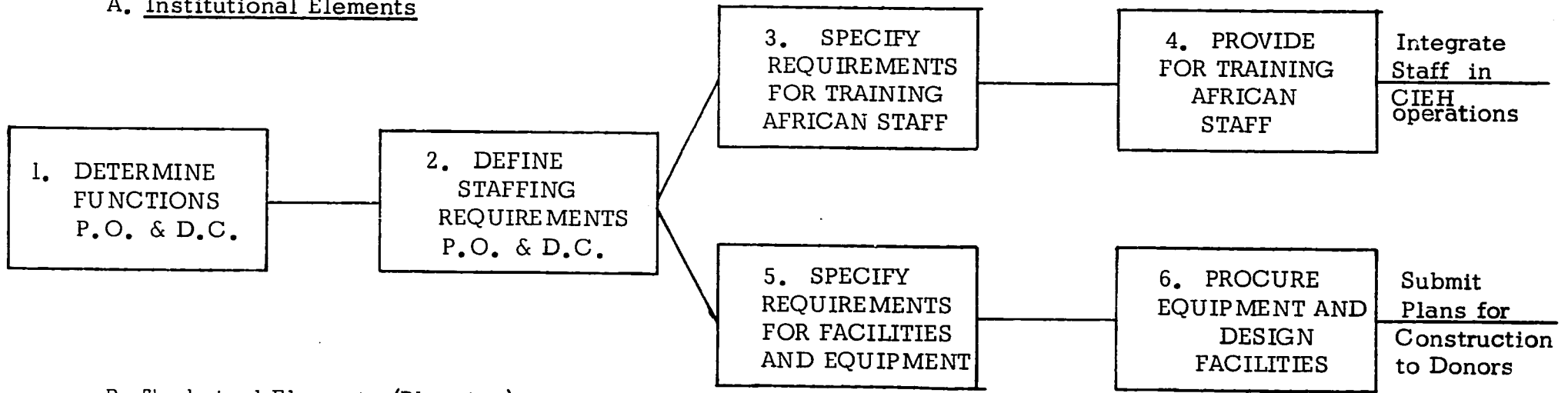
3/4. Training of CIEH staff

The CIEH assistant hydrologist, M. Georges Sola, continued his training program at the University of Arizona, Tucson. During the report period he took the following courses:

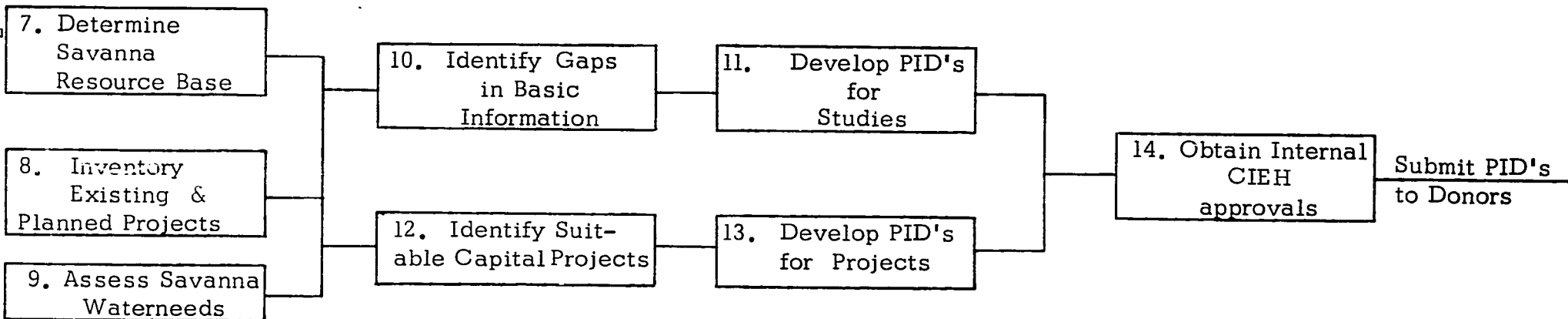
- Irrigation Principles and Practices
- Water Control in Agriculture
- Principles of Hydrology
- Natural Resources Economics

Figure 1. Flow Chart of Work for Assisting CIEH to establish a Planning Office (P.O.)
and Documentation Center (D.C.)

