PD-AAJ-011

SOIL MANAGEMENT SUPPORT SERVICES

(PASA # AG/DSB-1129-5-79)

ANNUAL PROJECT REPORT

for the period

October 1, 1979 to September 30, 1980

Submitted to the

U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT

by the

U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

WASHINGTON, D.C.

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Report Summary

A. Project Information

1. Project title and contract number:

   Soil Management Support Services
   (PASA # AG/DSB - 1129-5-79)

2. Project Monitor:

   T. S. Gill
   Office of Agriculture
   Development Support Bureau
   Agency for International Development
   Washington, D.C. 20523

3. Prinicpal Investigator:

   K. W. Flach
   USDA-Soil Conservation Service
   P.O. Box 2890
   Washington, D.C. 20013

4. Project Leader:

   H. Eswaran
   Soil Management Support Services
   P.O. Box 2890
   Washington, D.C. 20013

5. Contract Period:

   August 1979 to September 1982

6. Period Covered by Report:

   August 1, 1979 to September 30, 1980

7. Budget for the Contract Period:

   $2,127,000

B. Narrative Summary of Accomplishments

The two basic ojectives of the project are (1) provide technical assistance personnel to AID and to LDC's to assist national staff in soil surveys, land use planning, and soil conservation and management, primarily in tropical and subtropical countries, and (2) increase the transfer of soil management technology by revising Soil Taxonomy (the system of soil classification of USDA) to classify tropical and subtropical soils more accurately.

During 1980, assistance was provided to eight AID mission countries: Peru, Guatemala, Senegal, Rwanda, Philippines, Thailand, Jamaica, and Sudan. The project provided a total of 18 consultants to these countries. The nature of the assistance ranged from soil related project evaluations to determining laboratory requirements of national soil survey organizations.

Technical assistance was also provided to AID/Washington. Much of this assistance is in the form of providing documentation on specialized subject matter areas. Prior to the present PASA, AID has been continuously involved in many international activities of SCS. A synopsis of these activities has now been compiled to help AID and SCS follow up on past activities and guide future planning. The project also assisted AID in the preparation of Volume IV of the "Bibliography of Soils on the Tropics" by A. C. Orvedal. The previous three volumes, prepared and distributed by AID, have proved to be very useful to workers in tropical and subtropical areas.

The technology transfer part of the project was developed in several different aspects. Six international committees are currently working to improve Soil Taxonomy for greater use in the intertropical areas. The highly successful, International Soil Classification Workshops, organized by the University of Pureto Rico and funded by AID, are now continued under this project. The project assisted in the Third Workshop held in Syria-Lebanon in April 1980 and has been making plans for a fourth workshop in Rwanda in 1981 and the fifth in Sudan in 1982. The workshops have provided a forum for testing Soil Taxonomy in the intertropical areas and for refining the system. The project is also organizing a series of interviews by several soil scientists with Dr. Guy Smith, who provided the leadership to develop Soil Taxonomy. The result of these interviews will be a document that explains more fully the rationale and background of the system, which has been requested by many users of Soil Taxonomy.

Finally, as many LDC's are using Soil Taxonomy and as the system requires some specific analyses for the correct classification of the soils and as facilities for these analyses are not readily available in these countries, the project provides a mechanism for assistance in this respect. During the year, soils were analyzed for the Arab Centre for Studies on Arid Zones and Dry Lands in connection with the 3rd International Soil Classification Workshop. The soil chemist in the project is also developing and testing new analytical techniques for the analyses of soils of the tropics.

I. Introduction.

To accelerate the wise development of LDC land resources for agriculture and other uses requires detailed knowledge of soils and their potentials. Unfortunately, individual LDC's have neither sufficient qualified personnel nor financial resources to acquire

Historical

Prior to creation of the Soil Management Support Services, USAID was already aware of the potentialities of Soil Taxonomy for the agrotechnology transfer process. The Benchmark Soils Project of the Universities of Hawaii and Puerto Rico, funded by AID under the 211(d) program had, as its major objective, the testing of the feasibility of transferring agroproduction technology in the tropics on the basis of the soil family. The experience and success of their efforts has prompted them to embark on a more ambitious program which they are calling the International Benchmark Soils Network for Agrotechnology Transfer (IBSNAT). I mention these efforts as they are directed to our common goal of increased use of Soil Taxonomy and a more effective means of agrotechnology transfer. Before I proceed to the SMSS, I must point out that though our goal is similar, the approach and specific objectives are different. The IBSNAT program is directed to actual testing and proving of the applicability of Soil Taxonomy, while that of SMSS, as I will elaborate later, is the refinement of Soil Taxonomy and through it, technical assistance to LDC's.

Objectives of SMSS

1. Improve the U.S. system of soil classification, Soil Taxonomy, to make it more applicable and acceptable to tropical and subtropical countries, thus enhancing its value as a vehicle for effective agrotechnology transfer.

2. Technology Transfer

a. Improve the U.S. system of soil classification, Soil Taxonomy, to make it more applicable and acceptable to tropical and subtropical countries, thus enhancing its value as a vehicle for effective agrotechnology transference.

b. Encourage and motivate the use of Soil Taxonomy in tropical and subtropical LDC's for the benefit of international communications and knowledge transfer, and

c. Document the philosophy and key concepts of Soil Taxonomy in order to provide its users with a rational basis for comprehending its logic.

D. Scope of Work:

1. Technical Assistance

To provide "at request," TDY assistance up to 6 weeks for AID and LDC's in the subject areas that are directly related to the field of soil management technology and agrotechnology transfer methodology. There is no limit to this request at any given time. At this time this project will provide a total of 24 person-months for these services. If experience suggests a need for additional services, DS/AGR will attempt to obtain increased assistance by amending the contract.

The tasks to be undertaken under this agreement include the following:

a. Provide professional expertise to AID in formulating appropriate broad policies and programs relating to problems in land use, and land use planning for food production in the LDC's.

b. Give professional technical assistance to countries on matters concerning soil surveys and soil conservation.

c. Participate in reviews or evaluations of proposed or ongoing projects in soil survey and soil conservation.

d. Organize seminars and training programs in LDC's to meet program needs.

e. Provide specific analytical and/or field testing services to the field.

f. Prepare publications on selected aspects of soil management as they affect land use and land use planning in LDC's.

2. Technology Transfer

Soil Taxonomy has several deficiencies relative to tropical soils. Moisture regimes in tropical areas are different from those in most of the United States and are in need of modifications. Low cation exchange capacity of Alfisols and Ultisols is another property of many tropical soils that need to be given consideration in the classification of soils. The soil requirements of many tropical crops have not yet been fully considered in some of the criteria used for classifying soils in Soil Taxonomy.

Much of this information is, however, available in records of universities and experiment stations and through the knowledge of the many soil scientists that are or have been working in these countries. This proposal will collect this information, organize it within the framework of Soil Taxonomy, develop concepts of classes and criteria for separating classes, and through consultation with soil scientists in tropical countries, test these concepts and criteria before they are finally made a part of Soil Taxonomy. This is essentially the same way through which Soil Taxonomy has evolved in the U.S.A.

This work will be carried out through the following three activities:

a. International Soils Program Staff--The staff will work closely with the Director, Soils, SCS. The function of this staff will be to coordinate revisions to Soil Taxonomy with the goal of making it more applicable and more acceptable to tropical and subtropical countries. Highly competent soil scientists with broad experience will encourage the use of the Soil Taxonomy and will document revisions and prepare them for publication in a suitable mode. Specific functions include:

(1) Review proposals for updating Soil Taxonomy.

(2) Originate and develop changes in the Soil Taxonomy for use outside the United States.

(3) Establish and give guidance to international committees dealing with certain facets of the Soil Taxonomy.

(4) Provide limited onsite assistance in the use of Soil Taxonomy. Provide technical support in soil classification to scientists who are involved in soil survey projects.

(5) Organize and coordinate international workshops for improving Soil Taxonomy.

(6) Publish newsletters to inform committee members of any activity for improving Soil Taxonomy.

(7) Maintain a comprehensive file of proposals for updating Soil Taxonomy and of supporting documentation.

b. Research Soil Scientist and the National Soil Survey Laboratory, SCS.

The soil scientist will work closely with the International Soils Program staff and the staff of the National Soil Survey Laboratory to provide for coordination and quality control in the uniform application of soil classification standards. The staff of the NSSL is available to develop methods and to assist in sampling and characterization of soils in intertropical areas. Specific functions include:

1. Verify analytical procedures and analytical results established by cooperating laboratories for use in soil classification.

2. Develop methods needed for characterizing soils in intertropical areas.

3. Perform analyses needed to define new taxa if sophisticated laboratory facilities are not available in the countries where these soils occur.

4. Maintain a bank of representative samples of taxa from intertropical areas.

5. Compile a list of analyses required in Soil Taxonomy, with an outline of the methodology and interpretations of results.

c. Framework for International Workshops on Soil Classification.

The objective of these Workshops is to bring soil scientists together to solve deficiencies in Soil Taxonomy. Usually, the Workshops are scheduled at a critical period in the deliberation of an International Committee as described before.

The format of the Workshops will be 3 to 4 days of conference sessions and a maximum of ten days of field trips. The papers to be presented during the conference sessions will relate to the topic mentioned above. Key soil profiles exemplifying the issues under study will be inspected in the field.

In support of this activity, the International Soils Program staff will:

a. Organize meetings of international leaders in soil classification.
b. Evaluate results of these meetings.
c. Publish proceedings of meetings.
d. Incorporate results into Soil Taxonomy.

III. Accomplishments

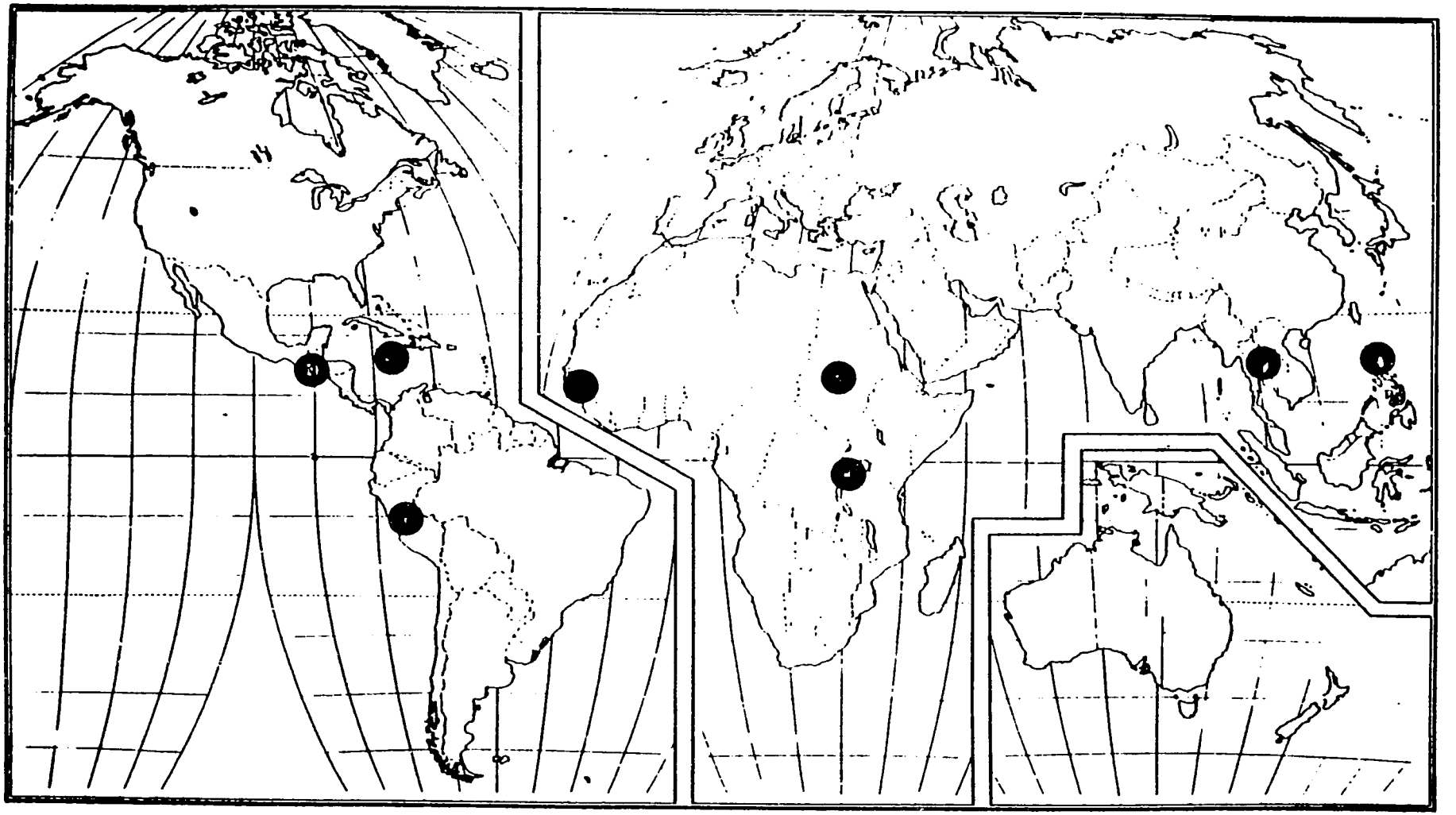
A. Technical assistance to AID Missions. During 1980, assistance was provided to eight AID Mission countries. Of these requests the project was able to provide 18 consultants to these countries. Figure 1 is a map showing the countries visited and Enclosure II contains trip reports from each country. The countries and types of assistance included:

° Peru--Assist the USAID Mission and the Government of Peru in the preparation of a bilateral project related to the development and institutionalization of a soil conservation program in Peru. A team consisting of Ray T. Margo, SCS, Eugene S. Pope, SCS, and Clayton Ogg, ESCS worked in Peru during the period March 29-April 27, 1980. The team reviewed soil conservation activities in the Cajamarca and Chiclayo areas and discussed these activities with local officials. Upon completion of the consultancy, the team assisted USAID and the General Directorate of Soil and Water, Ministry of Agriculture and Food in the preparation of a project paper which will be the basis for a USAID grant to the Government of Peru.

