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Soil Management Support Services



TRAINING BROCHURE



To Request Assistance

To request assistance or obtain more information about Soil Management Support Services (BST-1229-P-AG-2178) ask your AID Mission or write to:

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Soil Management Support Services

GOAL

To increase food production through improved land resource management in the developing nations.

PURPOSE

To develop the prerequisites for soil conservation, soil fertility, and soil-based agrotechnology transfers among tropical and subtropical countries.

OBJECTIVES

1. To provide technical assistance to the Agency for International Development (AID) and to less developed countries (LDCs) in problem identification, evaluation of opportunities, and planning and utilization of land resources, especially in the subject areas of soil survey, soil conservation, and soil fertility and management.
2. To develop worldwide linkages for the more efficient utilization of agricultural information for crop production.
3. To improve the potential of soil survey interpretation for agricultural development in LDCs.

4. To refine Soil Taxonomy for intertropical areas and to assist LDC scientists in its application to agrotechnology transfer from one tropical region to another similar region.

What is SMSS?

SMSS, or Soil Management Support Services, is a project of the Agency for International Development (AID) implemented by the Soil Conservation Service (SCS) of the U.S. Department of Agriculture (USDA) to provide technical assistance to developing countries in soil survey, soil classification, and the use and management of soils.

SMSS was started for a period of three years in October 1979, and in October 1982 it received an extension of another five years. Its work is guided by an international advisory panel which provides broad guidelines for operations and monitors the general progress of the project.

The central staff of the project consists of a project leader, a soil management specialist, and a soil chemist. The project office is at the national headquarters of SCS in Washington, D.C., while the soil chemist works at the National Soil

Survey Laboratories of SCS at Lincoln, Nebraska. This pamphlet provides information on the SMSS training program, the International Forums.

Assistance Available from SMSS

Help in conserving and managing vital soil resources is available to countries on request through SMSS. The SMSS project is designed to:

1. Provide short-term technical assistance in soil surveys, land-use planning, and soil conservation and management, primarily in tropical and subtropical countries; and to
2. Increase the transfer of soil management technology by revising and updating Soil Taxonomy (the system of soil classification used by the U.S. Department of Agriculture) to classify tropical and subtropical soils more accurately.



Assessments of less developed countries (LDCs) have repeatedly drawn attention to the lack of personnel at all technical levels, not only for making and interpreting soil resource inventories but also for supporting production oriented research. The training of key personnel from LDCs to provide competent technical support for research, development, and production activities in their respective home countries is a priority function of Soil Management Support Services (SMSS). Their training programs are designed to create a multiplier effect, with personnel trained by SMSS in turn conducting their own training courses within their own countries. Another function of SMSS with respect to training is to produce training packages and assist whenever possible these secondary training activities.

"A nation's success in extending the agricultural revolution to all its regions will depend in large part on its ability to produce substantial numbers of people who understand national goals and objectives, who command basic farming skills, who are well grounded in agricultural science and technology, and who are oriented to act fast."

S. Wortmann and R. W. Cummings (1978)

Objectives

GENERAL

The training program of SMSS (hereinafter called Forums) is designed to develop staff at LDC institutions who will, to varying degrees, initiate and provide assistance for appropriate research in the development and utilization of agrotechnologies. These staff people will also have the capability to receive technologies developed in similar or related agro-environments, to assist in the modification of technologies to suit local conditions, and to extend these technologies to the farmers.

SPECIFIC

- To have land-use planners and other users of soil resource inventories become aware of how Soil Taxonomy can be used for agricultural development through agrotechnology transfer.
- To enable soil scientists to become proficient in the use of Soil Taxonomy for making and interpreting soil resource inventories.
- To inform persons in agricultural research about soil survey, soil classification, and the kinds of information



Participants of the VIII Forum evaluate a soil in the Jordan Valley.

that could be derived from soil resource inventories.

- To enhance the quality of teaching soil science in agricultural universities and to enable all workers in soils to exchange information and experience.