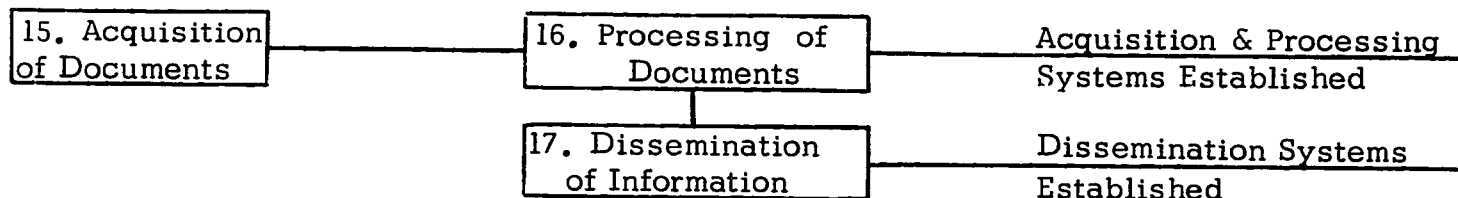
A. Institutional Elements



B. Technical Elements (Planning)



C. Technical Elements (Documentation)



In the period from June 5 to July 14, 1978, Mr. Sola took part in an observation program organized by the Bureau of Reclamation, Denver, Col., to study hydrologic aspects of irrigation development in the Western United States. For details of Mr. Sola's training program see Appendix B.

On May 25, 1978, Mr. Kodjo Ativon, Hydraulic Engineer, started a daily program of English language training. Arrangements were made by TAMS and Earth Satellite Corporation for a 4-6 weeks on-the-job training program for Mr. Ativon in Washington. Mr. Ativon is scheduled to work with the Earth Satellite Corporation's staff on their assessment of current use of the Savanna's land resources later this summer (see section 8 below). The necessary arrangements for this training were made during the report period.

Mr. Michel Sorou, recently named documentalist at the Direction de l'Hydraulique of Upper Volta, spent 4 weeks at the Documentation Center in an intensive training program in basic documentation techniques given by Mr. Krissiamba. Mr. Krissiamba also prepared a consultation report on organization of the Documentation Center of the Upper Volta Direction de l'Hydraulique.

5/6. Facilities and Equipment

In 1975, 1976 and 1977, CIEH requested AID to purchase office and library furniture for the project, to be financed by the Commodity budget of the Grant Agreement. About \$7,000 worth of furniture was never delivered to CIEH but was charged to the project.

During this period efforts were made again by several people to locate the materials. The status per June 30, 1978, of each of the Purchase orders involved is given in Figure 2.

TECHNICAL ELEMENTS - PLANNING

7. Savanna Resource Base*

Project Reports (Volumes 1, 2 and 3) on the Savanna's water, land and human resources were published in both French and English:

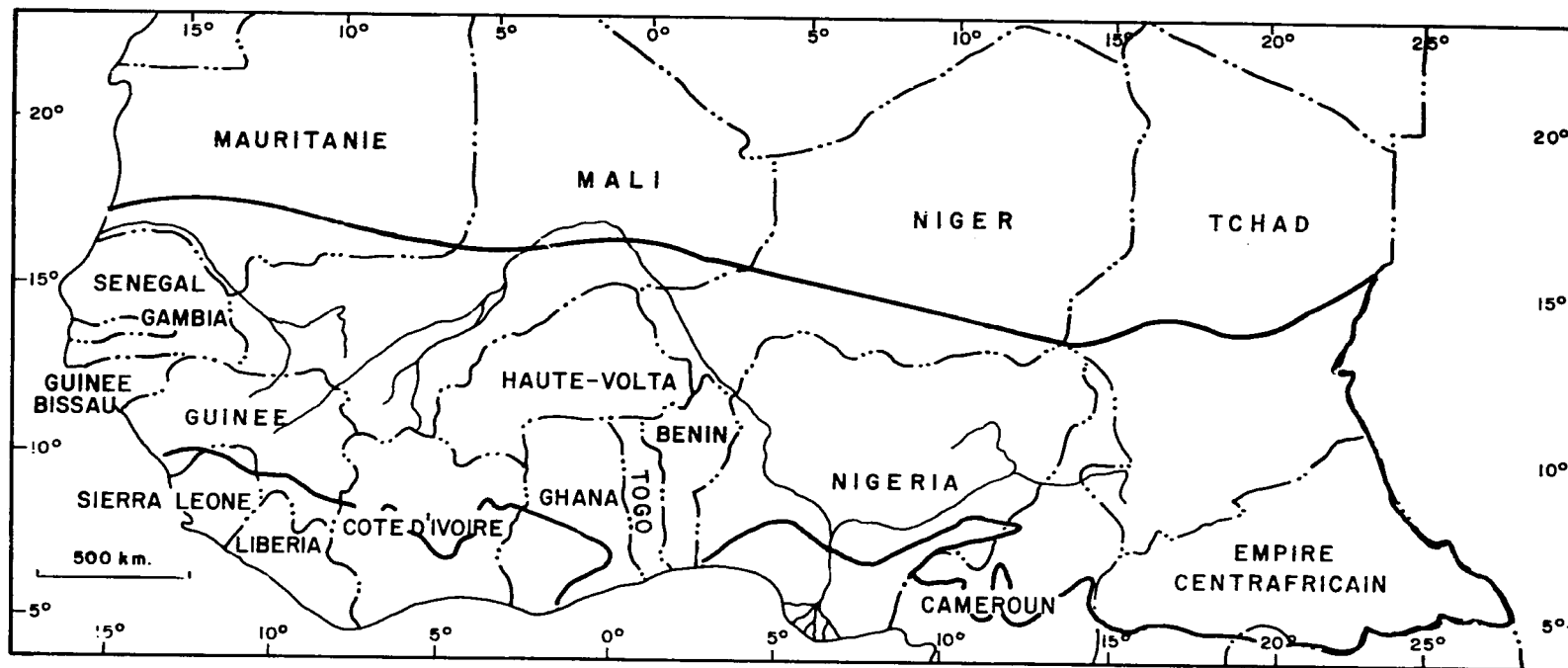
- Volume 1. Savanna Resources - Report
- Volume 2. Savanna Resources - Mapfolio
- Volume 3. Savanna Resources - Appendices