° Guatemala--W. M. Johnson, SCS, assisted the USAID Mission in examining the impact of soil conservation and irrigation project AG/GUA-233 on small farmers and as a possible model for other AID countries.

° Senegal--A two-man team assisted USAID/Dakar with a soil survey of a reforestation area in April and May 1980. The team assisted the Senegal Fuelwood Production Project--685-0219 in the selection of suitable sites for plantations of fuelwood tree species. James Bower, SCS, retired, and James Brown, SCS, were assigned to the project for a period of approximately 5 weeks. The team completed a general soil map of the entire 10,000 hectare forest, detailed surveys on 450 hectares, and

FIG. 1 Countries which received technical assist[redacted]



ratings of soil map units for forest production. USAID/Daker has requested additional assistance under this project which will be provided in November 1980.

° Rwanda--Dr. Armand Van Wambeke, Cornell University, assisted the Government of Rwanda in the development of a legend to prepare a national soil map at a scale of 1:1,000,000.

° Philippines--Dr. Richard Arnold assisted USAID/Manila and the Philippine Council for Agriculture and Resources Research in evaluating initial efforts in soil classification using Soil Taxonomy. This 30-day assignment was completed in June 1980.

° Thailand--Two specialists assisted USAID/Thailand and Department of Land Development (DLD), Ministry of Agriculture and Cooperatives (MOAC) during the period August 18-September 6, 1980. W. E. Austin and V. G. Link, SCS, prepared a "Report and Recommendations for Strengthening the Thailand Ministry of Agriculture and Cooperatives and Department of Land Development's Soil and Water Conservation Delivery and Direct Assistance to Northeast Region Thailand Farmers".

° Jamaica--Short-term specialists assisted USAID/Jamaica and the Ministry of Agriculture in evaluating soil conservation measures on sloping land and in training personnel in soil mapping, soil classification and use of the Universal Soil Loss Equation. Richard Guthrie and Arnold King, SCS, were consultants on this assignment.

° Sudan--Two soil scientists assisted USAID/Sudan and the Soil Survey Administration, Ministry of Agriculture, Food, and Natural Resources. Hari Eswaran and John Kimble, SCS, helped to plan an international soil classification workshop planned for Sudan in 1982 and also recommended changes to strengthen physical and chemical analyses at the Soil Survey Administration laboratories.

B. Technical assistance to AID/Washington SMSS provides for direct assistance to AID/Washington, Regional Bureaus, and the Renewable Natural Resources Division (RNR). During the past year, AID was assisted in a variety of ways including:

° Tunisia imagery--At the request of the Near East Bureau, LANDSAT imagery covering a project area in Tunisia was provided to AID. SCS made arrangements for the purchase of imagery from the United States Geological Survey (USGS).

° Bibliography of Soils of the Tropics--A. C. Orvedal, SCS, retired, is working under contract to complete Volume V which covers tropical areas of the Near East and Far East. SMSS assisted with the contracting and distribution of volumes I-IV in addition to providing office space and source documents for Mr. Orvedal's use.

° SMSS Brochure--In April 1980, a brochure entitled Soil Management Support Services, was published and distributed to AID Missions and to scientists in developing countries.

° Soil Classification Workshop proceedings--SMSS distributed proceedings of two soil classification workshops that were sponsored by AID. These conferences, held in Brazil in 1977 and in Malaysia-Thailand in 1978, were organized by AID, the University of Puerto Rico, and USDA-SCS to bring together international experts in soil classification in order to focus on needed revisions to Soil Taxonomy.

° Resource Conservation Glossary--SMSS is cooperating with the Soil Conservation Society of America (SCSA) in translating in Spanish and French a glossary of soil and water terms to be published by SCSA. SMSS will distribute a limited number of copies of the publication to LDC's.

° SCS International Activities--In order to help AID follow up on past activities and guide future planning, SMSS contracted with O. R. Carter, SCS, retired, to compile a summary of SCS international activities. For many years SCS has participated in AID Projects in developing countries and a synopsis of these activities can be very helpful to AID and LDC's.

° Burundi seed farm--A technical paper containing the classification and management recommendation for soils on an experimental farm in Burundi was translated from French to English.

° Tanzania--F. T. Miller, SCS, was sent to represent AID as an observer at an Expert Consultation on Soil Correlation and Land Evaluation, Arusha, Tanzania.

C. Technology transfer. SMSS objectives include: (1) Improve the U.S. system of soil classification, Soil Taxonomy, to make it more applicable and acceptable to tropical and subtropical countries, thus enhancing its value as a vehicle for effective agrotechnology transference; (2) Encourage and motivate the use of Soil Taxonomy in tropical and subtropical countries for the benefit of international communications and knowledge transfer; (3) Document the philosophy and key concepts of Soil Taxonomy in order to provide its users with a rational basis for comprehending its logic. This work is being carried out through the following activities:

° International Committees--Formal procedures for updating Soil Taxonomy provide for international committees to study various aspects of the system. Presently, six committees (Enclsoure III) involving about 200 leading soil scientists from more than 20 countries are participating. A typical committee report is shown in Enclosure IV. Committees will be

dissolved as their objectives are reached and new committees will be formed as new problems are identified. SMSS is evaluating and coordinating the work of these committees, finalizing proposals, and assisting with the incorporation of changes in Soil Taxonomy.

The International Committee on Classification of Low Activity Clay Soils (ICOMLAC) was formed partly because of difficulties in identifying the argillic horizon in soils that have properties similar to Oxisols. The mandate is to recommend changes in the classification of Alfisols and Ultisols dominated by low activity clays and to define new taxa as well as the diagnostic properties required for the definition of those taxa. A final report is expected from this committee in early 1981.

The International Committee on Oxisols was formed to evaluate the effects of changes proposed by ICOMLAC on the Oxisols order and to rework the entire order in light of the increased work on these soils in the last decade. As these soils are most extensive in developing tropical countries, the work of this committee is essential to the proper application of Soil Taxonomy.

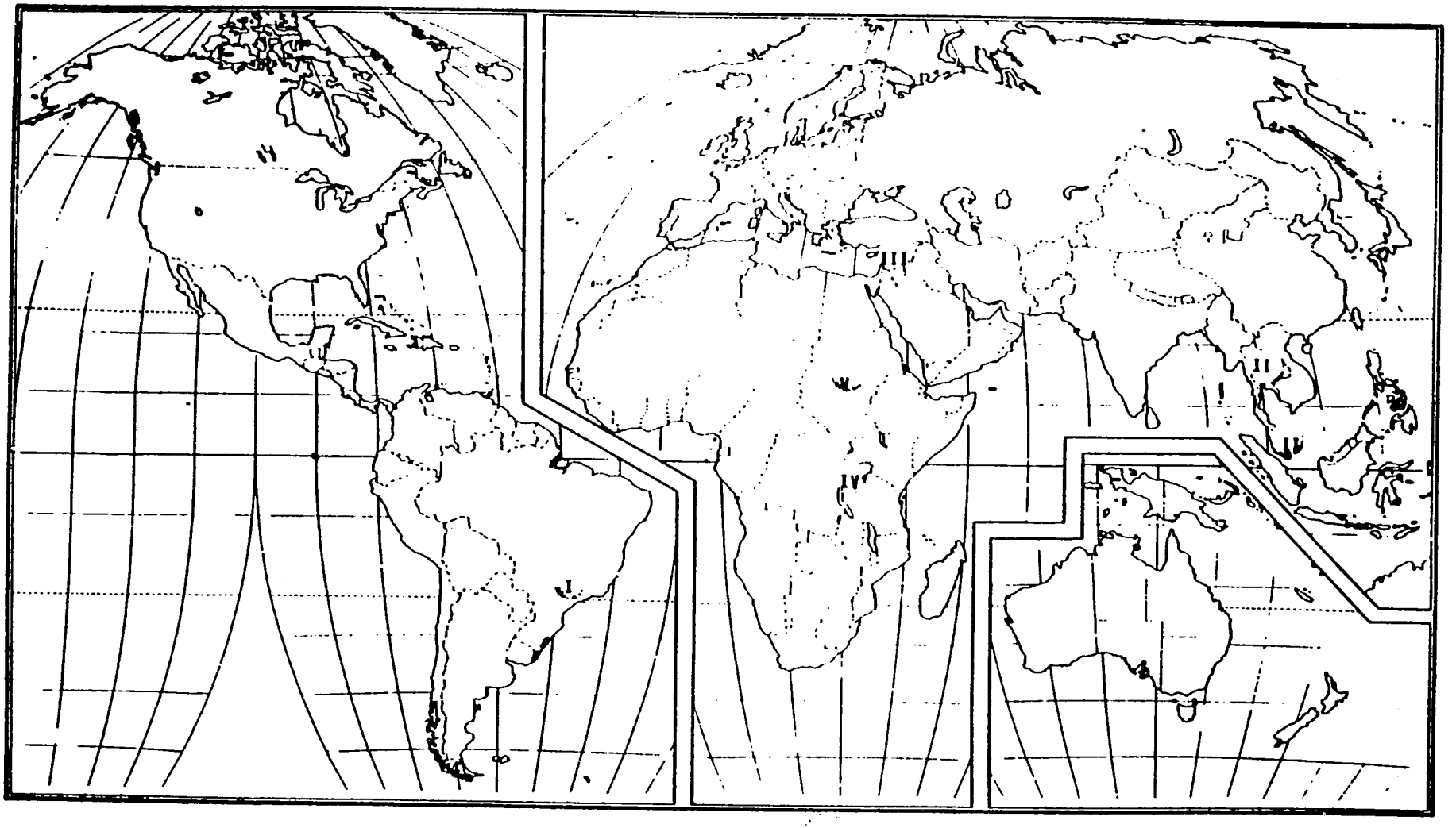
The International Committee on Moisture Regimes of the Tropics (COMMORT) is examining possible subdivisions of soils with udic moisture regimes and attempting to redefine, typic, aridic, and udic subgroups of soils with ustic moisture regimes. Ustic soils in tropical countries with monsoon climates are managed differently from ustic soils in temperate climates. This committee plans to develop soil moisture regime maps of South America and Africa based on needed refinements of existing soil moisture regimes.

The International Committee on Andisols (ICOMAND) was formed to consider proposals to set up a new soil order for the existing Andepts suborder. ICOMAND is studying ash soils throughout the world and developing new methods for identifying andic soil materials.

At the Third International Soil Classification Workshop held in Syria and Lebanon in 1980, two new committees were proposed. The International Committee on Aridisols (ICOMID) was set up to study Aridisols and the International Committee on Vertisols (ICOMERT) was set up to reevaluate Vertisols.

o International Workshops--Three workshops have been held to date. They were organized by Dr. F. H. Beinroth of the University of Puerto Rico, and were all funded by AID through a grant to the University of Puerto Rico. The workshops were cosponsored by other interested organizations such as Cornell University, University of Hawaii, USDA-SCS, and the University of Ghent, Belgium. The first workshop was in Brazil in 1976

FIG 2 - SITES OF INTERNATIONAL SOIL CLASSIFICATION WORKSH



for the mandate of ICOMLAC and hosted by EMBRAPA. The proceedings of this workshop are now available from SMSS and EMBRAPA,

Servicio Nacional de Levantamento E Conservacao de Solos, Rua Jardim Bontanico, 1024, 22 240 - Rio de Janiero, RJ, Brazil.

