SDSU-RSI-83-09

Land Classification/Soil Survey Project of the

SYRIAN ARAB REPUBLIC

VOLUME 8

Land Classification and Soil Survey
Training Program

October 1982

Prepared for

United States Agency for
International Development
and the
Syrian Arab Republic

Prepared by

Louis Berger International, Inc.
East Orange, New Jersey, U.S.A.

Remote Sensing Institute
South Dakota State University
Brookings, South Dakota , U.S.A.

and the
Ministry of Agriculture and Agrarian Reform
Directorate of Soils

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SYRIAN ARAB REPUBLIC

volume 8

Land Classification and Soil Survey Training Program

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Contract AID/NE-C-1644

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1 ACKNOWLEDGEMENTS*

The staff at the Remote Sensing Institute express their appreciation to the various Ministries of the Syrian Arab Republic who provided the opportunity of working with their scientists in the training program. The Syrian Arab Republic Government (SARG) is to be complimented for their enthusiasm for assessing the resources of The Republic to develop a program for realization of their potential. The U.S. Agency for International Development provided support for the project under contract AID/NE-C-1644.

Professionals from the Departments of Plant Science, Animal Science, and Chemistry of South Dakota State University and from the Geology Department of the South Dakota School of Mines and Technology were the prime instructors for the training course. Their dedication to their discipline and their positive attitudes in technology transfer are commended. These attributes indicate their true professional spirit. A multitude of non-South Dakota State University consultants were involved with the training program. We express our gratitude for their support which allowed the Syrian Visiting Scientists to broaden their knowledge base and to establish scientific contacts in the United States.

All of the staff of the Remote Sensing Institute, especially those of the Visiting International Scientist Program (VISP) are commended for their dedication to the program and for offering the Visiting Scientists their full understanding and support during their brief period of residence in South Dakota. Mr. Victor Myers, Campus Coordinator, Dr. Bruce Worcester, initial Syrian Program Manager and Mr. Haluk Yuksel, Second Program Manager, are commended for their efforts on the project and are thanked for their coordinating efforts for the trainee's benefits.

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*Prepared by Dr. Donald G. Moore, Assistant Director of the Remote Sensing Institute and Head of International Programs at the Remote Sensing Institute, South Dakota State University, Brookings, S.D., U.S.A.

2 BACKGROUND

A program to provide a reconnaissance survey of the soil and land use of the Syrian Arab Republic (SAR) was cooperatively implemented by SARG and the United States Agency for International Development (USAID) through contract to Louis Berger International, Inc. (LBII), and under subcontract to the Remote Sensing Institute (RSI), South Dakota University (SDSU). The program utilized satellite remote sensing as a cost-efficient and modern mapping tool; thereby, training and technology transfer were inherent within the project. The survey was to assure that appropriate multistage sampling techniques be employed so that resulting map products would be of high quality and accuracy. The survey would emphasize renewable sources and would culminate in the production of specific thematic resource maps, (i.e. soil, vegetation, land capability, etc.,). The maps would be useful as a planning guide to any future SARG resource development projects implemented to optimize benefits derived from human and financial inputs.

The development of skills of remote sensing as a resource mapping and monitoring tool useful to the scientists and technicians of SARG could be continually utilized as required for monitoring of land surface changes associated with development. Technologies such as computerized geographic information systems would be transferred to SARG and their staff would be trained for continued use of the techniques.

To accomplish these goals, a staff of U.S.experts, who were experienced in resource mapping using remote sensing techniques, would be in residence in Syria. A group of SARG resource scientists and technicians would cooperate as counterparts in the planning, execution, and summarization of the surveys. This group was to include eighteen SARG Staff who have had training and experience in soils, land use, irrigation and other resource disciplines. They would be in residence in the United States for six months of training in their respective disciplines. The training program would include a brief introduction to remote sensing. Training was to be practical and responsive to the needs of the survey. A brief introduction to the concepts of air photo interpretation and remote sensing would be presented, but the U.S. part of the training would concentrate primarily on specific discipline topics such as U.S. methods of soil fertility analysis, the U.S. system of soil classification, etc.

The remote sensing technology transfer would start with a brief introduction to the basic theory while the trainees were in the U.S. The practical use of the technology, emphasizing Landsat data, would follow in the actual mapping phases. Therefore, interpretation maps prepared in the U.S. by the trainees would become a basis for field investigation after the Visiting Scientists returned to Syria for updating and final mapping unit delineations. This approach would require that all Visiting Scientists remain on the project in an active status to benefit from the remote sensing training.