It is expected that distribution of these will take place from both Ouagadougou and New York later this summer.

* See Figure 3 for delineation of project area.

Figure 2. Status of Equipment Orders for CIEH not delivered per June 30, 1978

PURCHASE ORDER	VENDOR	DESCRIPTION	QUANTITY	TOTAL COST	STATUS
AID-023-75 5 Feb. 1975	IBM	Selectric Typewriter	1	\$ 830.90	Statement by AID that item was not delivered to CIEH, Feb.28, 78.
AID-213-76 17 Aug. 1976	GSA	Office Furniture	85	1,506.70	Arrived in Ouagadougou on May 25, 1977 - not received at CIEH.
AID-214-76 18 Aug. 1976	BRO-DART	Table	1	116.00	Vendor initiating tracer action Ref. Cable State 625606 of Feb. 3, 78.
AID-215-76 18 Aug. 1976	LIBRARY BUREAU	Periodical Display Unit	1	800.00	Shipment rerouted to Ouagadougou Ref. Cable State 625606 of Feb. 3, 78.
AID-114-77 28 Feb. 1977	GSA	Office Furniture	48	3,474.80	Tracer action requested by AID Apr. 17, 78.



THE PROJECT AREA. THE NORTHERN BOUNDARY OF THE SAVANNA REGION IS THE 250mm. ISOHYET AND TO THE SOUTH IS THE FOREST BOUNDARY.
ZONE DU PROJET. LA REGION DE SAVANNE EST LIMITEE AU NORD PAR L'ISOHYETE 250mm. ET AU SUD PAR LA FORET

FIGURE-3

8. Existing and Planned Land and Water Use

During the report period the study of existing landuse of the Savanna region was started. For this purpose TAMS signed a subcontract with the Washington based Earth Satellite Corporation to carry out the analysis and mapping on the basis of existing documentary information and satellite imagery (Landsat II). The study is to be completed in the fall of 1978.

At CIEH work continued on existing and planned use of surface water . A map showing existing and proposed dam sites in the West and Central African Savanna was nearing completion at the end of the report period. The data base used for this study is the information available at CIEH's Documentation Center. This information is substantial but personal orientation in member states concerning planned surface water developments (now not possible due to financial restrictions on travel) could have made this effort more comprehensive and up to date.

9. Savanna Water Needs

In conjunction with the above study of existing water use, some initial work was carried out on assessing the existing and future needs for water.

10/11. Gaps in Information and Study Proposals

A report containing 22 study proposals was completed at CIEH and sent to TAMS, New York, for final editing, translation and printing. These study proposals will be published as Volume 4 of the Savanna Project Reports.

The proposals suggested include studies in the fields of hydrology, hydrogeology, water resource development, climatology and land use.

12/14. Capital Projects

Plans for new capital projects, or support for existing plans can only be made once the work described in sections 7, 8, and 9 is completed.

TECHNICAL ELEMENTS - DOCUMENTATION

15. Acquisition of Documents

During the report period, the Documentation Center acquired more than 200 new titles. This low figure is a result of almost complete dependence on exchange and gift arrangements; due to lack of project funds, only a few titles essential to project work were purchased. As the acquisitions rate declines and

as requests for documentation from visitors and CIEH staff engineers continue unabated, it is already quite clear that a serious information gap has developed at the Documentation Center. With the availability of limited additional project funds a modest acquisitions program was begun again in June 1978.

16. Processing of Documents

During the report period, 600 documents were given descriptive cataloging and geographic indexing. When added to previous totals, this figure brings the grand total of Documentation Center holdings to 8,000.

Figure 4 shows the increase in documentary units since the beginning of the project till June 30, 1978.