As indicated by the objectives, the Forums present a unique opportunity for

senior technical personnel in agriculture, in other government agencies, and in the private sector (those concerned with soil as a resource) to obtain a detailed introduction to Soil Taxonomy—an internationally used soil classification system—which will enable them:



A lecture session at the III Forum in Cameroon.

- To understand basic literature pertaining to soil properties in terms of an internationally known classification system;
- To be effectively involved in soil surveys and to be able to use soil survey information;
- To actively participate in the transfer of agrotechnology both internationally and within the country.



'Tender loving care.' A critical component in Chinese agriculture.

The Need

The goal of every nation in its endeavor to seek self-sufficiency in food and fiber production is to improve and sustain the productivity of its soils. In the last few decades, there has been tremendous investment in agricultural research, and great strides have been made in the development of new technologies. Plant breeders have bred and are continuing to develop new cultivars, many of which tolerate specific soil conditions, such as moisture stress and soil acidity. This agromomic research has caused yields of many

crops to increase dramatically. However, the science of matching crop requirements to soil conditions is still in its infancy. How can we relate information on crop requirements to units delineated on a soil map, or, conversely, how can we better use soil survey information? These questions require more thought.

In many countries, lack of personnel, time, and money prevent research results from being applied. An infusion of information from agro-ecologically similar environments is an immediate partial solution to helping the farmers of these



A rural farmer with his sacks of potatoes in Lahore, Pakistan. A success story in soil management.

countries. One basic requirement for agrotechnology transfer (the taking of an agricultural innovation from its site of origin to a new site where it is likely to succeed) is knowledge of the soil resources of the country. To effect the transfer, a common knowledge is necessary, and Soil Taxonomy—a soil classification system

used in more than 60 countries—serves this purpose.

The soil resource of a nation is one of its greatest assets. It must be managed so that its productivity is the best and at the same time it must be conserved to form a resource base for the generations to come. This calls for a discriminatory use of soils

which in turn requires a reliable resource inventory and an appreciation of soil potentials and constraints. Soil surveys provide such an inventory and soil research provides the basis for their optimal use and management. All local, national, and even regional agricultural planning should be based on soil resource inventories. Every country has some kind of resource inventory, but these vary in scale, terminology, quality, and the methodology with which they were made. From the point of view of regional cooperation and collaboration, it will be useful to rectify this situation and work toward standardizing inventory techniques and approaches. This forms the rationale behind the International Forums of SMSS.

The International Forums

The International Forums or training courses are an integral part of the activities of SMSS. The Forums thus far organized or planned for the near future are:

No.	Year	Country/Region
I	1980	Fiji; S. Pacific
II	1981	Morocco; N. Africa
III	1982	Cameroon; W. Africa
IV	1983	Thailand; S.E. Asia
V	1983	Papua New Guinea; S. Pacific
VI	1983	Costa Rica; C. America
VII	1984	Philippines; S.E. Asia
VIII	1984	Jordan; Middle East
IX	1984	Guam; S. Pacific
X	1985	Rwanda/Burundi; C. Africa
XI	1985	Zambia; Southern Africa
XII	1985	Pakistan; Asia
XIII	1985	Tunisia; N. Africa
XIV	1986	Philippines; Association of South-East Asian Nations (ASEAN)
XV	1986	Western Samoa; S. Pacific

The number of participants at each Forum varies from 40 to 75. As a rule, all persons working on soils are welcome to attend but sometimes logistics require that numbers be limited.



Participants are from different parts of the world, but their desires are the same - to increase agricultural production in their countries.

The academic qualification for attendance is a bachelor's degree in agriculture, sciences, or geography. Holders of diplomas in agriculture, and extension agents who do not have formal university education, could attend if they have worked for a soil survey or agricultural institute for at least five years.

The language of instruction is generally English, but French and Spanish courses have been given. The duration of the course is usually two weeks but sometimes this has been extended to three weeks. An outline of a program is provided elsewhere; in most cases the courses are tailored to suit local needs and conditions.