The second workshop was hosted by the Department of Agriculture, Malaysia (Dr. S. Paramanathan), and the Land Development Department, Thailand (Mr. S. Panichapong), in 1978. The Malaysian part of the workshop formed the first meeting for ICOMOX; the Thailand meeting was mainly for ICOMLAC. The proceedings are available from SMSS.

The third workshop was held in Syria and Lebanon in April 1980 and hosted by the Arab Centre for the Studies of Arid Zones and Dry Lands (ACSAD). About 40 Arab scientists and 20 foreign scientists attended the workshop. The workshop opened with 2 days of discussion sessions, when papers on soil moisture regimes and soils in the arid parts of the world were presented. This was followed by a week of excursions in Syria and Lebanon. Soil sequences were selected to reflect the influences of soil moisture regimes, specifically the xeric to aridic transitions, on soil properties. On the terraces of the Euphrates River, the participants could evaluate the effects of irrigation on soil attributes and study soils with gypsic and petrogypsic horizons. Soils on volcanic ash and cinders having aridic soil moisture regimes were shown around Raqqa. In the Bekka Valley in Lebanon, variations in soil cimate over short distances result in marked differences in soil characteristics. The other interesting sequence was on basalts where the soils ranged from Vertic Xerochrepts to Typic Chromoxererts. Finally, the intense biological activity induced by long-term irrigation in an oasis was discussed at Ghota, where the concept of the Vermic epipedon was expounded by Prof. R. Tavernier from Belgium.

The closing session dwelled on the taxonomic problems that had arisen during the field discussions. Several resolutions and recommendations were also adopted. These and the papers submitted will be compiled later and distributed as the proceedings of the workshop.

A followup meeting in Athens, Greece, was held from May 1-3, 1980, to evaluate the workshop and to approve some of the resolutions and recommendations. The meeting was hosted by the Ministry of Agriculture and the Soil Survey Institute of Greece and was arranged by Mr. T. Koutalos, Director of the Institute. All the resolutions and recommendations tabled in Syria were accepted with some minor modifications. The creation of the two new committees--ICOMID and ICOMERT--was accepted. The proceeding of the workshop will be available by the middle of 1981.

SMSS has contracted with the University of Puerto Rico to organize a Fourth International Soil Classification Workshop to be held in Rwanda in June 1981, with the cooperation of Institut de Science Agronomique Rwanda (ISAR). Figure II is a map showing the location of previous workshops and those proposed by SMSS.

o Soil Taxonomy News--As a means of providing new information and exchanging ideas, SMSS has developed a newsletter that is being mailed to approximately 1,000 individual soil scientists throughout the world. The newsletter contains items of interest to scientists, especially those interested in soil classification. It encourages the use and improvement of Soil Taxonomy and transmits news of revisions that have been approved.

o Guy Smith Interviews--Many users of Soil Taxonomy, as well as others interested in using it, especially those in developing countries, have suggested that it would be beneficial to have a companion document to explain more fully the background and rationale of the system and to clarify many of the definitions and the reasons for setting their limits. Toward that end, Dr. Guy Smith, who over a period of 25 years has provided the leadership in the development of Soil Taxonomy, is participating in a series of meetings with soil scientists in the United States, Belgium, and Latin America. The discussions with Dr. Smith are being taped and transcribed and will form the basis for a publication to be written by Dr. Smith. Discussions with Dr. M. L. Leamy have already been held and are now being edited.

IV. Project Design

Through a Participating Agency Services Agreement (PASA), funds are provided by USAID for the Soil Management Support Services. The Office of International Cooperation and Development (OICD) in USDA is the contracting agency for the 3 year project of SMSS and the implementing agency is SCS.

The Soil Conservation Service (SCS) of USDA has a long and distinguished history of involvement in the area of soil management both in the U.S. and overseas. In addition, SCS has an exceptional range of physical resources and manpower expertise and as SCS has worked very closely with all land grant colleges in U.S., it is also able to tap appropriate expertise from these institutions.

A. Duration

The project is now approved for a period of 3 years from 1979 to 1982, though it is envisaged to last for a minimum of 5 years or as long as it is needed.

B. Coordination

A committee, to serve in an informal capacity to provide advisory direction to the project and to facilitate coordination among agencies and institutions which will be directly or indirectly involved in the SMSS, has been made and the members are listed in Enclosure I. Dr. A. Van Wambeke of Cornell University is the Chairman and Dr. T. Gill of USAID is the Co-chairman.

C. Organizational Aspects of SMSS

Personnel of USAID, OICD, and SCS have been appointed to manage SMSS activities. Figure III shows the organizational chart. Dr. T. Gill, of the Office of Agriculture, USAID, is the Project Monitor and acts as the liaison between USAID and USDA in addition to providing the overall guidance to the project. Dr. K. W. Flach is the Principal Investigator and is responsible for the administrative leadership. The contracting agency is OICD and Mr. Greg Garbinsky is the Technical Assistance Officer assigned to the project. OICD handles all the financial aspects of the project.

Since the inception of the project in 1979, Dr. Richard Guthrie has served as the Acting Director. Dr. Hari Eswaran was appointed as the Program Leader on November 1, 1980, and Miss Phyliss Wigginton is his secretary. The project has also a Research Soil Chemist, Dr. John Kimble, who is located at the National Soil Survey Laboratory in Lincoln, Nebraska.

All the resources of SCS are placed at the disposal of the project. The technical assistant component of the project is handled essentially by Dr. Jerry Hammond, Director of International Activities of USDA. The liaison with the national soils staff is made through Dr. Richard Arnold, Director of Soils of SCS. Analytical facilities are provided by the National Soil Survey Laboratory at Lincoln, Nebraska. In addition, considerable assistance is received from the editorial, cartographic, and the other services of SCS.

The International Advisory Panel, with Dr. A. Van Wambeke as Chairman (Enclosure I) also provides guidance to the project. The panel operates mainly through correspondence. The various international committees, through their chairmen and members, provide the link between the project and the soil scientists of LDC's. This link also serves as the feedback mechanism for the technology transfer component of the project.

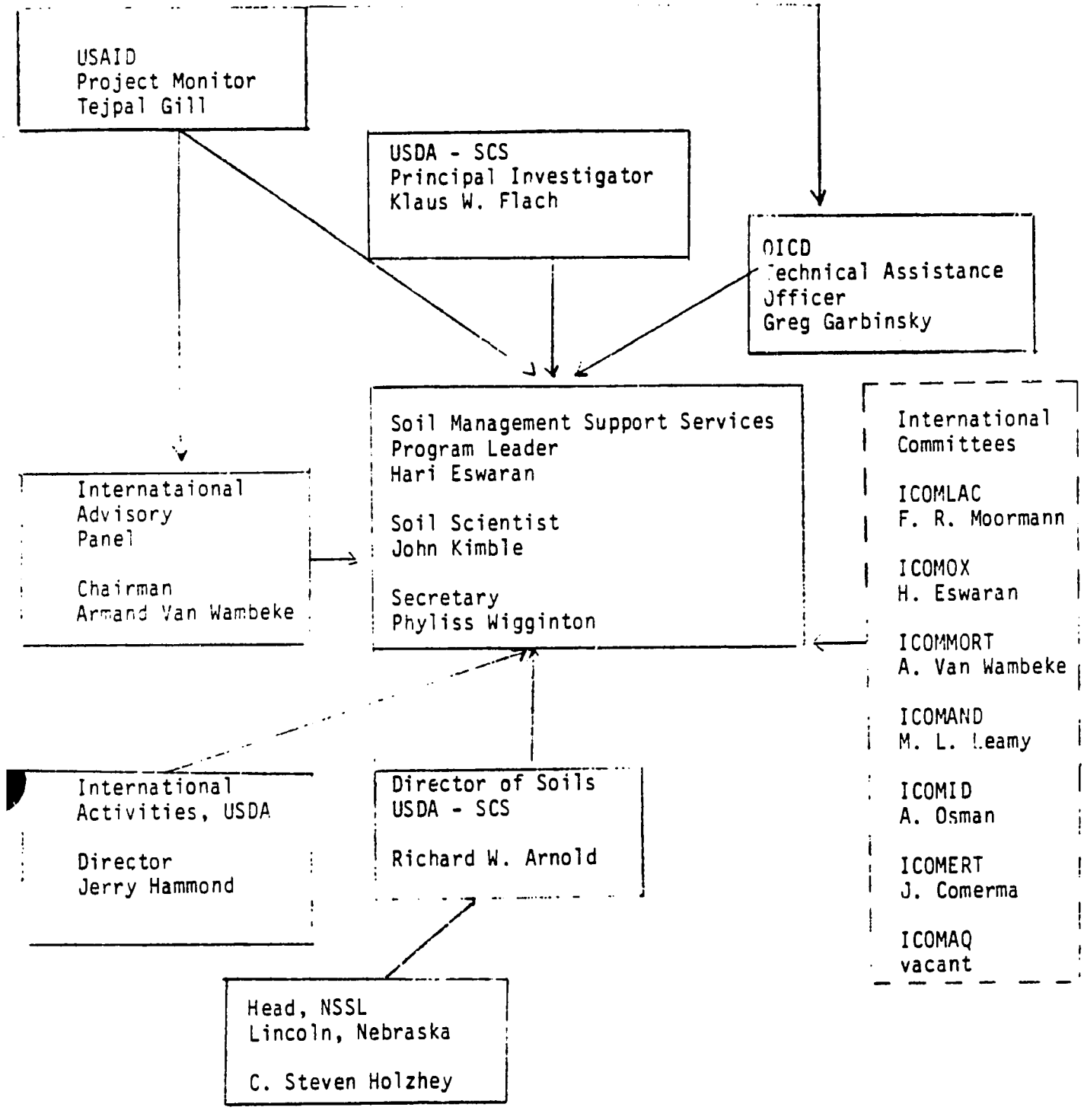


FIG. III Organizational Chart of Soil Management Support Services

D. Operational Aspects of SMSS

1. Technical Assistance

All technical assistance requests originate from AID Missions in LDC's. These requests are channeled through AID Washington to the Program Leader. The role of the Program Leader is mainly in the selection of personnel for the request and this is done through consultation with SCS staff and the SMSS Principal Investigator. The Office of International Activities, USDA, and OICD handle the details of the travel and other aspects of the TDY.

Some technical assistance request also originate from international organizations such as the FAO and are handled in a similar fashion.

2. Technology Transfer

The basic objective is to reach as many soil scientists as possible, to (a) inform them of the developments in Soil Taxonomy, (b) develop a feedback mechanism to help refine the system, and (c) provide the technology transfer mechanism by informing LDC scientists on the applicability of the taxonomy.

SMSS acts as the liaison between the U.S. domestic activities and the international sphere. Efforts to refine Soil Taxonomy are taking place on both fronts. On the international front, several international committees have been established with renowned scientists as chairmen of the ICOM's (Enclosure III). Each ICOM is given a specific mandate covering well defined subject matter areas to examine. Although the membership of each ICOM is open to all interested scientists, a core committeee is responsible for most of the decisions. More than 200 scientists throughout the world are cooperating in this endeavor.

The ICOM's are organized specifically for Soil Taxonomy. However, contact is maintained with other national, regional, or international groups for two reasons: (a) to provide assistance in developing their classifications and (b) to extract useful information from these systems to improve Soil Taxonomy. Two current approaches in which SMSS is cooperating are (a) the new classification being developed by some ORSTOM scientists and (b) the international reference base for soil classification which is a project of the International Soil Science Society in cooperation with FAO and the International Soil Museum.

SMSS also attempts to participate in all international meetings by sponsoring scientists to attend these meetings. This is very rewarding not only from the discussions during the meeting but also from the data on soils which are presented, particularly from the field tours. Such data, especially from intertropical areas, are difficult and expensive to obtain and meetings provide an opportunity to get them. It is considered that these kinds of data are very useful to refine Soil Taxonomy. Enclosure V lists some of the papers submitted to the international meetings.

In order to obtain reliable data, national soil organizations are requested to sample specific soils which are analyzed by SCS. Due to this desire to improve the data base for the soils of the tropics, the policy adopted is that all the soils studied during the International Soil Classification Workshops, are also analyzed by SCS. In addition, a few soils sampled by the consultants during their technical assistance activities, are also sent for analyses to the SCS laboratories.