In June 1978, a subject indexing system using keywords was established for CIEH's Documentation Center and work was started on subject indexing CIEH's most recent acquisitions. By June 30, 1978, 200 documents had been subject-indexed. It is expected that in the following months a substantial part of the CIEH collection can be indexed this way. Subject key-word indexing not only greatly facilitates access to information, it is also a space saving device in that books can now be shelved in numerical order, rather than by the cumbersome Universal Decimal Classification System. The first issues of the CIEH Bibliographic Bulletin are scheduled to be printed in the second half of 1978. The Bulletin will alert readers to documents received after the publication of the CIEH Catalog of the Documentation Center (1977), and will include a subject key-word index.

17. Dissemination of Information

For detailed recommendations for a comprehensive CIEH Information Dissemination Program please refer to Appendix B of Semi-Annual Report 9. At the CIEH Council of Ministers meeting in Lome, Togo, in February 1978, Mr. Krissiamba presented a report on Documentation Center activities and a request for Council support for future programs. The Ministers passed resolutions calling for the creation of a system of "antennes" (or correspondents) to assist the Documentation Center in acquiring documentation from member countries. The Council also went on record as approving CIEH's plans for a microfiche production and dissemination system. They called upon the Secretary General to address USAID for continued support for Documentation Center programs.

During this six months period more than 60 new visitors used the services of the Documentation Center. Figure 5 shows the increase in the number of new visitors since the beginning of the project. One hundred copies of the Catalog of the Documentation Center published by G.K. Hall arrived at CIEH and are in the process of being distributed by the Center.