This report summarizes the Visiting Scientists' experiences during training, the U.S. contacts at institutions other than South Dakota State University, and the evaluation of performances and skill development of the Visiting Scientists as a result of the training activity. A section of the report is devoted to the appropriateness of the training approach.

3 INTRODUCTION

3.1 REPORT TIMING

In keeping with the objectives agreed between SARG and USAID, the role of the Remote Sensing Institute was to offer training and to provide project leadership in conducting and documenting the surveys. The field surveys were in progress at the time of this report generation so they will be mentioned only in the context of what should occur as originally planned and not what did in fact result at the end of project.

3.2 ABOUT REMOTE SENSING

Remote sensing using satellite data as a base map and interpretation aid has proven to be an excellent technique for small-scale mapping of large areas. The sensors aboard the orbiting satellite electronically record a pulse of energy which relates to the reflectance of the land surface. These recordings have been archived and are available for all regions of the world through the EROS Data Center, Sioux Falls, South Dakota. The present Landsat satellite series, which was used for this investigation, has a capability to record data in various spectral regions. Certain of the spectral regions are more appropriate for specific resource interpretations than others. Therefore, the multispectral capability offers a unique set of data that has use in many and varied mapping programs. As an example, the reflective infrared spectral regions reveal high spectral contrast between water and soil or vegetation. To map the occurrence and position of lakes or rivers, this infrared spectral region has advantages. A spectral band emphasizing the visible red relates to differences in vegetation since this spectral region contains the chlorophyll absorption band. Since the satellite data have been used in numerous mapping projects, many generalizations such as these are available to aid the user. This multispectral capability is in contrast to the typical aerial photograph which records incoming energy over the majority of the visible light region on panchromatic film (Note: this film is not sensitive to the infrared spectral region). The spectral sensitivity to land surface changes is often not as apparent on these films that record the wide spectral band and which are not sensitive to the reflective infrared spectral region.

However, interpretation of the satellite images is accomplished just as interpretation of the traditional aerial photography. Image elements of tone, texture, pattern, and association are used to delineate homogeneous areas of land surface. The multispectral satellite capability along with other sensor characteristics often permit ease of interpretation. Since the satellite data are of smaller image scale, certain of the land surface features cannot be resolved. Therefore, a major effort in training is to draw upon the trainees traditional skills in photo interpretation and to relate them to advantages and disadvantages of satellite data.

Satellites provide a synoptic view. Where small-scale maps are required covering areas as large as SAR, image map base costs are dramatically reduced by acquiring the few Landsat images rather than hundreds of aerial photographs necessary for coverage of the area. Spatial integrity is maintained with the standard product satellite images in that the mapping features are within most mapping standards at the 1:1,000,000 or 1:500,000 scales. Aerial photography must be mosaicked using expensive procedures and surveys for ground control. This advantage of large-area coverage with near-precision geometry by each satellite scene (185 km x 185 km) offers a unique cost and time savings.

Satellites provide a repetitive source of data such that changes in land surfaces occurring over time, (i.e., during droughts, seasonal differences, solar illumination changes, with land or water development programs) can be efficiently monitored. Therefore, even after the survey of SAR associated with the present project is completed, the technology will be useful in future efforts. These may include larger scale surveys, continued monitoring of change, use of the computerized storage and analysis of the data by automated techniques, as well as other programs requiring repetitive and recent information. These as well as other characteristics of satellite technology offer a unique data source which is being used for various mapping and monitoring activities in most parts of the world. The technology is appropriate for the range from developing countries to highly developed countries when a need exists to acquire resource information over large areas quickly. Even for countries as established as SAR, an appropriate resource map was evidently not available as evidenced by the need for mapping as defined in this project.

Often concentrated development occurs in small regions of cultural/historical importance where resources permit. These areas are mapped and monitored extensively in extreme detail. Regions of inaccessibility are often not adequately mapped even at small scales. To gain perspective of the highly developed areas as well as remote regions, a synoptic mapping procedure at a common scale and legend can provide valuable planning and management information. Remote sensing using satellite technology can help serve this need.