In order to develop the taxonomy and ensure its correct use, Internatonal Workshops are organized. The general theme of each workshop is classification and management of specific groups of soils. The 4th Workshop in Rwanda is on Oxisols. Rwanda is selected not only because it has a range of Oxisols but also because it represents a specific environment--tropical mountain soils. The 1982 Workshop is for the subject of Vertisols and Sudan is selected as the Venue as more than one-sixth of the total area of Vertisols in the world is present in Sudan. There is a tremendous exchange of information between the local and foreign participants and these workshops have proved to be an effective means in the technology transfer process.

Another strategy which is being developed is directed mainly to the younger generation of soil scientists in LDC's and also other users of soils. This is to have training courses in the classification and management of soils. These courses are organized on a regional basis so as to reach a large number of people. Specialists from the SCS and universities will be hired to give the courses.

Soil scientists in LDC's are generally not informed of current developments in soil science due to their inability to acquire international journals. SMSS hopes to produce monographs on selected topics and these will be distributed free of charge to LDC scientists. This is envisaged to be an important contribution to the technology transfer process.

Many of these activities, though coordinated by SMSS, are not actually executed by SMSS. Cooperation with other organizations is a general policy. The International Soil Classification Workshops have now been contracted to the University of Puerto Rico. UPR has organized the first three of the workshops and will organize the future workshops. Cornell University has been contracted to develop the monograph on "Guidelines for Soil Resource Inventory Evaluation." Such contracts are made for projects initiated by SMSS or where cooperation is sought for from other organizations. Individuals have also been contracted for specific projects. For example, Dr. Guy Smith will be documenting the rationale and philosophy of Soil Taxonomy through a series of interviews with soil scientists in the U.S. and elsewhere. These interviews were initiated by Dr. M. L. Leamy and some have been published in the New Zealand Soils Newsletter.

Cooperation also takes place on an informal basis without any contractual obligations. This is mainly through initiatives of national or regional organizations. The Soil Survey Division of D.S.I.R. of New Zealand, has developed a series of monographs on Soil Taxonomy. These are flow charts for easy use of the system. The flow charts received worldwide circulation and indirectly have helped in the greater use of Soil Taxonomy. Another example is the Soil Map of the Arab World project of the Arab Centre for the Studies of Arid Zones and Dry Lands (ACSAD), Syria. ACSAD is using Soil Taxonomy for thier soil map and SMSS cooperates in providing some technical assistance.

This brief review of the SMSS approach to technology transfer component of the project indicates that the strategy is to develop a multifaceted approach. It is believed that only through such an approach which involves both formal and informal contacts that we can attain the objectives that have been set forth.

E. Budget

The total budget for the 3 year period is $2,127,000. The breakdown for the first year is given as an example in Enclosure VI.

V. Work Plan for the Coming Years

A. Technical Assistance to AID Missions

The increasing demand from AID Missions has already placed a heavy work load on the project. The last year has shown that the two bottlenecks in promptly and efficiently responding to

requests have been (1) the lead time and (2) the search and selection of personnel. Even when a suitable person has been found, considerable time is spent for his travel arrangements, particularly for obtaining official passports, etc.

SMSS, through solicitations in the Agronomy News, is compiling a register of potential candidates for short term consultations. To date more than 50 people have responded. These candidates have now been classified and arrangements are being made to issue some of them with official passports.

No estimates can be given on the number of requests that will be received during the coming years. This will, however, be an important ongoing activity of SMSS.

B. Technical Assistance to AID Washington

As for the AID Missions, SMSS will continue to provide all assistance to AID Washington. These are mainly on an ad hoc basis and a function of the requests that are received. The project on the "Bibliography of Soils of the Tropics" being compiled by A. C. Orvedal will be continued.

C. Technology Transfer

The basic objective is to improve Soil Taxonomy for its greater acceptance and application in the intertropical areas and elsewhere. The three components of this objective are (1) refining Soil Taxonomy, (2) document the rationale and key concepts in Soil Taxonomy, and (3) encourage and motivate its greater use.

A multifaceted strategy is developed for this objective. The six international committees are already engaged in discussions on the refinement of Soil Taxonomy. As the need arises, more committees can be added. Through their circulars, the chairman of each committee maintains contact with all users of Soil Taxonomy. SMSS also acts as a clearing house for feedback from LDC's to the committees and acts as a liaison between the committees and U.S. scientists. Response to this activity from LDC's has been very encouraging as finally a mechanism is available for the LDC scientists to voice their opinion and to use a system which they are helping to develop.

SMSS also maintains a close contact and even cooperates in the development of other national, regional, or international classification systems. This kind of cooperation is mutually rewarding. The International Soil Science Society (ISSS) in cooperation with the International Soil Museum (ISM) and the Food and Agricultural Organization (FAO) has embarked on a project funded by the United Nations Environmental Program

(UNEP) to develop a "Reference Base for International Soil Classification" and SMSS has and will continue to assist in this endeavor.

To assist the international committees in their deliberations and to obtain more basic information on the soils of the tropics, international workshops are organized. The 4th International Soil Classification Workshop is planned for Rwanda in 1981 and the fifth in Sudan in 1982. These workshops provide a forum for scientists from LDC's to meet and discuss with other international experts.

Although Soil Taxonomy was published in 1975, there has been no companion book to explain the concepts and rationale of the system. The absence of this has given rise to a number of discussions and there have been many requests from LDC and other scientists to document this. A publication consisting of interviews with Dr. G. D. Smith is one way in which this is being documented. Preparations are already under way to produce technical monographs on selected topics which will help to explain Soil Taxonomy. Two or three such monographs will be prepared per year in the forthcoming years.

Though many LDC's have adopted Soil Taxonomy, the new generation of scientists may not be informed of the system unless the scientists were educated in the U.S. or in some universities outside the U.S. where the system is taught. Several requests have been received to organize short courses on the use and application of the system. In 1981, the Unversity of the South Pacific in Fiji, is organizing such a course with some support from SMSS. The Arab Centre for the Studies of Arid Zones and Dry Lands (ACSAD) has requested the cooperation of SMSS in the organization of such a course as ACSAD has opted to use Soil Taxonomy in their soil map of the Arab World.

VI. Dissemination and Utilization of Results

As the project is only 1 year old, it is difficult to access the impact of our efforts. However, some feed back has developed and the initial reactions are encouraging.

A. Technical Assistance to AID Missions and LDC's

The short term technical assistance that have been provided have responded quickly. Enclosure VIIa is an example of a report from a consultant mission and Enclosure VIIb is an example of the reaction to the report and the follow up activities that are being contemplated.

In some instances LDC's request more than could be provided under the PASA. Although it is the desire to assist whenever possible, some disappointments do arise. However, every attempt is made to seek alternative sources of assistance.

B. Technology Transfer

This is a long term program and it is perhaps too early to expect positive responses. The recognition given to the work of the international committees is shown by the response to the circulars.

The Proceeding of the 3rd International Soil Classification Workshop organized by the University of Puerto Rico in cooperaticn with the Department of Agriculture, Malaysia, the Land Development Department, Thailand, and other international organizatons and funded by USAID was published in August 1980. SMSS circulated the Proceedings on a worldwide basis and responses to the Proceeding are just coming in. Enclosure VIIIa, b, c are examples of letters which have been received.

VII. Concluding Remarks

Due to the short lead time to the project, staff recruitment has been a major handicap in getting the project moving. The project has been very fortunate in obtaining the services of Dr. Richard Guthrie, Soil Scientists of SCS, to serve as Acting Director. Despite the difficulties, much has been achieved as the SCS has put all its resources at the service of SMSS. However, in some areas unavoidable delays occur in the execution of some activity due to the beaurocratic process.

The output of the project, to date, would not have been so much if not for the excellent cooperation between all the agencies. The very efficient cooperation of particularly the Office of International Cooperation and Development (OICD) and the international activities section of USDA has guaranteed the success of the project. The excellent liaision between AID and USDA and the personal interest of Dr. Tej Gill ensures a continuing success of the project.

Hari Eswaran
Program Leader
November 10, 1980

Enclosure 1

Soil Management Support Services Advisory Panel
October 1980

Dr. Armand Van Wambeke - Chairman
Professor of Soil Science
Department of Agronomy
Cornell University
Ithaca, New York 14853

Dr. T. S. Gill - Cochairman
State Department
DS/AGR/SWM
Agency for International Development
Washington, D.C. 20523

Dr. N. C. Brady
Director General
The International Rice
Research Institute
P.O. Box 933
Manila,
PHILIPPINES

Dr. R. Dudal
Director, Land and Water
Development Division
FAO-AGL
Via delle Terme di Caracalla
00153 Rome,
ITALY

Dr. L. W. Fitzgerald
NE/TECH/AD
Room 6984, New State Bldg.
USAID
Washington, D.C. 20523

Dr. H. Greenland
Assistant Director General
International Rice Research Institute
P.O. Box 933
Manila,
PHILIPPINES

Mr. W. M. Johnson
Deputy Chief for
Natural Resource Assessments
Soil Conservation Service
P.O. Box 2890
Washington, D.C. 20013

SMSS Committee

Dr. J. P. Mbuvi
Soil Scientist, Arid/Semi-Arid Lands
Study Project
Railway Hqs. Building
Haile Selassie Avenue
P.O. Box 30028
Nairobi,
KENYA

Dr. Christopher R. Panabokke
Director, Agriculture Research Office
of Deputy Director Agriculture
No. 5, Sarassavi Mawatha
Peradeniya,
SRI LANKA

Dr. D. L. Plunknett
ASIA/TR/ARD
Room 606 SA-18
USAID
Washington, D.C. 20523

Dr. P. Segalen
Senior Pedologist
ORSTOM
70-74 Route d'Aulnay
93140 Bondy,
FRANCE

Dr. W. G. Sombroek
Director, International
Soil Museum
Duivendaal 9
P.O. Box 353
Wageningen 6140
THE NETHERLANDS

Dr. L. Swindale
Director, International Crops
Research Institute for the
Semi-Arid Tropics
1-11-256 Begumpet
Hyderabad 500 016, A.P.
INDIA

Dr. R. Tavernier
Director, Geological Institute
University of Ghent
271, Krijgslaan
9000 Ghent
BELGIUM

ENCLOSURE IIa

1. Country: Peru

2. Title: Technical assistance on Soil Conservation

3. Objective: To assist the mission and General Directorate of Soils and Water, Ministry of Agriculture and food obtain and develop written analysis on various aspects of soil conservation for use in the preparation of project paper.

4. Significant Comments:
(100-150 words)
Visited field sites in Cajamarca and Chiclayo areas with Ministry officals and prepared portions of a draft project paper.

5. Report (Reference, availability)
Trip report and draft of project paper sent to USAID/PERU and USAID Washington.

- Person days: 85
- Service period: March 29 - April 27, 1980
- Team personnel:
(name, adress, telephone)

Ray T. Margo
USDA - SCS
Albuerque, N.M.
FTS 474-3277

Clayton Ogg
USDA -ESS
Washington, D.C.
FTS 447-8104

Eugene S. Pope
USDA - SCS
Lincoln, NE.
FTS 541-5363

SOIL MANAGEMENT SUPPORT SERVICE - - TDY/TA

PASA: AG/DSB-1129-5-79

(AID/USDA-SCS)

1. Country: Guatemala

2. Title: Soil Conservation and Irrigation

3. Objective: Assist Mission in examining impact of soil conservation and irrigation project AG/GUA-233 on small farmers.

4. Significant Comments:
(100-150 words)

Field sites visited, project evaluated, reccomendations made to mission.

5. Report (Reference, availability)

Dr. T.S. Gill

- Person days: 12
- Service period: April 13-18 1980
- Team personnel:
(name, adress, telephone)

W.M. Johnson
USDA-SCS
Washington, D.C.
202-447-5195

T.S. Gill
USAID-DS/AGR
Washington, D.C.
703- 235-8877

SOIL MANAGEMENT SUPPORT SERVICE - - TDY/TA

PASA: AG/DSB-1129-5-79

(AID/USDA-SCS)

ENCLOSURE IIc

1. Country: Senegal

2. Title: Senegal Fuelwood Production Project

3. Objective: Assist mission with soil survey and interpretations for production of fuelwood on reforestation project.

4. Significant Comments:
(100-150 words)

Prepared general soil map of 10,000 hectare plantation. Prepared detailed soil survey of 450 hectares. Assisted Mission in selection of most suitable sites for plantation and preapred soil potential ratings for map units of general and detailed maps. Assisted mission, GOS, and ORSTOM in description and sampling of soils on sites selected for planting.