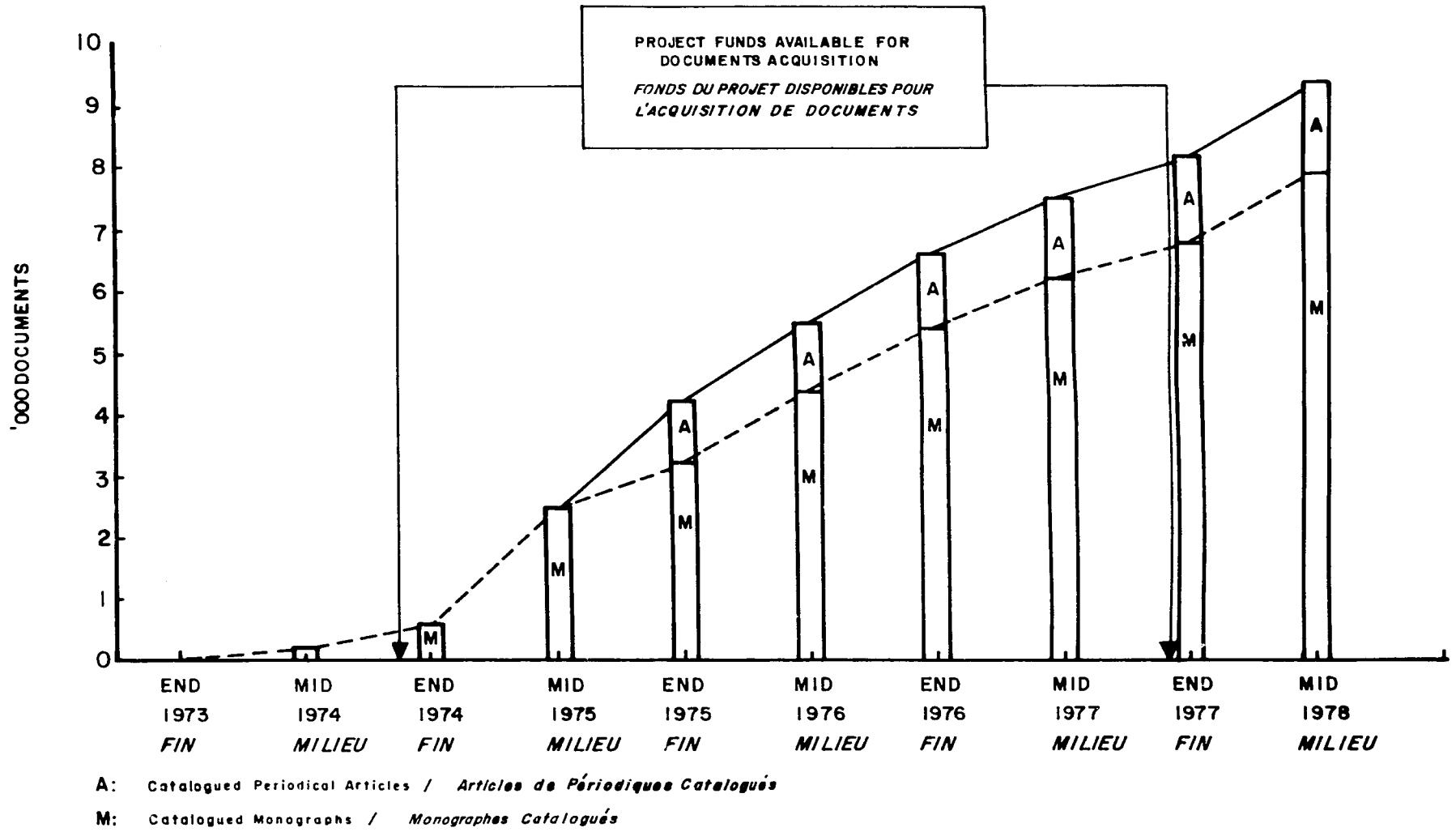


Fig. 4 Increase of Catalogued Documentary Units Available at the C.I.E.H Documentation Center
Accroissement des Documents Catalogués au Centre de Documentation du C.I.E.H

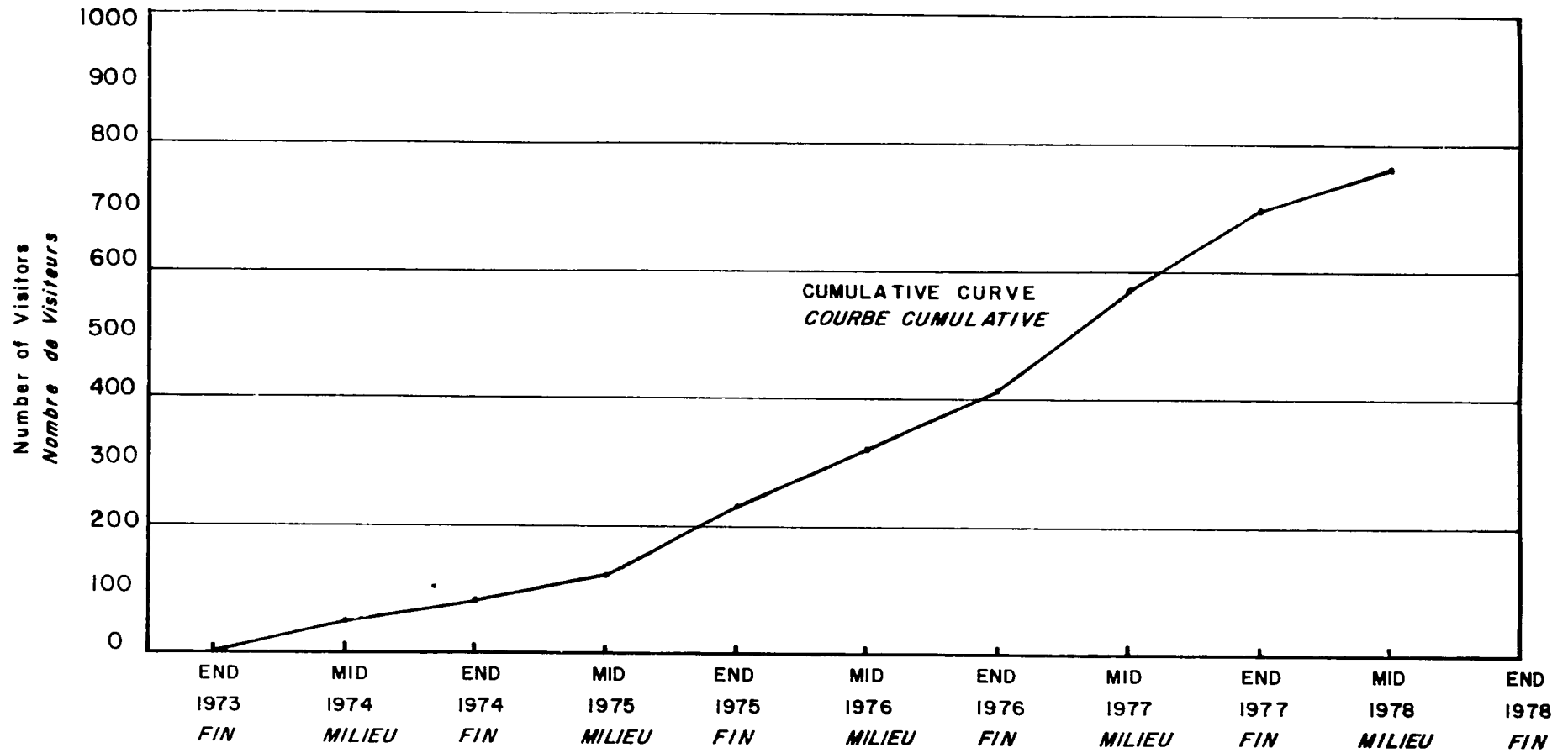


Fig. 5 Increase of Visitors Using the C.I.E.H Documentation Center
Accroissement des Visiteurs au Centre de Documentation du C.I.E.H

Most of the one thousand copies of the January 1978 edition of the CIEH List of Publications were distributed during the report period, primarily at the CIEH Lome Meeting. A new revised list will need to be prepared and printed.