SMSS only coordinates the Forums. The host-country institutions are responsible for the organization and all local logistics. They also publish the proceedings of the Forum.

Cost-sharing is crucial to the success of the Forums, and fortunately many national, regional, and international organizations support SMSS's efforts.

Collaborators of the SMSS Forums are shown in the following list. Collaborating institutions also provide resource persons who lend a range of experience and expertise to the Forums.



Professor Tavernier, of Belgium, serves as a resource person in some of the Forums.

Collaborations on SMSS Forums

Forum

No. Collaborating Institutions

- I. University of South Pacific, Fiji
Department of Agriculture, Fiji
South Pacific Council, New Caledonia
Soil Bureau, DSIR, New Zealand
ORSTOM, France
USAID/Suva
- II. Institute National Recherche Agronomique, Morocco
University Hassau II, Morocco
University of Ghent, Belgium
FAO, Rome
Arab Centre for the Studies of Arid Zones and Dry Lands, Syria
Benchmark Soils Project, University of Hawaii and University of Puerto Rico
USAID/Rabat
- III. Institute National Recherche Agronomique, Cameroon
Benchmark Soils Project, University of Hawaii and University of Puerto Rico
FAO, Cameroon
ORSTOM, France
USAID/Yaounde

Collaborations (Continued)

- IV. Department of Land Development, Thailand
IBSNAT, University of Hawaii and University of Puerto Rico
FAO, Rome
Rubber Research Institute of Malaysia
Other Thai Organizations
USAID/Bangkok
- V. Department of Primary Industries, PNG
IBSNAT, University of Hawaii and University of Puerto Rico
Soil Bureau, DSIR, New Zealand
Soils Division, CSIRO, Australia
University of South Pacific, Fiji
USAID/Suva, American Embassy, PNG
- VI. CATIE, Costa Rica
CIAT, Columbia
Kellogg Foundation, USA
University of Costa Rica
ROCAP/San Jose
- VII. PCARRD, Philippines
IRRI, Philippines
USAID/Manila
- VIII. Department of Agriculture, Jordan
ACSAD, Syria
University of Jordan
USAID/Jordan
Near East Bureau, AID/W
- IX. University of Guam, Guam
University of South Pacific, Fiji
ACIAR, Australia
Commonwealth Foundation, Great Britain
GTZ, West Germany
USAID/Suva
- X. Carte Pedologic Rwanda
Ministry of Agriculture, Rwanda
Ministry of Agriculture, Burundi
Universiti Burundi
BADDC, Belgium
USAID/Kigali
USAID/Bujumbura
- XI. Department of Agriculture, Zambia
University of Zambia
NORAD, Norway
BADDC, Belgium
USAID/Lusaka
- XII. Soil Survey of Pakistan
National Agriculture Research Center, Pakistan
FAO/Rome
Fauji Fertilizer Company, Pakistan
National Fertilizer Corporation, Pakistan
USAID/Islamabad
- XIII. Department of Agriculture, Tunisia
ACSAD, Syria
University of Ghent Belgium
ORSTOM, France
USAID/Tunis
Near East Bureau, AID/W
- XIV. Ministry of Agriculture and Food, Philippines
Bureau of Soils, Philippines
PCARRD, Philippines
ACIAR, Australia
USAID/Manila
- XV. University of South Pacific, Western Samoa
University of South Pacific, Fiji
Soil Bureau, New Zealand
ACIAR, Australia
South Pacific Agriculture Research and Development, Western Samoa
USAID/Suva
-
- AID/W - Agency for International Development (Washington)
ACIAR - Australian Centre for International Agricultural Research
ACSAD - Arab Center for Studies of Arid Zones and Dry Lands, Syria
BADDC - Belgian Administration for Development Cooperation, Belgium
CATIE - Centro Agronomico Tropical de Investigacion y Ensenanza, Turrialba
CIAT - Centro Internacional de Agricultura Tropical, Cali, Colombia
CSIRO - Commonwealth Scientific and Industrial Research Organization, Brisbane, Australia
DSIR - Department of Scientific and Industrial Research, Lower Hutt, New Zealand
FAO - Food and Agriculture Organization, United Nations, Rome, Italy
GTZ - Deutsche Gesellschaft fur Technische Zusammenarbeit, Frankfurt, Federal Republic of Germany
IBSNAT - International Benchmark Sites Network for Agrotechnology Transfer
IRRI - International Rice Research Institute, Manila, Philippines
NORAD - Norwegian Agency for International Development, Norway
ORSTOM - Office de la Recherche Scientifique et Technique d'Outre-Mer, Paris, France
PCARRD - Philippine Council for Agriculture and Resources Research and Development, Manila, Philippines
PNG - Papua, New Guinea
ROCAP - Regional Office for Central American Program, (USAID)
USAID - United States Agency for International Development, Washington, D.C.