The Landsat data can be and are being used for mapping at relatively large scales (1:24,000 or 1:50,000). This requires extensive digital processing equipment in contrast to the use of the simplist but standard photo interpretation equipment for standard image analysis. The data are recorded and can be spectrally analyzed as 1.1 acre (0.4 hectare) picture elements. This type of approach allows maps to be produced at scales of 1:24,000 or smaller. This approach is worthwhile considering that SAR future efforts will not only serve this specific project but can be of advantage either for future larger scale mapping efforts or for change analysis.

Since large quantities of data and information can be produced quickly using remote sensing approaches, a method to archive and analyze such data is developing in the remote sensing community. This method, commonly termed "computerized geographic information system", uses the computer to store and analyze data and to produce output products. The computer system retains spatial integrity of the map data and has the ability to store data of varying scales and levels of detail. Maps or combinations of maps of thematic resource information can be prepared quickly and accurately allowing decision makers a methodology to evaluate and document various results from variations in development strategies.

3.3 COMMON SURVEY METHODOLOGY

This section details the typical methodology for completing a large area, reconnaissance survey making full use of remote sensing methodology. This section is presented to set the stage for the topics of training considered appropriate for the on-going project. Steps are altered depending upon the level of detail of survey, the resources to be surveyed, and the individual surveyor's method. However, for the discussion in this report they are generalized as follows:

1. Determine the ultimate use for which survey products are required

2. From the information needs for the intended use, define the level of accuracy and the level of detail required in map products.

    a. scale

    b. minimum mapping unit size and level of cartographic accuracy

    c. resource classification detail (i.e., Level I, II, III or IV vegetation classification)

    d. form of final product (i.e. whether spatial data as a line map product are required or statistics are required)

    e. types of resources to be mapped

    f. required accuracy of resource information

3. Survey available resource information.

4. Define mapping legends.

5. Construct phenologic calendars if vegetal land cover is present.

6. Select map base - in this case Landsat data are to be used. Selection must be in reference to optimal spectral interpretation - commonly two dates of imagery are procurred.

7. Preprocess data using photographic or computer approaches.

8. Prepare base mosaic at appropriate mapping scale.

9. Prepare field sheets of larger scale than the final mapping scale.

10. Conduct aerial visual reconnaissance of region (or as alternative work with resource scientists who are familiar with the terrain).

11. Delineate polygons of apparent homogenous landscape regions.

12. Synthesize all available resource documentation to estimate mapping unit composition.

13. Conduct appropriate ground and aerial observations to finalize mapping unit delineations.

14. Conduct field studies of each mapping unit describing the resources (whether they are soils, vegetation, geology, hydrology, other or a combination of all themes).

15. Collect appropriate samples in the field for laboratory analyses.

16. Conduct laboratory analyses.

17. Compile resource mapping unit delineations on the base map.

18. Draft final legend.

19. Conduct accuracy evaluation.

20. Produce maps, statistics, and descriptions as final report and map products with given accuracy estimates.

21. Transfer map and legend into either a computer geographic information system or analog map separate form.

22. Develop required thematic interpretations of map products as required for intended use.

3.4 TRAINING NEEDS FOR ON-GOING SAR PROJECT

Section 3.3 outlined the complexity of the survey operation. Since the SAR survey was to be an integrated resource analysis, several scientific disciplines were required. The project was defined assuming that a critical mass of staff required training in both their respective disciplines and in the application of remote sensing approaches. The decision was to send a multi-disciplinary team to a U.S. university for non-academic intensive training in their respective discipline for a period of six months. A brief introduction to the basics of remote sensing would be presented during this period. The training would continue after their return to SAR throughout the activities of the project as guided by the U.S. experts stationed in Damascus.

Training in a discipline was to emphasize those practical activities required for the survey. Theory would not be emphasized other than that required to fulfill survey needs. Such topics as the use of the U.S. system of soil or plant taxonomy, typical U.S. manufactured equipment, U.S. quality standards, and U.S. accepted mapping methodologies should be addressed. Secondly, the development of professional contacts for future reference was to be emphasized. Since resources in South Dakota do not exactly parallel those in SAR, these additional contacts should emphasize professionals from the arid lands in the western U.S.

While the survey is being conducted, the most appropriate training is "on-the-job" since remote sensing is a practical mapping tool. A brief introduction to Landsat technology basics (Note: this is only a small portion of the technology of remote sensing) should be provided. Laboratory image interpretation of data covering SAR should be emphasized and preliminary maps for field checking produced. The training should continue as field efforts in SAR for analysis of the images and correlation to ground features.