APPENDIX A

How to Improve C.I.E. H. Support Capabilities

(by M. Gagara)

Interafrican Committee
for Hydraulic Studies
(C.I.E.H.)
P.O. Box 369 - Tel. 334-76
335-18

OUAGADOUGOU

(U.V.R.)

HOW TO IMPROVE C.I.E.H.
SUPPORT CAPABILITIES

-:-:-:-:-:-:-

I. - BACKGROUND NOTES -

1) - Committee's Objectives

Created in 1960 by newly independent African States, the committee has the following objectives:

- 1 - to guarantee the most extensive interchange of water information between member States. In order to fully meet this goal, a Documentation Center was established with the assistance of interested nations.
- 2 - to define broad scientific and technical studies of common interest, seek out means of funding, carry out promotion work and guarantee dissemination of results. Today CIEH is carrying out increasing numbers of specific or localized studies.
- 3 - to advise or assist technically the States at their request in the preparation, control and execution of projects.

2) - Member States and Observer States

At the time it was founded, CIEH included 7 member States. Now their number has been increased to 12 (Benin, Cameroon, Congo, Ivory Coast, Gabon, Upper Volta, Mali, Mauritania, Niger, Senegal, Tchad and Togo); associated with them as observers are Ghana, Nigeria, the Central African Empire and Liberia.

3) - Institutional Staff

The Council of Ministers is the governing body of CIEH. Its decisions and resolutions are implemented by the Secretary-General. The head office of the Secretariat-General is in Ouagadougou (Upper Volta).

A reorganization of the Secretariat-General was approved by the Council of Ministers at their Lome meeting of February 8 to 16, 1978, as follows: The Secretariat-General headed by the Secretary-General includes three departments:

- 1) An administrative department with two sections:
 - Administrative and financial affairs
 - Accounting

- 2) A Technical department with eight fields of specialization:
 - Hydrology
 - Hydrogeology
 - Agroclimatology
 - Water techniques (utilization, treatment, pollution...)
 - Urban and rural hydraulics
 - Agricultural hydraulics
 - River hydraulics and large hydraulic works
 - Computer center.

- 3) A Documentation and Information Center

Under the direct control of the Secretariat-General, the Center serves all the CIEH agencies.

4) - Capabilities of CIEH

1/- Personnel -

The Council of Ministers approved the following African Staff for the year 1978, at the Lome meeting of February 1978: 4 senior engineers, 2 junior engineers and 26 support staff. In addition there are 5 engineers provided by the French Government and 3 engineers from USAID/TAMS. The recruitment of an additional engineer at the beginning of 1979 has been approved by the Lome Council of Ministers to strengthen the African team.

2/- Financial -

The contributions of the member States, which has been set at an annual rate of F CFA 3,500,000 per State, is barely enough to cover the salaries of the African personnel, the operation of the Secretariat-General (office supplies, correspondence, water-electricity, subscriptions, editing, transportation and travel) and rent for office space provided to the french engineers.

Funding for studies approved by the Council of Ministers is sought from various sources. If up to now France, and recently the United States of America, have provided the major portion of CIEH's support, the fact remains that our organization is open to all people of good will providing that our choices and priorities are respected.

II. - IMMEDIATE NEEDS OF CIEH -

A/- Funding of program of studies determined by the Lome Council of Ministers (February 8-16, 1978)

1) FUNDED STUDIES

- in the process of execution, not completed
- or to be undertaken in the near future

a) - Studies being carried out -

- 1 - Water resources maps of the member States: Ivory Coast, Ghana*, Togo, Benin.
- 2 - Publication of daily rainfall data for Gabon, Cameroon and Congo.
- 3 - Study of design criteria for sewage systems in the cities of Bamako, Cotonou, Abidjan, Bouake, Niamey, Lome and Ouagadougou.
- 4 - Study of ten-year flood discharge for drainage areas less than 200 Km² in forest zones
- 5 - Study of drainage methods.
- 6 - Development of farming techniques to conserve water: decrease over-land runoff and erosion, increase capacity for water-retention.
- 7 - Collect data on the daily rainfall variability over small agricultural areas (5 Km²).
- 8 - Anaerobic compost and energy saving technologies.

b) - Studies to be undertaken soon -

- 9 - Study of the water resources of the Bateke plateaus in Congo and Gabon.
- 10 - Method of searching for underground water in crystalline soils (second part).
- 11 - Map of the water resources of the Cameroon Republic.
- 12 - Study of runoff over small water basins in the Sahel.

2) NON FUNDED STUDIES

- Additional studies
- Updating of past studies
- Studies already submitted to the Ouagadougou Council of Ministers (1975) and kept on the Lome program.