How a Forum is Organized

Requests for holding a Forum originate in a country. The director of agriculture or the head of a soils institution must write to the country USAID Mission indicating interest in organizing such a Forum and requesting assistance from SMSS. If the Mission concurs with the request, they cable the Project Monitor of SMSS, Dr. Raymond Meyer of the Bureau for Science and Technology, Office of Agriculture, Department of Renewable Natural Resources (S&T/AGR/RNR). In some instances, the USAID Mission might itself be interested in organizing a Forum.

On receiving such a request and after evaluating the feasibility of organizing such an activity, the project leader of SMSS visits the country for preliminary discussions. Many individuals and institutions are contacted to appraise the needs and determine the standards. This is a necessary step as each Forum is tailored to the country's or region's needs. At the end of this visit, a calendar of activities is drawn up.

The lead time for a Forum's organization is a year to 18 months. During the first visit, with the assistance of local soil scientists, a program for the field tour is



Soils are described and sampled a year in advance.

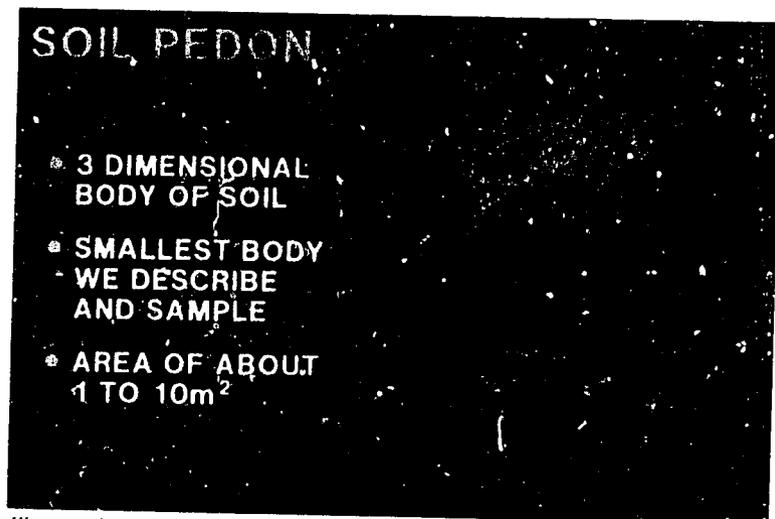
devised. The field tour is usually six to eight days and every detail is considered. About 20 sites are identified, and a few months later a soil scientist from the U.S. Soil Conservation Service (SCS) is dispatched to assist the local soil scientists in sampling the soils. Pits are dug to a depth of 2 meters or more, to rock or to a water

table, and sampled in detail. The samples are sent to the SCS laboratories in Lincoln, Nebraska, for detailed analysis. The local institutions are also asked to perform all the analyses so that an interlaboratory crosscheck can be made. From the day of arrival of the samples in Lin-