5. Report (Reference, availability)
Trip reports and reccomendations sent to USAID/Senegal and USAID/Washington.

- Person days: 56
- Service period: April 4-17, 1980 and May 19-June 6, 1980
- Team personnel:
  (name, adress, telephone)

  James H. Bowers
  P.O. Box 1245
  Victoria, Texas 77901

  (512) 575-2737

  James H. Brown
  USDA - SCS
  Auburn, Alabama
  FTS 534-4540

SOIL MANAGEMENT SUPPORT SERVICE - - TDY/TA

FASA: AG/DSB-1129-5-79

(AID/USDA-SCS)

ENCLSOURE IId

1. Country: Rwanda

2. Title: National Soil Classification Program

3. Objective: Assist GOR in the development of legend for national soil map.

4. Significant Comments:
(100-150 words)

An initial legend was reviewed, field sites visited and agency personnel interviewed. Needs for additional assistance were identified. Tentative discussions on a proposal for international soil classification workshop were held with GOR and ISAR.

5. Report (Reference, availability)

- Person days: 12
- Service period: June 2-14, 1980
- Team personnel:
  (name, address, telephone)

Dr. Armand Van Wambeke
Department of Agronomy
Cornell University
Ithaca, New York 14853
607 256-5457

ENCLOSURE IIe

1. Country: Philippines

2. Title: National soil classification program

3. Objective: Request to review status and develop or recommend a program.

4. Significant Comments:
(100-150 words)

An initial proposal was reviewed, field sites visited, and agency personnel interviewed. A draft proposal was developed but verifiable indicators of national commitment and structure were lacking. Alternative procedures and training needs were identified for PCARR and BS (Bureau of Soils) to consider as steps toward developing a national program based on use of Soil Taxonomy.

5. Report (Reference, availability)

Eleven memos were drafted and copies are to be sent to Washington to become the consultancy report.

- Person days: 29
- Service period: May 26-June 24, 1980
- Team personnel:
  (name, adress, telephone)

Richard W. Arnold
Staff Leader - Soil Classification
USDA Soil Conservation Service
P.O. Box 2890
Washington, D.C. 20013
(202) 447-5905

ENCLOSURE IIf

1. Country: Thailand

2. Title: National Soil and Water Conservation Program

3. Objective: Assist MOAC in preparing report and recommendations on upgrading DLD operations that could serve as basis for possible AID-supported project in soil and water management and conservation.

4. Significant Comments:
(100-150 words)

Field sites were visited with DLD officals, capabilities of DLD field centers were evaluated, and recommendations on institutional framework for disseminating soil conservation information were made. Team recommended program for adoption and use of Soil Taxonomy, and completed report assessing DLD capabilities to implement soil survey, land classification and soil and water conservation programs.

5. Report (Reference, availability)

Report submitted to USAID Thailand

- Person days: 38
- Service period: August 18 - September 6, 1980
- Team personnel:
  (name, adress, telephone)

William E. Austin
USDA - SCS
Gainesville, Fla.
FTS 946-3871

Victor G Link
USDA - SCS
Washington, D.C.
301 436-7333

SOIL MANAGEMENT SUPPORT SERVICE - - TDY/TA

PASA: AG/DSB-1129-5-79

(AID/USDA-SCS)

ENCLSOURE IIg

1. Country: Jamaica

2. Title: Technical assisatnce - soil classification, mapping, soil loss estimator.

3. Objective: Assist IRDP and MOA in evaluating conservation practices and in training personnel in soil classification and mapping.

4. Significant Comments:
(100-150 words)
Visited IRDP project area, evaluated conservation practices and advised IRDP technicans on use of USLE (2 person weeks). Trained MOA land capability planners in using Soil Taxonomy soil mapping and use of aerial photography,(two person week).

5. Report (Reference, availability)
Trip report to USAID/Jamaica and USAID/Washington

- Person days: 29
- Service period: August 25 - September 12, 1980
- Team personnel:
(name, adress, telephone)

Richard L. Guthrie
USDA - SCS
Washington, D.C.
202 447-9198

Arnold King
USDA - SCS
Washington, D.C.
202 447-2646

SOIL MANAGEMENT SUPPORT SERVICE - - TDY/TA

PASA: AG/DSB-1129-5-79

(AID/USDA-SCS)

ENCLOSURE IIh

1. Country: Sudan

2. Title: Soil survey assistance

3. Objective: Assist Soil Survey Administration with proposal for soil classification workshop and evaluation of soil survey laboratory analyses.

4. Significant Comments:
(100-150 words)
Reviewed proposal for Workshop, visited field sites and laboratories and interviewed agency personnel. Soil Survey Administration would like to have assistance in organzing a soil classification workshop to study Vertisols.

5. Report (Reference, availability)
Trip report to USAID/SUDAN and USAID/Washington.

- Person days: 28
- Service period: October 2 - October 17, 1980
- Team personnel:
  (name, adress, telephone)

John Kimmble
USDA - SCS
NSSL
Lincoln, NE.
FTS 541-5363

Hari Eswaran
USDA - SCS
Washington, D.C.
202 447-9198

SOIL MANAGEMENT SUPPORT SERVICE - - TDY/TA

PASA: AG/DSB-1129-5-79

(AID/USDA-SCS)

Enclosure III

International Committees

Pursuant to the objectives of refining Soil Taxonomy, several international committees have been formed. The charge of each committee is defined very specifically as each has been created to evaluate some specific aspects of Soil Taxonomy. Based on recommendations from the scientific community, SCS nominates a chairman for each committee. The chairman develops an international mailing list and develops a dialogue through circulars. Enclosure IV gives an example of a circular. If known in advance, the members also meet at international meetings to discuss specific aspect of the committee's charge.

A brief outline of each committee is given below:

1. International Committee On classification of soils with low activity clays (ICOMLAC).

Chairman: Dr. F. R. Moormann, Professor of soils, University of Utrecht, Utrecht, Nederland.

Dr. Moormann, commenced his soil survey career in Belgium (1947-1955) under Prof. Tavernier and then joined the FAO. He initiated modern soil surveys in Jordan (1955-1957), South Vietnam (1957-1961) and Thailand (1961-1969). Prior to becoming Professor at Utrecht, he was Pedologist at IITA, Nigeria (1969-1978). He has been connected with Soil Taxonomy from the early days of its inception.

Soils with low activity clay are extensive in both the dry and wet tropics. The current classification of these soils in Soil Taxonomy does not produce the kind of groupings that are desirable from the point of view of the soil scientists working in these areas. ICOMLAC's objectives are to remedy this situation.

2. International Committee on Oxisols (ICOMOX)

Chairman: Dr. H. Eswaran, Pedologist, University of Ghent, Ghent, Belgium.

Dr. Eswaran has been working on Oxisols and related soils for more than a decade, mainly in south east Asia and occasionally in West Africa. The unifying property of this group of soils is their mineralo-chemical properties and Dr. Eswaran has made extensive studies on this aspect of tropical soils.

Oxisols, in general, represent the most advanced stage of weathering and soil information, and occupy about 8 percent of the earth's land surface. Some members are the poorest soils in the world, having very low nutrient retention properties, low nutrient status, low available water, ability to fix and withhold some nutrients and other kinds of limitations which require special management techniques for efficient utilization. They

are confined to the intertropical areas and when considered on a global sense, they are unique. Some may have laterite or plinthite which harden irreversibly to laterite on exposure. Laterite has sometimes been described as the scourge of the tropics. If there are also climatic constraints as in the drier tropics, the Oxisols have serious problems for economic use.

As much more information is available on Oxisols in the last decade, it was considered necessary to revise the present classifiction.

3. International Committee on Soil Moisture and Temperature Regimes. (ICOMMORT)

Chairman: Dr. A. Van Wambeke, Professor of World Soils, Cornell University, New York.

Dr. Van Wambeke began his soil survey career in Zaire, Rwanda, and Burundi before joining the FAO and working in South America. He has also been directly or indirectly involved in the development of Soil Taxonomy. His extensive travels exposed him to the contrastingly different climatic environments and he was able to study the adaptations of soil management to soil and climate. Based on a model developed by Dr. F. Newhall of SCS to estimate soil moisture and temperature regimes, Dr. Van Wambeke developed a similar computer program as Newhall's, to estimate soil moisture and temperature regimes from atmospheric data. His interest, knowledge and enthusiasm made him eminently qualified as chairman of ICOMMORT.

The present classification of soil moisture and temperature regimes in Soil Taxonomy makes meaningful classes in the U.S. The climatic pattern in the intertropical areas is however, different and ICOMMORT is engaged in making modifications to the present classification. Based on these changes, computer maps will be generated showing the soil moisture and temperature regimes in the intertropical areas. This will be the first step to delineating agro-ecological zones.

4. International Committee on Andisols (ICOMAND)

Chairman: Dr. M. L. Leamy, Director of Soil Survey, Soil Bureau, DSIR, New Zealand.

Dr. Leamy had his early experience on soils of the tropics when he was Soil Correlator in Malaysia in 1960. He has worked in Singapore and South Africa and recently he is involved in bilateral technical aid programs with Fiji, Samoa, Tonga, and Cook Islands, Dr. Leamy's expertise on volcanic ash soils stems mainly from his work in New Zealand and the Pacific Islands.

Volcanic Ash Soils or Andisols occupy about 1 percent of the land area in the world and are specifically concentrated along the circum-pacific belt. Although much is known on their properties and management in the temperate zones, the same cannot be said for the soils in the intertropical areas.

ICOMAND is developing methodologies to identify these soils. When their proposal is approved, the Andisols will form a new Order--the 11th Order in Soil Taxonomy.

5. International Committee on Aridisols (ICOMID)

Chairman: Dr. A. Osman, Director, Soils Division, Arab Centre for the Studies of Arid Lands, Syria

Dr. A. Osman, formerly the director of the Agricultural Research Station in Tel Amara, Lebanon, had his early education in Lebenon and France and his post-graduate training in Belgium, under Prof. R. Tavernier. He has travelled widely in the middle east and has an indepth knowledge of agriculture and soils in mediterranean and arid areas. ACSAD is currently involved in preparing a 1:1,000,000 soil map of the Arab World and Soil Taxonomy is used for the legend of this map.

Although Aridisols are estimated to occupy about 15 percent of the world land surface, this area is continously increasing due to encroachment of the desert. Desertification of arable land is an important concern of many countries and the United Nations is comitted to combat this phenomena. ICOMID will, indirectly, be involved in these questions.

However, the present concern is to arrive at a better taxonomy of these soils.

6. International Committee on Vertisols (ICOMERT)

Chairman: Dr. J. Comerma, Head of the Soils Division of CENIAP and Professor at the University of Maracay, Venezuela.

Dr. Comerma, a graduate from North Carolina State University, has wide experience of the soils of South America. Even prior to being appointed as chairman of ICOMERT, he has been one of the most active members in all the other committees and this testifies to his wide experience and deep commitment to Soil Taxonomy.

Vertisols, though agriculturally one of the better group of soils and occupying about 2 percent of the worlds land surface, may have serious limitations with respect to engineering uses. Their capacity to shrink and swell may cause serious problems for foundations, roads, bridges, etc., ICOMERT will test more engineering properties so that some may be incorporated in the definition of Vertisols. They will also consider other physical properties which could be used for defining the lower categories.

ENCLOSURE IV

INTERNATIONAL COMMITTEE ON MOISTURE REGIMES IN THE TROPICS

ICOMMORT

CIRCULAR LETTER # 2

OCTOBER 1980

New York State College of Agriculture and Life Sciences
Department of Agronomy Cornell University
Bradfield and Emerson Halls, Ithaca, N. Y. 14853

New York State College of Agriculture and Life Sciences
a Statutory College of the State University
Cornell University
Department of Agronomy
Bradfield and Emerson Halls, Ithaca, N. Y. 14853
Telephone 607-256-5459

INTERNATIONAL COMMITTEE ON SOIL MOISTURE
REGIMES IN THE TROPICS (ICOMMORT)

ICOMMORT CIRCULAR LETTER #2 OCTOBER 1980

It is now more than one year ago that the first circular letter of ICOMMORT was sent to the members of the Committee. Since that time, most of the participants have commented on the points which were raised. The Syrian workshop was held. A second letter is now needed in order to inform about the opinions expressed in the field.

A. Mandate

It may be appropriate to recall the role of this Committee which is one of those which deals with suggested changes in Soil Taxonomy. We act as an informal clearinghouse for suggestions made abroad by the users of Soil Taxonomy. We discuss these suggestions and subsequently submit them as a package to the Soil Conservation Service.