* observer country (Ghana).

a) - Additional studies

- 13 - Estimate of operation capacity of wells in crystalline soils.
- 14 - Estimate of capacity of coastal aquifers.
- 15 - Maps of water resources of member States Gabon and Congo.
- 16 - Evaluation of artificial rain operations.

b) - Updating of past studies -

- 17 - Publication of daily rainfall records from 1965.
- 18 - Study of exceptional rain storms. Study to be updated for West Africa - Study to be undertaken for Central Africa.
- 19 - Study of ten-year flood discharge for drainage areas less than 200 Km² in tropical zones. Updating of a previous study.

c) - Studies already submitted to the Ouagadougou Council of Ministers and kept on the Lome program -

- 20 - Variations of water table levels.
- 21 - Selection of equipment for wells and drillings in CIEH member countries.
- 22 - Measurement of Tritium content in ground water in discontinuous aquifers.
- 23 - Bibliographic study on erosion control efforts in tropical areas (to be carried out by CIEH) to be incorporated in the program of the agro-climatology section.
- 24 - Bibliographic study of the elimination of solid particles in agricultural hydraulic works (to be carried out by CIEH).
- 25 - Water balance study for some experimental tropical basins.
- 26 - Agroclimatology: assigning values for development of the simulation model of water balance for plant cover (CIEH/AGRHYMET...).

B/ - Strengthening of the Documentation Center by:

1) - Assignment of information correspondents ("Antennes") in the CIEH member States. The system adopted is the one using microfiches. In order to avoid duplication, the correspondents will be assigned jointly with sister agencies of documentation centers of the area.

2) - Establishment of a photo-library: acquisition of aerial and satellite photos will cover a broad spectrum and will concern all the member States of CIEH.

3) - Establishment of a bank of basic data (in climatology, hydrology, hydrogeology, water and land use, etc.). A proposed computer center will ensure in house treatment of those data.

Additional Personnel and Equipment -

The implementation of those three projects assumes that the Documentation Center will receive additional support in personnel, funds and equipment.

4) - Additional Personnel Needed:

1 documentalist
4 library assistants

5) - Equipment to be ordered:

2 microfiche-viewers for the Documentation Center
1 microfiche-viewer per member State
1 camera for microfiche classification
1 camera for microfiche filming
1 photocopy unit
1 consignment of office equipment (tables, cabinets, low tables, book and review shelves, chairs, arm chairs)
Typewriters

6) - Financial support, specially in assuming responsibility for additional personnel to be recruited.

C/ - Developments to be carried out by the technical departments for which outside assistance is needed:

- 1) Setting up of local manufacturers of hand pumps.
- 2) Construction and equipment of water works (wells, drillings, earth dams. . .) under the auspices of CIEH at the request of the member States.
- 3) Establishment or strengthening, under CIEH supervision, the hydrological and hydrogeological departments of the member States.
- 4) Supplying water to communities of more than 5,000 inhabitants.
- 5) Development of irrigated lands in member States.
- 6) Experimentation followed by dissemination of information on enriched compost and biogas production.

- 7) Additional studies in areas where knowledge is inadequate, as revealed by CIEH/USAID/TAMS projects.
- 8) Increase the technical staff and financial resources.

D/ - Training needs - These needs come down to:

- 1 - Scholarships for basic studies of future CIEH personnel.
- 2 - Scholarships for advanced studies of current personnel.
- 3 - Setting up funds necessary for organization of seminars, refresher and training programs at the CIEH.
- 4 - Setting up funds for training rural peoples in the maintenance of small hydraulic works and simple equipment (like hand pumps).

E/ - Necessary infrastructure : for which funding is requested from interested countries and aid agencies.

Expansion of CIEH facilities approved by the Ouagadougou (1975) and Lome (1978) Councils of Ministers. This expansion, estimated at FCFA 110,000,000 will include:

- construction of an office building;
- construction of staff accommodations;
- construction of guest houses for visitors and consultants;
- construction of a machine-shop;
- construction of reproduction shop;
- construction of a vehicle shed;

III. - OBLIGATION OF THE MEMBER STATES -

It is obligation of the member States to assure, within a time period to be determined by those providing funds, that the technical and financial support of CIEH will be renewed. The resolutions adopted by the various Councils of Ministers of CIEH emphasize the desire of the member States to achieve this renewal within a reasonable time, considering their current options.

(Unpolished translation from the original French text)

APPENDIX B

Training Results of Mr. Georges Sola
(C.I.E.H. Assistant Hydrologist)



United States Department of the Interior

BUREAU OF RECLAMATION
ENGINEERING AND RESEARCH CENTER
P.O. BOX 25007

BUILDING 67, DENVER FEDERAL CENTER
DENVER, COLORADO 80225

March 23, 1978

IN REPLY
REFER TO: 2200
CTH/rd

Observation Program for
GEORGES SOLA
TAMS Participant
Upper Volta

June 5 - July 14, 1978

Program Objectives

To study hydrologic aspects of irrigation development.