4 DEFINITION OF TRAINING PROGRAM

4.1 GENERAL

For a full complement of the SARG program in terms of SARG staff counterparts, the following disciplines were selected. A total of 18 SARG resource scientists were determined to be sufficient to provide adequate input to program activities. Please note that these definitions were documented in the Project Paper prior to project implementation by the Remote Sensing Institute. The anticipated group composition is provided in Table 8-1

A program was defined for each discipline group as a general monthly outline in "Proposed Training Summary for Syria", December 1979. That program defined that all 18 SARG scientists should be in residence in the U.S. at the same time. This would allow maximum efficiencies in use of facilities and personnel. Office space would be provided on the campus of South Dakota State University and living would be in apartments in the City of Brookings. All but one of the scientists would stay in Brookings during the major activity due to the availability of professional University staff. The hydrogeologist would reside in Rapid City at the School of Mines and Technology (approximately 640 km from Brookings).

The core curriculum would include a one week orientation, two weeks of remote sensing, and the remainder as laboratory classroom, or field activities in their respective disciplines. Example cost-of-living data were provided to the Syrian project manager and presumably to the Syrians along with an explanation of per diem structures. Outlines of training topics and anticipated schedules were documented in the December 1979 report to identify those areas that the University professional staff felt most appropriate for training topics. These were discussed with the SARG scientists prior to their departure for the U.S. Timing was critical so that the field efforts in training could be accomplished during the warm period in South Dakota.

4.2 ADMINISTRATION

The method of program administration was such that South Dakota State University had technical responsibility and Louis Berger International Company had administrative responsibility to assure travel, per diem, trainee cost-of-living stipends were available in a timely and auditable manner. Secondly, since conflicts in understanding can potentially arise, RSI requested that one individual be assigned leadership and administrative responsibilities for the group of Syrians. All negotiations concerning their program would be conducted with their team leader.

5 PROGRAM IMPLEMENTATION

5.1 GENERAL

The trainees who were selected and in-residence in South Dakota are listed in Table 8-2.

According to the contract, the entire group of scientists selected for training was scheduled to participate at the RSI as a single group. Arrangements within the VISP were made accordingly. However, the group was actually split into three groups which greatly impacted the overall effectiveness of the training program.

During January of 1980, 23 candidates were interviewed and 17 selected for inclusion in the VISP. It was apparent at that time that selection of the computer trainee would present a problem. His training was scheduled to begin in early fall, 1980. The SARG finally approved 10 of the proposed trainees and they did not depart for the RSI until May, 1980. The remaining seven were enrolled in USAID language training full time to correct English language comprehension deficiencies. They finally departed in October 1980 for training at the RSI. The computer trainee did not begin training until February, 1982. This delay and division of trainees had the effect of diluting the training program by placing a strain on the budget and time allowed for training.

5.2 PROGRAM OUTLINE

A program was designed specifically for each group. Again the program duplication caused by the group being divided was a problem. However, within the scope of resources available, the best possible program was offered. The following provides a brief outline presenting topics which were covered for various groups. Not all trainees were offered the same opportunities since climate, unavailability of professionals, and other problems limited the potential offerings.

5.2.1 REMOTE SENSING

SESSION 1 July 14 - Monday

0815 - 0825 - Registration
0825 - 0830 - Welcome to Workshop - Donald G. Moore
0830 - 0835 - Welcome to RSI - Victor I. Myers
0835 - 0845 - Workshop Overview - Janet Gritzner
0845 - 1045 - Principles of the Electromagnetic Spectrum: Its Land Interaction and Remote Measurement - Stan A. Morain
1045 - 1115 - Break
1115 - 1215 - The Landsat System - Stan Morain
1215 - 1330 - Lunch Break

SESSION 2

1330 - 1500 - The EROS Program Connection - Bill Draeger
1500 - 1530 - Break
1530 - 1630 - Image Formats and Basic Image Interpretation - Stan A. Morain

SESSION 3 July 15 - Tuesday

0900 - 1030 -	NASA Satellite and Research Program - John E. Estes
1030 - 1100 -	Break
1100 - 1200 -	Fundamentals of Image Interpretation - John E. Estes
1200 - 1330 -	Lunch Break

SESSION 4

1330 - 1430 -	Vegetation Information Extraction Techniques Using Landsat MSS Data - Cliff Harlan
1430 - 1500 -	Break
1500 - 1600 -	Cost Comparison of Aircraft versus Satellite: Land-Use Example - John E. Estes.