In general the scope of the mandate of ICOMMORT was overestimated; we are only expected to consider changes in the definitions of moisture regimes in tropical areas. Many suggestions received from the members involved drastic modifications in the overall structure of Soil Taxonomy. Opinions varied from complete elimination at all levels, except the lowest, of all properties that relate to climate which cannot be retained in samples, to the introduction of new or more detailed climatological characteristics in the system.

At present this Committee is not ready to propose changes which would completely alter the structure of Soil Taxonomy. However, for later reference we give the opinions expressed in this matter by ICOMMORT members.

1. Reasons not to use soil climatic data.

The criticism on the use of climatic data in soil classification was best summarized in a paper by R. Dudal and A. Pecrot presented at the Damascus Workshop: "A pragmatic reason [not to use differences in soil temperature and soil moisture] was that the [climatic] data were not available with sufficient precision...The more fundamental reason was that a subdivision in very broad temperature and moisture categories was not considered to have specific interpretation value" and "any refined climatic subdivision may still be insufficient to make estimates on crop suitability..." Furthermore, "the trop-concept leads to certain anomalies in the classification of soil of the tropics."

The authors conclude that "the adoption of a flexible characterization of climatic conditions, rather than the use of broad soil temperature and moisture regimes, may be more appropriate for the application of soil surveys..." and felt that "an overlay of climatic data on the soils base would allow for a more detailed and precise break-down of the climatic requirements of crops."

2. Reasons to use soil climatic data.

Even a drastically revised Soil Taxonomy will probably continue to use soil climatic properties to indicate at appropriate levels, and where necessary, the major temperature and moisture limitations for root growth. The intent is not to replace agroclimatology, a task for which soil science is not adequately equipped; however, when temperature or moisture are limiting factors, they should be implied in the definition of the taxa. The problem is to define the level where climatic constraints are to be introduced, and the precision required for use in the definitions.

It is not the intent to construct a new climatic classification, nor to make new climatic maps on the basis of atmospheric data. The temperature and moisture criteria would only be used where they are needed in order to indicate climatic limitations for root development which cannot be expressed by other soil criteria.

The Sofia Consultation agreed that an international soil classification system will be "...based on soil properties, including soil moisture and temperature regimes..." (ISSS Bulletin #57, 1980, page 20).

B. Correlation between FAO and Soil Taxonomy

One of the issues raised during the discussions at Damascus and in comments received from participants was the correlation between definitions of the USDA climatic regimes and the FAO agroclimatic zones.

The major difficulties in achieving such a correlation result from the following differences: Soil Taxonomy recognizes three conditions of the moisture control section: completely dry, partly moist, and completely moist. The definitions of the moisture regimes depend on combinations of these three conditions expressed in number of days per year. The definitions of the FAO agro-ecological zones recognize only two soil moisture conditions: days during which water is available for plant growth and days during which no water is available. Therefore the limits between classes in FAO and USDA are difficult to compare.

The Soil Conservation Service and the Agro-ecological zone project in FAO have exchanged their computer programs and have calculated statistical correlations between the two systems. First results were presented at the Workshop in Damascus. They indicate that for extreme regimes, the arid and humid climatic classes in FAO, the correlation with the USDA Aridic and Udic regimes is satisfactory. For the intermediate classes such as Ustic and Xeric this is not the case. Precise conversion factors will have to be calculated in order to pass from one system to another without too much loss of accuracy.

C. Subdivision of Ustic Regimes

Dr. Guy Smith has made suggestions for the subdivision of the Ustic moisture regime in areas with iso-temperature regimes. They are based on the number of consecutive days that the moisture control section is moist in some or all parts during one year. The critical limits are six months and nine months. Those with less than six months would be aridic. Those between six months and nine months would be typic. The soils with more

than nine months would belong to Udic subdivisions of the ustic moisture regime in iso-temperature areas. The detailed definitions were given in the previous circular letter, as well as the great groups for which they would be used.

It was felt that the subdivision of the soils with Ustic moisture regimes in non-iso-temperature climates should be different from the subdivisions used for soils in the tropics. In Ustic temperate regions, the assessment of the availability of water has to be combined with seasonal soil temperature changes. One proposal was submitted to the Athens meeting for further study; the key to a tentative system of subdivisions of moisture regimes is given in the appendix.

D. Temperature Regimes

The first circular letter indicated that the moisture regimes in the tropics cannot be discussed without considering at the same time the criteria used for the temperature regimes.

There are several points which need to be mentioned.

1. No reaction was received on the proposal that the hyperthermic regime would serve as a criterion to include soils in the tropo-subgroups or other tropo-taxa. The proposal has been accepted by SCS and it will be implemented.

The hyperthermic regime thus becomes increasingly important for separating soils: it eliminates soils from Xeric taxa and forces some of them in tropo-subgroups, even in areas with winter rainfall.

The previous statement that hyperthermic regimes were only found in aridic moisture regimes was not correct. There are several exceptions in the world, for example Argentina.

2. There is strong criticism against the present definitions of temperature regimes which are now based only on mean annual soil temperatures and the iso-criterion. FAO recommends developing a system which takes into account the duration and the intensity of cold and warm seasons.

3. The usefulness of the iso-temperature criterion is still debated, and some suggest eliminating it completely or only use it at the family level. A complete elimination at all levels and in all definitions, including the definition of Xeric, would produce groupings of winter rainfall and summer rainfall soils into one taxon of high category.

Another suggestion by FAO proposes to replace the criterion of 5°C difference between winter and summer by a more than 18°C as the lower limit for all months in one year. Tropical regimes would have all mean monthly t° greater than 18°C. The rationale is that the 18°C limit would match the inter-tropical belt better than the actual 5°C difference limit. Testing of these boundaries is needed to allow more precise selection of criteria.

E. Aridic Moisture Regime

The definition of the Aridic moisture regime is reported not to be working properly in areas having a low temperature winter (R. Tavernier). Crops growing during the cooler months after winter need more than three months to mature. Consequently, the maximum three months consecutive moisture availability limit now allowed for aridic regimes is too short and forces soils into Xeric regimes. A proposal by R. Tavernier would allow Aridic regimes to include non-iso soils in which the moisture control section is completely or partly moist for up to 4 consecutive months. Another and probably better alternative would be to accept a sliding scale for the lengths of the period with availability of water according to the temperature of the months in which plant growth is taking place.

F. Difficulties in the determination of the moisture regime.

It is often difficult to determine the moisture regimes because of the lack of data or deficiencies in the computational methods.

The comments related to several points: (1) definition of the moisture control section; (2) calculation of the potential evapotranspiration; (3) importance of the amount of available water in the soil profile; (4) estimation of the soil temperature from air temperature records; (5) techniques to measure soil temperatures in the field and the influence of vegetation on the actual temperature of the soil at certain depths; (6) computer models themselves as well as the degree of detail in the input data.

These comments confirm previous concerns that there are no sufficiently detailed observations on soil climate to determine consistently and over large areas the moisture and temperature regimes. These methodological problems are such that some individuals suggest abandoning soil climate as a criterion in soil classification. Others try to improve the methodology to assess moisture and temperature conditions in the soil.

We summarize in the following paragraphs the most important points raised in discussions and correspondence.

1. The moisture control section. Soil Taxonomy states that the intent in defining the MCS is to facilitate the estimation of moisture regimes from climatic data. It is that part of the profile in which changes in moisture during one year would be diagnostic of the moisture regime according to a preconceived classification.

In this perspective, the moisture control section is not limited exclusively to the part of the profile from which plants extract water. Neither does it represent exclusively the major rooting zone of crops. It is actually an artifact which serves the purpose of a classification system which uses properties of a part of a profile to evaluate the impact of climate on the soil and on the roots of crops growing in it.

This definition may of course be broadened to include available water present in the rooting zone, for example, in a section of a soil between fixed boundaries. Members are invited to make suggestions.

Some comments relate to the absence of guidelines to determine the

limits of the moisture control section in the field. Problems arise for soils that never reach the permanent wilting point, and for which the initial stage for measuring penetration of water cannot be set. Others have questioned the accuracy of determinations of the three conditions: completely moist, partly moist or completely dry.

2. The soil temperature measurements. Several members comment that the soil temperature at 50 cm depth changes markedly when the soil cover is modified by cropping.

These observations have been confirmed in several parts of the world, particularly in tropical and in dry areas. An agreement is needed on the kind of soil temperature to be used in Soil Taxonomy and on the conditions under which it should be recorded. As in all other observations related to climate, measurements will be comparable when obtained under standardized conditions. Although we have not been able to find a quotation in Soil Taxonomy on this subject, the soil temperatures to be taken into account are probably those for soils under natural vegetation or growing crops. There is little practical value in using the temperatures observed in bare soils as requested by the World Meteorological Organization; these data may be useful for airfields or for road construction, but do not serve agronomic purposes adequately, except for seed emergence.

It would seem appropriate that Soil Taxonomy specifies the conditions under which the temperatures in the soil should be measured. We may have to consider the use of shelters to protect instruments and soils from direct radiation. Suggestions are requested on this subject.

3. The estimation of soil temperature from air temperature. There have been a number of attempts to relate air temperature with soil temperature in many parts of the world. Several members have been working on this particular subject. A list of publications is attached to this letter and members are recommended to contact the individual authors. Apparently there is no universal method which would be valid in all parts of the world and regional solutions may have to be sought.

4. Calculation of potential evapotranspiration. This is also a frequent subject of discussion and again the members are referred to individual authors. Regional solutions probably are the best for the time being.

5. Computer Models. There are several computer models available in the literature which help to identify moisture regimes on the basis of atmospheric data. The degree of detail and the factors to be taken into account depend on the degree of resolution required in the taxonomic subdivisions. There is not much to be gained on subdividing the soil continuum into segments which are narrower than the confidence limits attached to the measurements. Some climatic classes will remain broad for considerable time in the future.

A. Van Wambeke
Chairman, ICOMMORT

ICOMMORT CIRCULAR LETTER #2

Appendix 1, References

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ICOMMORT CIRCULAR LETTER #2. October 1980

Appendix 2.

Tentative Subdivisions of the Moisture Regimes

Claims have been made that the five classes recognized for moisture regimes are not sufficiently uniform for interpretation purposes.

For this reason suggestions have been made to subdivide or to modify the definitions of the five classes, particularly for the ustic moisture regime. The same concerns have been expressed for the temperature regimes which closely interact with moisture regime definitions.

A tentative system of subdividing moisture regimes was developed in 1976. The tentative key for the subdivisions accepts without any changes the criteria used for defining the five highest level classes. No attempt has been made to change the present definitions of the five moisture regimes: aridic, xeric, ustic, udic and perudic. The subdivisions, therefore, are to be evaluated keeping this restriction in mind. They are perhaps not the best that could be developed when major modifications to Soil Taxonomy would be considered.

The key leading to subdivisions of moisture regimes is given in this publication on a tentative basis. All requirements that are used are assumed to occur in most years, at least six out of ten. There will probably be a need to change the nomenclature of the subdivisions especially in the udic regime where the use of the terms minimal, medium, and maximal is probably confusing.

The ustic moisture regimes have been separated into two subclasses on the basis of iso or non-iso conditions for temperature, thus recognizing tropustic and tempustic regimes. The tempustic and tropustic regimes are subdivided following different systems in each case. In the tempustic subclass the winter or summer rainfall characteristics are taken into account.

It should be reemphasized that subdividing moisture regimes does not necessarily imply developing a new soil climatic classification. The intent is only to provide for certain taxa guidelines for the separation into subclasses on the basis of climate, and to achieve a certain degree of uniformity in the methodology.

When applied to soil taxa an appropriate terminology will have to be developed in each case; for the time being the important thing is that the criteria which are used make meaningful subdivisions, and members are invited to comment on them. The Key is not meant to be referred to in publications.