Personal Data

Name: Georges Sola
Country: Upper Volta
Birth Date: February 13, 1949
Marital Status: Married
Education: Graduate of Inter-State School of Senior Technicians
of Hydraulics and Rural Equipment, Saria
Position: Assistant Hydrologist
Organization: Inter-African Committee for Hydraulics Studies
Local Address: Camellia House, 1235 Grant Street

Program

June 5-16,
1978
751
Division of Planning Coordination, Hydrology Branch,
Flood Section, Denver, to receive training in the
technical standards and procedures governing hydro-
logical and meteorological determinations, including

preparation of inflow design floods and flood control studies, and to engage in studies pertaining to water and backwater computations for design of pumping plants and diversion headworks.

June 19-23
753

Division of Planning Coordination, Hydrology Branch, Sedimentation Section, Denver, to engage in studies pertaining to reservoir sedimentation, channel retrogression and aggradation, and related subjects, such as sediment loads in streams for design of pumping plants, turbines, and diversion headworks.

June 26-30
754

Division of Planning Coordination, Hydrology Branch, Water Quality Section, Denver, for an overview of the Bureau's water quality program with emphasis on prediction of return flow water quality, and methods of amelioration.

July 4

National Holiday - Independence Day.

July 5-7

Central Snake Projects Office, Boise, Idaho, to study establishment and administration of hydrologic data collection systems and coordination with other state and Federal agencies having responsibilities in this field. To gain experience in determining water requirements, water utilization, hydraulic capacities, stream-flow forecasting, and water supply as related to irrigation.

July 10-14,
1978

Mid-Pacific Regional Office, Sacramento, California, to observe various types of irrigation systems in use in the Sacramento area. Also, to gain practical experience in organization of water resources, data collection, report preparation, and analysis of findings.



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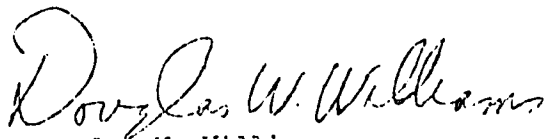
COLLEGE OF AGRICULTURE

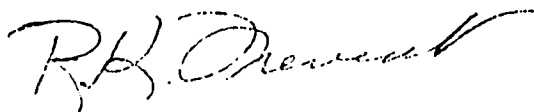
DEPARTMENT OF SOILS,
WATER AND ENGINEERING
401 AGRICULTURAL SCIENCES BUILDING

May 26, 1978

Letter of Recognition
for Georges Sola

This letter signifies that Mr. Georges Sola successfully completed two semesters' study in the Department of Soils, Water and Engineering, University of Arizona. Subjects studied included Farm Power, Basic Soils, Hydrology, English, Soil and Water Conservation Engineering, Irrigation, and Hydraulics.


Douglas W. Williams
Assistant Professor


Richard K. Frevert
Acting Head

Description of the courses taken by Mr. Georges Sola
at the University of Arizona, Tucson

Fall Semester 1977

Hydrology 1a-1b: Water and the Environment

Relations of physical and biological sciences to the understanding of the water cycle; man's impact on water resources, with special reference to management of the environment for improving and sustaining quality of water supply. Field trips. Open to non majors only.

Soils, Water, and Engineering: 11R. & 11L. Soils

Fundamental principles of soil science-origin, nature, and constitution of soils; their chemical, physical, and biological properties in relation to plant growth and the engineering uses of soils. Recitation and Laboratory.

Soils, Water, and Engineering: 103, Farm Power

Principles of operation, construction, utilization, and adjustment of internal combustion engines, tractors and electric motors, and selection of farm power.

Soils, Water, and Engineering: 206, Applied Hydraulics

Fundamentals of hydraulics applicable in the irrigation of agricultural lands including fluid properties, hydrostatics, irrigation flow characteristics, open channel and pipeline applications, and measurement of flowing water.

Spring Semester 1978

Soils, Water, and Engineering: 204, Irrigation Principles and Practices

Principles of irrigation, irrigation water supply, conveyance and measurement of water, water requirements, surveying applications in irrigation and evaluation of irrigation systems. Field Trip.

Soils, Water, and Engineering: 222, Water Control in Agriculture

Development and control of water in relation to irrigation, drainage, erosion, and flood prevention on agricultural lands.

Hydrology 50: Principles of Hydrology

Basic principles of hydrology dealing with chemical, physical, and biological aspects of water movement and mass transfer; techniques of measurement of hydrologic variable; relation used by man to develop water supplies.

Agricultural Economics 276: Natural Resource Economics

Economics principles useful in analyzing problems and policies of natural resource use, development and conservation.