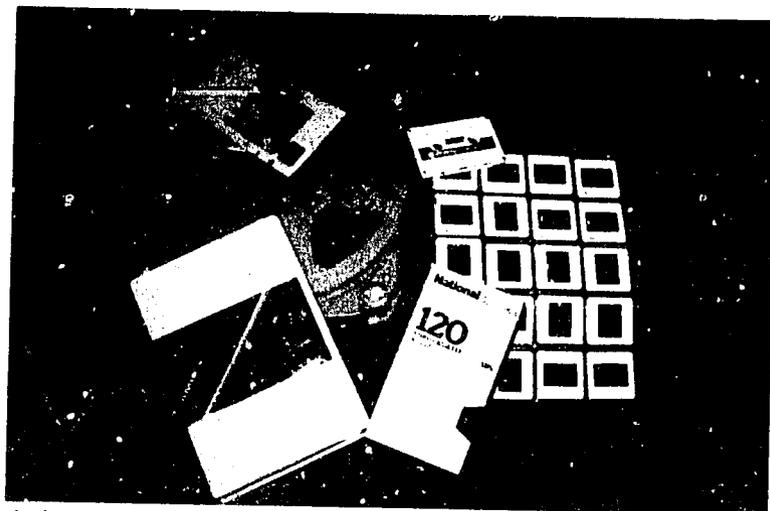
coln, it takes about a year for completion of the analyses.

During this period, resource persons are selected, participants are identified, and potential sponsors are contacted. The host institution prepares a tour-guide with the data provided by SMSS.

SMSS provides the training materials—books, color charts, and so on. SMSS also provides the travel and per diem of the foreign resource persons. The host country is responsible for the costs of the participants.



Illustrated concepts to facilitate learning.



Audio visual materials enhance quality of teaching.

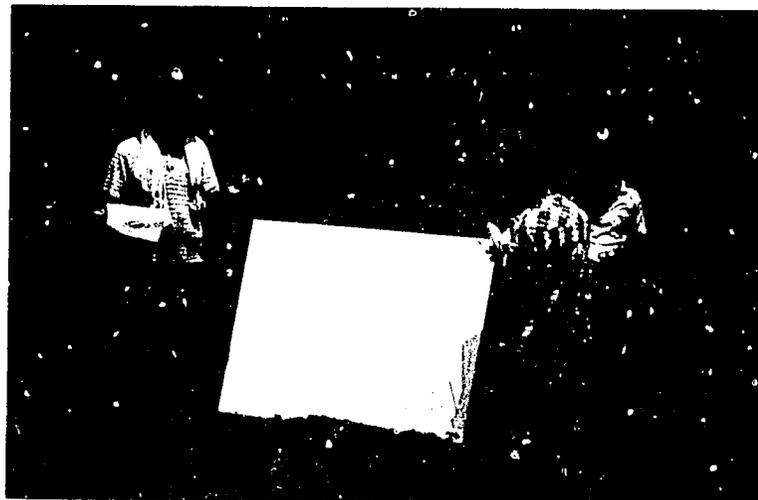


Monographs supplement teaching.

Example of a Forum Program

PROGRAM July - August, 1985

- Sunday 14 Participants arrive and register
- Monday 15
- Opening Ceremony**
- 08.30 Member of the Central Committee,
Hon. Reuben Kamanga
Program Leader, SMSS, Dr. Hari Eswaran
Minister of Agriculture and Water Development
Hon. Gen. Kingsley Chinkuli
- 09.30 Break
- Technical Session I**
- 10.00 Role of soil surveys in agricultural development programs
Rudy Dudal
- 10.45 Soil fertility evaluation in relation to soil survey
Arnor Njs
- 11.30 Soil Taxonomy: A technical language of soil science (A film)
Hari Eswaran
- 12.00 Purpose of the Forum
Hari Eswaran
- 12.30 Lunch
- Technical Session II**
- 14.00 Principles and logic of Soil Taxonomy
Stanley Buol
- 15.00 Structure of Soil Taxonomy and nomenclature
Rene Tavernier
- 16.00 Break
- 16.30 Diagnostic surface horizons
Hari Eswaran
- 17.30 Diagnostic subsurface horizons: cambic, argillic, kandic
Frank Moormann
- 18.30 Adjourn
- Tuesday 16
- Technical Session III**
- 08.00 Diagnostic subsurface horizons: oxic, spodic, albic
Stanley Buol
- 09.00 Diagnostic subsurface horizons: calcic, petrocalcic, gypsic, petrogypsic, salic
Rudy Dudal
- 10.00 Break
- 10.30 Other diagnostic features
Hari Eswaran
- 11.30 Soil moisture and temperature regimes
Rene Tavernier
- 12.30 Lunch



Dr. Ron Yeck explains chemistry of rice soils at the VII Forum.