A. Van Wambeke

Tentative Subdivisions of Moisture Regimes*

A. Van Wambeke

April 1976

A. Key to subdivision of ARIDIC

1) Soils in which the moisture control section (MCS) is completely dry during the whole year — EXTREME ARIDIC

2) Other soils in which the MCS is moist in some or all parts for 45 consecutive days or less during the period that the soil temperature at 50 cm depth is more than 8°C — TYPIC ARIDIC

3) Other soils with aridic moisture regime — WEAK ARIDIC

B. Key to Subdivision of XERIC

1) Soils in which the MCS is dry in all parts for more than 90 consecutive days during the four months following the summer solstice — DRY XERIC

2) Other soils with xeric moisture regime — TYPIC XERIC

C. Key to Subdivision of USTIC

1) Soils with an iso-temperature regime in which the number of consecutive days that the MCS is completely or partly moist when the soil temperature at 50 cm depth is more than 8°C, is as follows:

   a) less than 180 — ARIDIC TROPUSTIC

   b) 180 or more but less than 270 — TYPIC TROPUSTIC

   c) 270 or more — UDIC TROPUSTIC

2) Other soils with an ustic moisture regime, but not with an iso-temperature regime

   a) soils in which the MCS is dry in all parts for more than 45 consecutive days during 4 months following the summer solstice, and where the MCS is moist in all parts for more than 45 consecutive days during 4 months following the winter solstice — XERIC TEMPUSTIC

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*All requirements are assumed to occur in most years (at least six out of ten).

b) other soils where the MCS is moist in all parts for more than 45 consecutive days during 4 months following the winter solstice, and where the MCS is not completely dry for more than 45 consecutive days during 4 months following the summer solstice

WET TEMPUSTIC

c) other soils where the MCS is dry in all parts for more than 45 consecutive days during 4 months after the summer solstice, and is not moist in all parts for more than 45 consecutive days during 4 months following the winter solstice

DRY TEMPUSTIC

d) other soils

HAPLIC TEMPUSTIC

D. Key to Subdivision of UDIC

1) Soils in which the MCS is completely moist during the whole year

CONTUDIC

2) Other soils with iso-temperature regime in which the MCS is dry in some or all parts for

a) less than 30 cumulative days — MINIMAL TROPUDIC

b) 60 or more cumulative days — MAXIMAL TROPUDIC

c) other soils — MEDIUM TROPUDIC

3) Other soils in which the MCS is dry in some or all parts for

a) less than 30 cumulative days — MINIMAL TEMPUDIC

b) 60 or more cumulative days — MAXIMAL TEMPUDIC

c) other soils — MEDIUM TEMPUDIC

Appendix 3

List of Correspondents

Dr. G. N. Alcasid, Jr.
Director, Bureau of Soils
Department of Agriculture
P.O. Box 1848
Manila, PHILIPPINES

Mr. M. Billaux
Centre Arabe pour l'Etude des
Zones Arides
B.P. 2440
Damascus, SYRIA

Dr. S. W. Buol
North Carolina State University
Department of Soil Science
Box 5907
Raleigh, NC 27607

Mr. Tom Cochrane
Centro Internacional de Agricultura
Tropical
Apartado Aereo 6713
Cali, COLOMBIA

Dr. Juan Comerma
CENIAP
Apartado Postal 4653
Maracay 200 Est. Aragua
VENEZUELA

Dr. R. Dudal, Director
Land & Water Development Division
FAO, Viale delle Terme di
Caracalla
00100 - Rome, ITALY

Dr. H. Eswaran
Soil Management Support Services
P.O. Box 2890
Washington, DC 20013

Dr. Klaus W. Flach
Associate Deputy Chief Natural
Resource Assessments
Soil Conservation Service, USDA
P.O. Box 2890
Washington, DC 20013

Dr. Waldo Espinoza Garrido
S. Irrigacao-CPAC/EMBRAPA
P.O. Box 70.0023
Planaltina - DF, BRAZIL

Dr. R. L. Guthrie
International Soils Program Staff
P.O. Box 2890
Washington, DC 20013

Dr. G. M. Higgins
Soil Resources, Management and
Conservation Service, FAO
Via delle Terme di Caracalla
00100 - Rome, ITALY

Dr. Ray F. Isbell
CSIRO
Private Bag, Townsville, QLD
AUSTRALIA

Dr. M. L. Leamy
Soil Bureau, Dept. of Scientific
and Industrial Research
Private Bag
Lower Hutt, NEW ZEALAND

Mr. W. Luzio
Facultad de Agronomia
Universidad de Chile
Casilla 1004
Santiago, CHILE

Dr. L. Moncharoen
Soil Survey Division
Department of Land Development
Bangkhen, Bangkok
THAILAND

Dr. F. R. Moormann
Soils Department RUU
P.O. Box 80.021
3508 TA Utrecht
THE NETHERLANDS

Dr. R. S. Murthy
National Bureau of Soil Survey
and Land Use Planning
Seminary Hills
Nagpur-440006, INDIA

Dr. A. Osman
Director, Soil Science Division
The Arab Center for the Studies
of Arid Zones & Dry Lands
P.O. Box 2440
Damascus, SYRIA

Dr. A. Pecrot
Soil Resources, Management and
Conservation Service
FAO, Viale delle Terme di
Caracalla
00100 Rome, ITALY

Dr. G. D. Smith
Koning Albertlaan, 218
9000 Ghent, BELGIUM

Dr. W. G. Sombroek
Director, International Soil Museum
P.O. Box 353
Wageningen 6140
THE NETHERLANDS

Dr. R. Tavernier
Geological Institute
Krijgslaan 271
9000 Ghent, BELGIUM

Dr. A. Van Wambeke, Chairman
Professor of Soil Science
Department of Agronomy
Bradfield Hall
Cornell University
Ithaca, NY 14853 USA

Dr. John Williams
Senior Research Scientist
Division of Soils-Davies Laboratory
Private Bag, Townsville, QLD
AUSTRALIA

Enclosure V

Papers Submitted by Staff of SMSS for International Meetings

1. Eswaran, H., A. Osman, and M. Iliawi. 1980. Mineralogy and Micromorphology of Aridisols. Submitted to the 3rd International Soil Classification Workshop. Damascus, Syria.

2. Eswaran, H., N. Daud, and Nik Mokhtar. 1981. Extractable Aluminum in Some Acid Sulfate Soils of Peninsular Malaysia. Submitted to the 2nd International Symposium on Acid Sulfate Soils, Thailand.

3. Eswaran, H., and R. Tavernier. 1981. Genesis and Classification of Oxisols. Submitted to the Conference on Soils with Variable Charge, New Zealand.

4. Paramanathan, S., and H. Eswaran. 1981. Morphology of Oxisols. Submitted to the Conference on Soils with Variable Charge, New Zealand.

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Enclosure VI

Budget for Soil Management Support Services
PASA Ag/DSB-1129-5-79

September 15, 1979, through September 30, 1980

1. Technical Assistance	Cost ($,000)
Personnel Compensation (24 p.m.)* (including benefits)	90
International Travel (16 trips, 4-6 wk each) (including per diem)	60
Domestic Travel (6 trips, 1 wk each)	4
Seminar, workshop, etc. (1) (to develop training package--held in LDC)	40
Laboratory Analysis (200 samples)	10
Publications (4)	6
Overhead	42
TOTAL	252

*p.m. - person months

2. Technology Transfer

Item	Cost ($,000)
Professional Staff	
Soil Scientist, Director (12 p.m.)	44
Soil Scientist, Research (12 p.m.)	38
Temporary (High Level Specialists) (16 p.m.)	76
Support Staff (16 p.m.)	18
Travel - international (8)	17
Travel - domestic (4)	3
Workshop - international (1)	75
Laboratory Analysis (150)	15
Publications (2)	10
Overhead	59
TOTAL	355

3. Projection for 3 years ($ thous.)

	FY 79	FY 80	FY 81
Technical Assistance	252	365	400
Technology Transfer	355	355	400
TOTAL	607	720	800

Senegal

ENCLOSURE VIIa

Date: June 23, 1980

From: James E. Bower
Consultant Agronomist/Soil Scientist
P. O. Box 1245
Victoria, TX 77901

Subject: Senegal Fuelwood Production Project, 685-0219
Soil Management Support Services
PASA AG/DSB-1129-5-79

To: Dr. Tejpal S. Gill
SMSS Project Monitor
DS/AGR/TSWM
U. S. Agency for International Development
Washington, D. C. 20523

Under USDA/FAS Contract No. 53-319R-0-123, dated March 30, 1980, two phases of work, relative to the Senegal Fuelwood Production Project, have been pursued during the respective periods: March 30 - April 19, 1980 and May 15 - June 23, 1980. Work under this contract may now be considered complete.

Reference is made to my report and memorandum dated April 18, 1980 to AID/DS/AGR/TSWM. This was a record of Phase I activities and addressed itself to the following issues:

1. Consultant's report to AID/DS/AGR/TSWM after completion of the specified reconnaissance work trip to Senegal.
2. A proposed plan of action to comply with the request for assistance by USAID/Dakar, including alternatives to rationalize certain constraints.
3. The response to specific pre-program questions about program formulation.
4. Consultant's plans and recommendations for fulfillment of contract obligations and for attainment of Project Paper goals relative to an overall Soil Resource Inventory.

A record of Phase II activities and recommendations is attached.

James E. Bower

Attachment

cc: Richard L. Guthrie, International Soils Program, USDA/SCS
John D. Hyslop, Technical Assistance Officer, USDA/OICD
David Shear, Director, USAID Mission, Dakar, Senegal
David Gibson, Co-Manager, Senegal Fuelwood Project, Thies, Senegal

SENEGAL FUELWOOD PRODUCTION PROJECT

685-0219

SOIL MANAGEMENT SUPPORT SERVICES

PASA AG/DSB-1129-5-79

Report of Team Leader: June 23, 1980

James E. Bower
Consultant Agronomist/Soil Scientist

The object of this record is to provide a summary of work activities of the Soil Survey Team in Phase II operations of the Soil Management Support Services of the Senegal Fuelwood Production Project.

It is desirable that a record be made of total progress toward the end-point of a complete inventory of soil resources for all lands of the Bandia Forest that will be selected for plantation, as the operation of the Project becomes realistic during a first year of plantation. Therefore, the body of descriptive information and the interpretive documents, developed in this initial survey work and made a part of the Project for interim project development, are itemized, as a point of departure for any on-going soil resource mapping that may be provided under any additional PASA.

Finally, this report will outline the important needs of the Project, pursuant to specific plans of the Project Paper and relative to any general resource inventory. The Survey Team Leader's recommendations for future action are included.

SCOPE OF WORK - PHASE II

The objectives of team work for Phase II of Soil Management Support Services were precisely as detailed in the Team Leader Report of April 18, 1980, as is excerpted, following:

"PROPOSED PLAN OF ACTIVITY: Phase II (about 30 man-days)

These proposals aim to provide the minimum assistance needed to the Project in advance of the July 1980 planting season, while complying with current contract specifications:

1. Enter-on-duty, Senegal Fuelwood Production Project O/A May 20, 1980; or as soon thereafter as USAID/Dakar notifies USAID/Wash.

that panchromatic base photos are delivered to the project.

2. Execute a program of soil sampling and analysis in first priority activity.
3. Make a General Soil Map (from reconnaissance field work) at scale 1:50,000.
4. Provide a General Soil Map Survey Legend with brief descriptions: about 22 mapping units (both CPCS and Soil Taxonomy Classification Units.)
5. Consult with Project Managers in the selection of those areas for plantation development, following the characteristics of soil-sites desirable for research analysis, in the amount of at least 3,000 ha.
6. Make very detailed soil surveys at scale 1:5,000 on all areas planned for July 1980 plantations (300 - 750 ha.)
7. Provide narrative documentation for Very Detailed Soil Surveys:

   -General Soil Description
   -Table of Estimated Soil Properties
   -Tables of Soil Interpretation: Soil Ratings for Woodland Uses
   -Results of Laboratory Analysis, as available"

TEAM PERSONNEL AND TENURE

Team leadership was provided by James E. Bower, USDA Consultant Agronomist/Soil Scientist. His tenure of contract assignment under PASA AG/DSB-1129-5-79 included the periods: March 30 - April 19, 1980 and May 15 - June 23, 1980 and comprised an aggregate of 48 in-country days.

A second team member was James H. Brown, USDA/SCS Soil Scientist, Alabama State Office, who performed specialized field mapping, soil classification and tropical soil correlation. His in-country work comprised the 23 day period, May 19 - June 10, 1980.

GENERAL APPROACH TO PROJECT INVENTORY

Reference is made to the program rationale of the Phase I Report, April 18, 1980:

FINDINGS
PLAN OF SOIL SCIENCE ASSISTANCE
PROPOSED PLAN OF ACTIVITY

In summary, whereas the Project Paper specified that the Bandia Forest of about 10,000 hectares be surveyed in high detail at scale 1:5,000, it was ascertained on reconnaissance that much of the Project lacked soils of good potential for forest plantation and that maximum efficiency could be gained by a general inventory at reconnaissance scale to locate the areas of highest potential for exploitation and by an inventory at detailed scale on soils selected for plantation.

The sequence of inventory involved, as a first priority, the development of a General Soil Map at scale 1:50,000, and, as a second priority, the detailed survey at scale 1:5,000 of areas selected for early development and plantation. The job of selecting the particular soils for chemical analyses and the actual sampling was a progressive activity, evolving from decisions during the course of progressive mapping.