SESSION 5 July 16 - Wednesday

0830 - 0915 -	The Use of Probability Sampling for Crop and Livestock Estimates - Robert Schulte
0915 - 1045 -	Elements of Image Resolution - Stan A. Morain
1045 - 1100 -	Break
1100 - 1145 -	Multistage Sampling - Robert Heller
1145 - 1315 -	Lunch Break

SESSION 6

1315 - 1400 -	Digital Extraction of MSS data - Ken Langren
1400 - 1445 -	Implications of Geometric Accuracy of Landsat MSS Data for Mapping - Everett Wingert
1445 - 1515 -	Break - Group Picture
1515 - 1600 -	Small Format Aerial Photography for Vegetation Mapping and Monitoring - John Taylor

SESSION 7

0900 - 1000 -	Vegetation Analysis for Fire-Fuel Management - Mike Consentino
1000 - 1045 -	Use of RBV Landsat Data for Base Maps - Anthony Lewis
1045 - 1115 -	Break
1115 - 1200 -	United Nations and Remote Sensing - Joseph Lintz
1200 - 1300 -	Lunch Break

SESSION 8

1330 - 1415 - Application of Remote Sensing in Arid Zones - David Mouat
1415 - 1500 - Remote Sensing Applications for Latin America - Roland D. Mower
1500 - 1530 - Break
1530 - 1615 - Digital Contrast Enhancement in Arid Lands - Merrill Ridd

SESSION 9 July 18 - Friday

0900 - 1000 - Interpretation of Landsat for Geologic Mapping - Sam Andrawis
1000 - 1030 - Break and Poster Session #1
1030 - 1115 - Understanding Color - Hall Cristman
1115 - 1200 - Image Resolution and Limits - Hall Cristman
1200 - 1330 - Lunch Break

SESSION 10

1430 - 1600 - Fundamentals and Vocabulary of Digital Image Processing - Mary DeVries

SESSION 11 July 21 - Monday

0900 - 1015 - Primer on Thermal Infrared Remote Sensing - James Heilman
1015 - 1045 - Break and Poster Session #2
1045 - 1200 - Geographic Information Systems - Jeff Eidenshink
1200 - 1330 - Lunch Break

SESSION 12

1330 - 1445 - Interpretation of Remote Sensing Data for Soil Surveys - Frederick C. Westin
1515 - 1630 - How to Conduct a Large Area Inventory - Donald G. Moore

SESSION 13 July 22 - Tuesday

0900 - 1015 - Methods for Monitoring Desertification - Kevin Dalsted
1015 - 1045 - Break and Poster Session # 3
1045 - 1200 - Desertification Analysis Using Landsat Data - Kevin Dalsted
1200 - 1330 - Lunch Break

SESSION 14

1330 - 1445 - Physiographic Analysis for Soil Surveys in Senegal Using Remote Sensing Data - Lucas van Sleen

1445 - 1630 - Cost Comparison of Landsat versus Aircraft for Soil Survey - Lucas van Sleen

SESSION 15 July 23 - Wednesday

0900 - 1015 - Primer on Radar - Stan A. Morain
1015 - 1045 - Break and Poster Session #4
1045 - 1200 - Radar Examples
1200 - 1330 - Lunch Break

SESSION 16

1330 - 1445 - Interpretation Models for Landsat Interpretations - Donald G. Moore
1445 - 1515 - Break
1515 - 1630 - Discussion and Summary by Participants

SESSION 17 July 24 - Thursday

0900 - 1200 - Multistage Interpretation Exercise of the Geomorphology of Eastern South Dakota - Janet Gritzner
1200 - 1330 - Lunch Break

SESSION 18

1330 - 1600 - Continuation of morning program

SESSION 19 - FIELD TRIP July 25 - Friday

0800 - 1200 - Ground Data Verification Exercise
1200 - 1330 - Lunch Break

SESSION 20

1330 - 1500 - Discussion of Field Experience and Workshop Review

5.2.2 HYDROGEOLOGY

Month 1. Interpretation of well locations and use of aerial photography geological maps for ground water exploration.

Month 2. Use of geological techniques and gravity, seismic, and electrical resistivity.