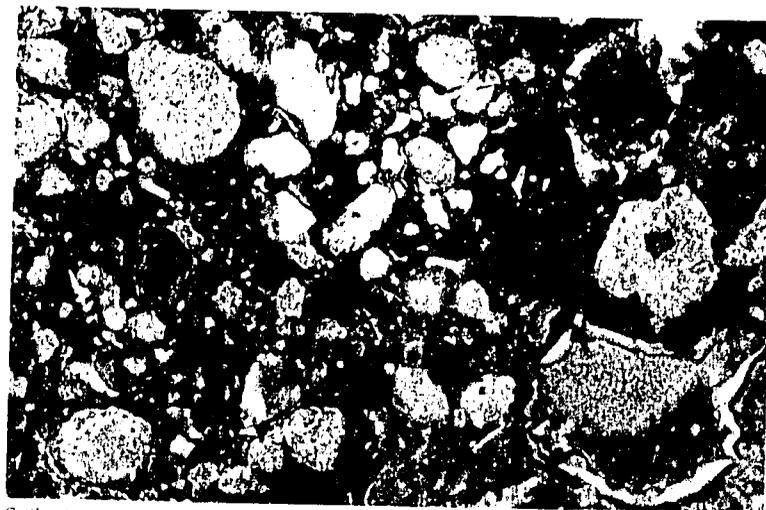
Remote sensing techniques, an integral tool in soil surveys.

Example of a Forum Program (Continued)

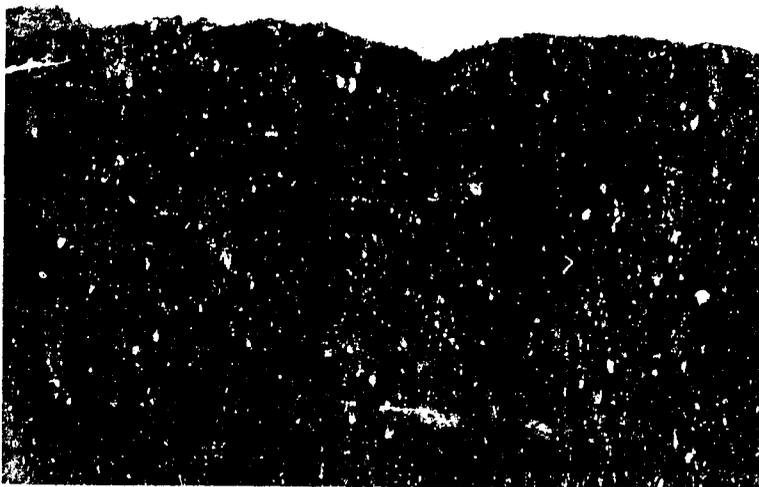
	14.00	Histosols Rudy Dudal
	15.00	Spodosols Rene Tavernier
	16.00	Break
	16.30	Allisols Frank Moormann
	17.30	Ultisols Fred Beinroth
	18.30	Adjourn
Wednesday 17		Technical Session IV
	08.00	Oxisols Hari Eswaran
	09.00	Inceptisols Rene Tavernier
	10.00	Break
	10.30	Mollisols Stanley Buol
	11.30	Vertisols Rudy Dudal
	12.30	Lunch
	14.00	Entisols Frank Moormann
	15.00	Aridisols Stan Buol
	16.00	Break
	16.30	Soil Families Hari Eswaran
	17.30	How to classify? Stan Buol
Thursday 18		Technical Session V
	08.00	Chemical analyses for Soil Taxonomy Jim Cheatle
	09.00	Charge characteristics of soils in the tropics Goro Uehara
	10.00	Break
	10.30	Mineralogy of soils in the tropics Hari Eswaran
	11.30	Micromorphology of soils of the tropics Hari Eswaran
	12.30	TROPISOILS Dhurmond Grove
	01.00	Lunch