TEAM ACCOMPLISHMENTS

1. A General Soil Map, scale 1:15,000, was developed and exists only as a hand-drawn original on photomosaic base. This photomosaic base is derived from Project contracting and is the only photo base map available for the Project. At scale 1:15,000, it is unsuitable as an operational work map because of excessive dimensions.

   A hand-drawn edition of the General Soil Map, scale 1:100,000 was produced in multi-copy and is suitable for interim use in making land appraisals.

   A General Soil Survey Legend was provided; it comprises 15 named mapping units, which are defined by taxonomic unit composition.

2. Soil maps of Very Detailed Intensity, scale 1:5,000, were produced for about 450 hectares in block mapping on individual photo field sheets. The area comprises all land that will be used for 1980 plantations and nearby blocks of land having good potential for future development. These surveys are located in the Project Soil Survey File and are available for operational use. A Soil Survey Legend is provided and includes 10 mapping units.

3. Other supporting documents and interpretive tables are a part of soil survey files and include the following:

a. Legend of Taxonomic Units - 20 in number.

Brief soil descriptions
Taxonomic classification: CPCS (1967) System
Taxonomic classification: USDA Soil Taxonomy

b. Tables of Physical and Chemical Characteristics of Taxonomic Units.

c. Soil Ratings for Woodland Production Potential.

d. Definitions of Terms and Classes used in description and narration.

e. Bibliography.

4. The program of soil sampling was executed according to plan. On June 13, 1980, under a memorandum request of that date, 20 soil samples, representing horizons from 7 key soil series, were presented for analyses to the Science Laboratory, ORSTOM, Dakar-Hann. The soil samples were accompanied by a letter of direction, detailing charge procedures and the disposition of results of analyses. On that occasion, M. Pechant, Chef de la Laboratoire, was contacted, and the objects of analyses and desired procedures were clarified.

   The expected date for availability of analytical results is August 15, 1980.

5. In a final action, taken to insure a full comprehension by Project personnel of soil surveys and interpretive materials in hand, a Project tour and field study was made by Party Leader and Co-Project Manager David Gibson. Examples of the important soils were observed, and the use of the soil resource inventory was explored for the purpose of making decisions relative to the choice of forest land for future development. The features of the General Soil Map were explained, and several areas of moderate and high potential forest land were evaluated on site.

CONCLUSIONS AND RECOMMENDATIONS

It is useful to review the recommended plan of soil science assistance of the Planning Report, April 18, 1980 and to re-state that the total job of providing very detailed soil surveys for an area of 3,000 hectares was not scheduled under the PASA covering this block of assistance.

The wisdom of this choice, in hindsight, is more apparent than ever because of several contributing factors. Field surveys are not performed optimally in the thoroughly dry soils of the summer months; the time frame in advance of prohibitive monsoon rain storms was marginal; the delivery to the Project of contracted aerial photographic coverage is still incomplete, and the panchromatic coverage in hand is inadequate for necessary photo interpretations; and any physical base map of the Project area has not been developed for planning and plotting uses.

The following recommendations for on-going soil management support services to the Project represent a valid need, may be realistically attained, and attempt to comprehend the constraints mentioned in the previous paragraph.

1. Production of Project Base Map

   The need exists for a line-drawn, physiographic map at scale 1:50,000 containing physical data: project boundary, roads, drainage patterns, and villages.

   The necessary items for preparing such a map have been forwarded to Richard I. Guthrie, International Soils Program, USDA/SCS/WASH: photomosaic sheets (4) at scale 1:15,000, containing Project delineations, roads, towns, available small-scale geophysical maps of IGN, Paris, etc.

2. Production of a General Soil Map, Bandia Forest Survey

   The need exists for a cartographically-reproduced map at scale 1:50,000. The base data for producing the General Soil Map have been forwarded to Mr. Guthrie and include work-draft delineations on photomosaic sheets (4) at scale 1:15,000 and a legend of mapping units with brief definitions.

3. Addition Soil Survey Assistance

   A planimetric measurement of general soil delineation yields the following estimated Woodland Suitability data, assuming a total inventory base of 10,000 hectares:

Woodland Production Potential	Area (ha)
High	645
Moderate	2,780
Low	5,575
Very Low	1,000
	10,000

Of the 450 hectares of very detailed soil surveys presently in hand, an estimated 350 hectares have high potential.

From the data, it appears that the Bandia Forest does not include land of exploitable potential greatly in excess of 3,000 hectares. Therefore, it is recommended that an additional area of land in suitable parcels be surveyed at scale 1:5,000 using the General Soil Inventory to guide the selection. A total of 3,500 - 5,000 hectares should be scheduled in a consultancy of about 30 to 45 man-workdays.

It is recommended that surveys be scheduled during the period November through January, 1980 - 81 for optimal accomplishments. A pre-requisite to any further soil survey programming is the certain availability for field use of the contracted photo field sheet series of the Bandia Forest in Infra-red Positive Prints.

PERSONNEL INTERVIEWED IN TECHNICAL CONSULTATION

Senegal Fuelwood Production Project, Thies (PARFOB)

MM. David Gibson, Project Co-Manager
B. Sidibe, Project Co-Manager
I. M'Baye, Project Adjoint
Ms. Carol Stoney, Forest Management Specialist

Office de la Récherche Scientifique Outre-Mer, Dakar-Hann (ORSTOM

MM. Monnet, Director, Science Laboratory
Loyer, Pedoloque
Pechant, Chef de la Laboratoire
Mme. Reversat, Ecologist

National Center for Forestry Research, Dakar (ISRA/CNRF)

MM. Dietti, Forestry Administrator
Roussel, Research Forester

National Center for Agronomic Research, Bambey (CNRA)

MM. S. Diatta, Director, Soil Studies
M. Niang, Pedologue
B. Diop, Service Documentation
A. Diouf, Bibliothecaire

MM. C. Charreau, ICRISAT, Dakar
M. LaVoie, Director, Teledyne Geotronics, Dakar-Hann
M. Allen, Laboratory Technician, Teledyne Geotronics, Dakar

ENCLOSURE VIIB

EMBASSY OF THE
UNITED STATES OF AMERICA

USAID/Senegal
B.P. 49
Dakar

July 11, 1980

Mr. James Brown
USDA/SCS
Auburne, Alabama

Dear James:

First I would like to thank you on behalf of myself and all the other project personnel for your contribution to the Senegal Fuelwood Production Project. The survey that Mr.Bower and yourself were able to accomplish will be of inestimable value and utility during this year's planting season and throughout the life of the project.

Secondly, we were very sorry to hear about a couple of unfortunate incidents that occurred towards the end of your stay here. I hope that you did not leave Senegal with a bad impression, as we are trying to arrange for a final consultancy to complete the soil study, and if possible we would like for you to participate in it.

We are continuing with site clearing still, as the rains have held off since that first shower that we had while you were here. We think we may get 150 ha of plantations established this season. That's a great deal less that what we had originally planned, but it's at least a beginning. We will have been able to iron out all the difficulties involved in project start up by then as well, so that next year things should go much more smoothly and we will be able to make up for time lost.

In order to begin site preparation for the 1000 ha of plantations that we are planning to complete by the end of next year however, we will need to extend the soil survey to a much greater area. In order to reach our goal of 3000 ha of fuelwood plantations by the end of four years, we will need much more of the kind of detailed soil type information that you have already supplied.

We are requesting another PASA grant therefore, in the hopes that one more consultancy can be arranged that will provide us with all the necessary data. I hope you will agree with us in regard to the need for additional assistance and that you will be able to advise people in Washington as to the best means for accomplishing it. We also hope that you would be interested in returning to help with an expanded survey. Thank you again.

Sincerely,

Dave

David Gibson

ATTACHMENT VIIIa

Universidad Nacional Experimental
de los Llanos Occidentales
Ezequiel Zamora

VICE-RECTORADO DE PRODUCCION AGRICOLA

Guanare, 02 de Octubre de 1980

211

LA UNIVERSIDAD QUE SIEMBRA

Dr. Hari Eswaran
Consultant
International Soils Program
U.S. Department of Agriculture
P.O. Box 2890
Washington D.C. 20013
U.S.A.

Dear Dr Eswaran

I have received a copy of the Proceedings of the Second International Soil Classification Workshop. The presentation of the material is excellent. The papers together with the Tour guide are a valuable contribution to the knowledge on - Tropical Soils. The copy will be included in our university library.

UNELLEZ

Sincerely,

Richard Schargel

Richard Schargel
Jefe Programa Recursos Naturales Renovables

RS/mgdea.-

Antiguo Convento de San Francisco. Guanare, Estado Portuguesa

ENCLOSURE VIIIb

Our Ref. D.17/07.00/(110)

Soils & Analytical Services Branch,
Department of Agriculture,
Swettenham Road,
KUALA LUMPUR.

27th September, 1980.

Dr. H. Eswaran,
Consultant,
International Soils Program,
Soil Conservation Service,
US Dept. of Agriculture,
P.O. Box 2890,
Washington, D.C.
20013 USA.

Dear Dr. Eswaran,

Thank you very much for the two volumes of the Proceedings of the Second International Soil Classification Workshop.

It was indeed a pleasure and an honour for us in Malaysia to be hosts to such a gathering. We are thankful to all concerned especially USAID without whose assistance the Workshop would not have been possible.

The Workshop allowed us to better understand the finer points of Soil Taxonomy and we look forward to more such gatherings. We are also glad to hear of the International Soils Program of the USDA-SCS and we hope that a closer band between soil scientists can be forged through the Program.

Regards

Yours sincerely,

Paramanantham

(DR. S. PARAMANANTHAN)
Section Head,
Soils & Analytical Services Branch,
Department of Agriculture,
Kuala Lumpur.

SP/rs

ENCLOSURE VIIIc

CSIRO

DAVIES LABORATORY—DIVISION OF SOILS

UNIVERSITY ROAD, TOWNSVILLE. (PRIVATE MAIL BAG, P.O. ~~TOWNSVILLE, QLD. 4810~~) *Aitkenvale. Qld. 4814. Australia.*

TELEPHONE 79 4855. TELEX 47181. TELEGRAMS CORESEARCH TOWNSVILLE.

RFI:cjm

OC1/32

29th September, 1980.

Dr. Hari Eswaran,
International Soils Program,
USDA Soil Conservation Service,
P.O. Box 2890,
WASHINGTON. D.C. 20013.
U.S.A.

Dear Hari,

This is to acknowledge receipt of the two volumes of the 2nd International Soil Classification Workshop. It is a first class job. At some stage, I may wish to purchase additional copies for several of our libraries in CSIRO, could you let me know sometime where purchases may be made and at what cost?

I was interested to see that you are presently employed by the USDA, is this a permanent appointment? If so I will be interested to hear your duties.

I guess I will see you in New Zealand next year. Until then.

Best wishes,

RAY ISBELL

this knowledge on their own soils. Compounding this problem is the fact that until recently there has been no common soil classification system used internationally. A common and universal soil classification system has been much in need to serve as an international language for information exchange and technology transfer between countries, especially the LDC's. Soil Taxonomy, published by the Soil Conservation Service of USDA in 1975, is now playing this role as an international language for information exchange on soils.

In August 1979, the United State Agency for International Development (USAID) entered into an agreement with the United States Department of Agriculture (USDA) to assist developing countries in the transfer of technology through a common classification system. Through a Participating Agency Service Agreement (PASA), with the office of International Cooperation and Development (OICD), the Soil Management Support Service (SMSS) has been created in USDA.

Dr. Richard Guthrie served as acting Director of SMSS during the first year of the activities of SMSS. Dr. Hari Eswaran has now been appointed as the Program Leader and together with the Soil Chemist, Dr. John Kimble, and Secretary, Miss Phyliss Wigginton, form the Staff of SMSS. An International Advisory Panel (enclosure 1) with Dr. A. Van Wambeke of Cornell University, as chairman, has been formed to advise the SMSS.

Dr. Klaus Flach of USDA-SCS is the Prinicpal Investigator and Dr. Tejpal Gill of AID is the Project Monitor.

II. Project Description

A. Goal:

Increased food production and conservation of soil resources in LDC's.

B. Purpose:

To provide (1) field support assistance to AID and LDC's on soil management programs and (2) a mechanism to improve Soil Taxonomy for the tropical and subtropical regions.

C. Objectives:

1. Techical Assistance

Provide technical assistance personnel to AID and LDC's to assist national staffs in problem identification, evaluation of opportunities and development of new ideas in the subject area of soil survey, land use, land use planning, and soil conservation.