Month 3. Aquifer evaluation including rocks, thin section and hand specimen study of porosity and laboratory determination of sediment size, porosity and permeability.

Month 4. Water well drilling techniques and pump tests for determination of aquifer coefficients.

Month 5. Hydrologic management including stream gauging and water recorders.

Month 6. Remote Sensing Workshop and summary and evaluation of acquired skills. Preparation of a brief report documenting techniques and their applicability to Syrian programs.

5.2.3 RANGE MANAGEMENT

Month 1.

1. Audit RANG 411 Range Improvement

2. Audit RANG 321 Range Ecosystems

3. Begin literature review for paper, "Range Management Problems and Solutions in Arid and Semi-arid Developing Countries".

4. Begin work determining dry green weight and chlorophyll content of grasses grown in greenhouse using a two-channel reflectance meter with double sampling.

5. Begin learning identification and ecological characteristics of range plants of South Dakota.

6. Assist with development and preparation of equipment for experimental work to be done in the field during the summer.

7. Attend Society of Range Management (SRM) meeting - San Diego - California.

Month 2. Continue 1 through 6.

Month 3. Continue 1 through 6.

Month 4. Visit Cottonwood Research Station to lay out plots and get ready for beginning research and measures. Observe pasture planting and visit ranches.

Research work at Cottonwood. Library work on #3.

Month 5. Research at Cottonwood will involve measurement of precipitation (standard, storage and recording rain gauges), temperature and humidity (maximum-minimum thermometers, hydrothermography, sling psychrometer), total solar radiation, wind movement, evaporation, soil water (gravimetric and neutron probe), soil temperature, water runoff (stage recorders from watersheds), measurement of standing crop of vegetation (two-channel reflectance meter, vertical color stereograms, aerial photograph with light aircraft, clipping by hand, clipping with sheep shears, clipping with mower), sampling for chemical composition, total available carbohydrate composition, root standing crop, samples for nematode density determination, cattle weights, cattle utilization, characterization of canopy different range condition classes, observation of photosynthesis measures.

Month 6. Range field tour of ranches. Continue above - learn to estimate weight of vegetation and to measure vegetation change, determine range condition, stocking rate estimation.

Month 7. Continue above - spend some time with Dr. Gartner and also Dr. Johnson in field.

Month 8. Continue above - map utilization. Visit Rod Baumberger and Maurice Davis, Area Range Conservationists with SCS and Wuentin Sulzle, Bureau of Indian Affairs (BIA). Audit RANG 200, 300 and 471.

Month 9. Laboratory work on standing crop, dry green weight, chlorophyll, TAC, in vitro dry matter and protein digestibility. Continue to audit the three courses - continue #3.

Month 10. Attend meeting South Dakota section of leave SRM. Continue activities for April.

Month 11. Assist with computer processing of data collected. Continue activities for October.

Month 12. Complete #3. Write review of activities in South Dakota with critique of methods learned.

5.2.4 SOIL SURVEY

Month 1. Soil and landscape; character and purpose of soil maps and reports; types of imagery used in soil survey. Parent materials of soils.

Month 2. Landform, relief and drainage; identification and nomenclature of soil horizons; soil color; soil texture, coarse fragments, stoniness and rockiness; soil structure.

Month 3. Soil consistence; soil reaction; special formations in soils (concretions, pans) organic matter and roots; accelerated soil erosion, vegetation, land use.

Month 4. Units of soil classification and mapping; preparation for field work; plotting and assembly of field data; the soil mapping legend, plotting soil boundaries in the field; collection and examination of soil samples; estimation and mapping of salts and alkali in the soil.

Month 5. Yield predictions, soil management practices and other interpretations.

Month 6. Soil correlation; soil grouping for interpretations; reconnaissance soil mapping.

Note: Actual soil mapping started in the third month and continued throughout the succeeding months.