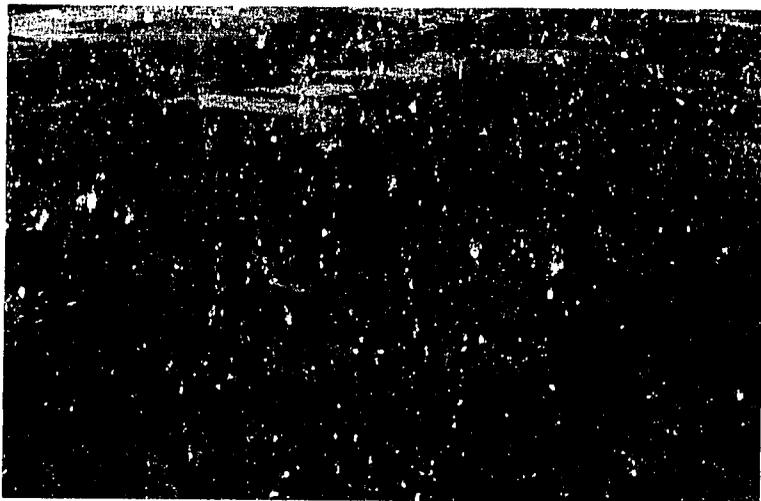
Morphological evaluation, a first step in understanding soils.



Soil micromorphology, a tool to understand genesis and effects of management.



Erosion. How do we handle fragile land?



Our goal: Sustained production and conserving the resource for future generations.

Example of a Forum Program (Continued)

	Technical Session VI
	14.00 Geology of Zambia Otto Spaargaren
	14.45 Climate of Zambia Maurice Muchinda & Otto Spaargaren
	15.30 Vegetation of Zambia Wen Ting-tiang & Chiyabwe
	16.15 Break
	16.30 Soils of Zambia Robert Magai
	17.15 Land use in Zambia Joseph Mutelo
	18.00 Land evaluation in Zambia Wietze Veldkamp
	18.45 Adjourn
Friday 19	Field trip I Lusaka to Kasama. Lunch at Kundalila Falls
Saturday 20	Field trip II Misamfu Research Station Pedon no. 1 (Misamfu) Pedon no. 2 (") Pedon no. 3 (") Soil Productivity Research Project
Sunday 21	Field trip III Kasama to Mbala Pedon no. 4 (Mbala) Afternoon: touristic Return to Kasama
Monday 22	Field trip IV Kasama to Mpika Pedon no. 5 (Mpika) Integrated Rural Development Project
Tuesday 23	Field trip V Mpika to Kabwe Pedon no. 6 (Mkushi)
Wednesday 24	Field trip VI Pedon no. 7 (Kabwe) Kabwe to Mpongwe Pedon no. 8 (Mpongwe) Return to Kabwe

Example of a Forum Program (Continued)

Thursday 25	Field trip VII Kabwe to Kafue, Mazabuka Pedon no. 9 (Liteta) Lunch at Lusaka Pedon no. 10 (Kafue)
Friday 26	Field trip VIII Kabwe, Mazabuka to Livingstone Pedon no. 11 (Magoye)
Saturday 27	Field trip IX Pedon no. 12 (Kabuyu) Afternoon: touristic
Sunday 28	Field trip X Livingstone to Lusaka Pedon no. 13 (Mochipapa)
Monday 29	Technical Session VII 08.00 Principles of Agrotechnology Transfer Goro Uehara 09.00 Application of systems analyses for agricultural research and transfer Goro Uehara 10.00 Break 10.30 Crop modelling research in Zambia Vernon Chinene 11.30 The Benchmark Soils Project Goro Uehara 12.30 Lunch 13.30 Field trip XI Visit to IPSNAT site, UNZA Farm Pedon no. 14
Tuesday 30	Technical Session VIII 08.00 Adequacy of Soil Surveys Armand Van Wambeke 09.00 Land evaluation Rudy Dudal 10.00 Break 10.15 Fertility capability classification Stanley Buol 11.00 Fertility evaluation of soil Obed Lungu 11.45 Evaluation of soil physical properties Jacques Lenvain 12.30 Lunch 13.30 Field trip XII Pedon no. 15 (York Farm, Makeni) Visit to Mount Makulu Central Research Station

Example of a Forum Program (Continued)

Wednesday 31	Technical Session IX 08.00 Agronomy of maize David Mbewe 09.00 Agronomy of sorghum Stephen Hallgren 10.00 Break 10.30 Agronomy of Soy-beans E. Javaheri 11.30 Agronomy of rice Qasam 12.30 Lunch 14.00 Agronomy of wheat Narayan Sisodia 15.00 Agronomy of sunflower Val Elands 16.00 Break 16.30 Agronomy of groundnuts Kelly 17.30 Relationship between plant pathogens and soils Plant Protection Section 18.30 Adjourn
Thursday 1	Technical Session X 08.00 NORAD's Technical Assistance Program Erik Berg 08.30 ABOS' Technical Assistance Program Jacques Lenvain 09.00 USAID's Technical Assistance Program 09.30 LABEX Program of the International Soil Reference and Information Centre (ISRIC) Pieter van Reeuwijk & Otto Spaargaren 10.00 Break 10.30 Panel discussion on "Making soil survey information more relevant and useful" Panel: Dr. R. Dudal Dr. E. Moorman Dr. R. Tavernier Dr. E. Beinroth Dr. S. Buol 12.30 Lunch 14.00 Forum evaluation (Reports of four participants) 15.00 Forum recommendation 16.00 Break 16.30 Closing ceremony

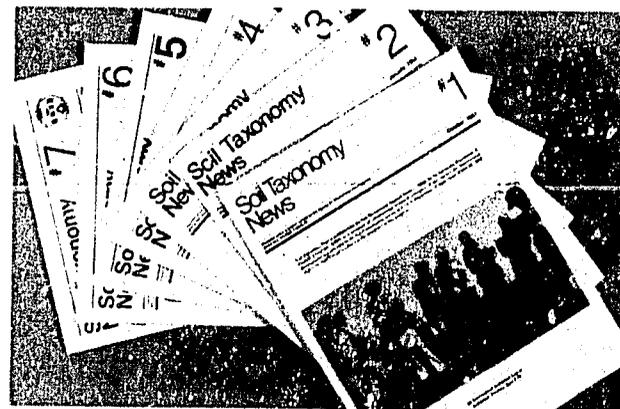
Feedback and Follow-up

Selected papers presented at the Forum are compiled as the proceedings. In addition, the descriptions and analytical data of the soils of the field tour, with additional information on fertility and management, are compiled as a monograph with the general title "Benchmark Soils of. . . ."

Participants are encouraged to maintain contact with SMSS and resource persons. SMSS distributes its newsletter and other publications. SMSS staff, on visits to the countries, have discussions and site visits with former participants. Some of the Forum participants are invited to attend other activities of SMSS such as workshops, symposia, or soil correlation trips. Some are also invited as resource persons in other Forums. After the Forum, some countries organize their own in-service courses using training materials provided by SMSS.



A proceeding records the discussions at the Forum.



A newsletter for international communication.

"These Forums will be and continue to be the most effective means of exchanging experience between countries of the ASEAN region."

Dr. Modesto Recel
Philippines

"The Forums not only stimulate the use of Soil Taxonomy but provide the basis for quality soil resource inventories in Africa."

Dr. Robert Magai
Zambia

"SMSS, through its Forums and technical assistance programs, has furthered the cause of agriculture in Oceania."

Hon. Ricardo J. Bordallo
Governor of Guam