5.2.5 IRRIGATION SPECIALIST, PLANT ECOLOGIST, SOIL FERTILITY, SOIL LAB TECHNICIANS, AND SOIL TECHNICIANS

ACTIVITY	MONTHS 1	2	3	4	5	6
1. ORIENTATION	All					
2. OVERVIEW	All					
3. BASIC SOILS-WATER		SF, ST, SLT, IR				
4. BASIC CROPS-FORAGES		PET				
5. SOIL CLASSIF.-SURVEY		SS, ST				
6. INSTRUMENTATION		SF, ST, SLT, IR				
7. FIELD SOIL SURVEY				SS, ST		
8. FIELD PLOTS				SF, IR		
9. FERTILITY,IRRIGATION ETC.				SF, IR		
10.PASTURE RESEARCH				PET		
11.SOIL LABORATORY				SLT		
12.REMOTE SENSING AND APPLICATIONS W/FIELD TRIPS						All

IR = Irrigation Specialist (1)
PET = Plant Ecologist Technician (1)
SF = Soil Fertility (1)
SLT = Soil Lab Technician (2)
ST = Soil Technicians (7)
SS = Soil Survey (3)

5.2.6 DESCRIPTION OF TRAINING ACTIVITIES

1. Orientation -- Introduction to extension, research and teaching in crops and soils. Introduction to soil testing, seed testing and water quality testing programs.

2. Overview -- A look at the role of the experiment station, experimental farms and extension. General introduction to laboratories, classrooms, instrumentation and training activities.

3. Basic Soils and Water -- A combination of classroom and laboratory training in soil chemistry, soil fertility, physical properties of soils, water quality, irrigation and soil management. Classroom lectures will be supplemented with seminars, laboratory exercises and library reading or research.

4. Basic Crops and Forages -- Introductory crop and forage lectures supplemented with research data from the Pasture Research Center will give a good background on forage plants, ecology, and pasture management. Laboratory and field exercises will concentrate on species identification, pasture quality and interseeding.

5. Soil Classification and Survey -- Basic soil classification and survey procedures, laboratory measurements and field mapping techniques will be covered. Use of aerial photographs in soil surveys will be emphasized in laboratory exercises. Land use interpretation and soil geography will be included.

6. Instrumentation -- Trainees will be introduced to soil chemistry, soil testing and water quality instruments. The method of analysis, characteristics of the instruments and interpretation of data will be covered. Students will learn how to use the instruments and calibration procedures.

7. Field Soil Survey -- Trainees will go to the field with an experienced soil surveyor to learn mapping, geological features, and preparation of various types of maps. Aerial photographic and remote sensing techniques will be included.

8. Field Plots -- Trainees will experience the design of field experiments, plot layout and installation of field plots in fertility and irrigation research. As many field procedures as are available at experimental sites will be covered.

9. Fertility and Irrigation -- Farm fertility practices, soil test interpretations, water management, irrigation practices and pest management procedures will be included. Experimental farm and commercial farm practices will be covered.

10. Pasture Research -- Grazing trials, interseeding practices, weed control and pasture management will be covered at the Pasture Research Center and at cooperator sites across the state.

11. Soil Laboratory -- "Hands-on" experiences included testing of soil samples for farm recommendations, laboratory analyses of research samples and interpretation of laboratory results. Instrumental techniques developed in class will be applied to operational conditions.

6 CONTACTS WITH U.S. RESOURCE SCIENTISTS

Field trips and guest lecturers provide a mechanism for trainees to become acquainted with the varied terrain and resources of the U.S. Trainees can draw parallels to their similar resources in SAR. Future reference to advanced research or technique applications in the U.S. can be better understood as to its adaptability in SAR if the trainees have seen the facilities for research and have personally become acquainted with the investigators. Continuing contacts, if at a minimum through published literature, offer a unique resource to SAR on fully utilizing academic understanding of resources development and preservation as is gained by U.S. Scientists. The following are contacts gained by the various groups.

6.1 SDSU Staff

Mr. A.S. Andrawis, Research Geologist, RSI. SDSU, Brookings, SD.
Mr. R.G. Best, Associate Wildlife Specialist, RSI, SDSU, Brookings, SD.
Mr. D. Bannister, Soil Scientist, SDSU Consultant, Brookings, SD.
Dr. G. Carlson, Soil Scientists, Assistant Professor, Plant Science Dept. SDSU, Brookings, SD.
Mr. P. Carson, Soil Scientist, Professor, Plant Science Dept., SDSU, Brookings, SD.
Mr. H.T. Cristman, Research Photo Scientist, RSI, SDSU, Brookings, SD.
Mr. K.J. Dalsted, Assistant Research Soil Scientist, RSI, SDSU, Brookings, SD.
Ms. M.E. DeVries, Associate Research Scientist, RSI, SDSU, Brookings, SD.
Dr. L.O. Fine, Soil Scientist, Professor, Plant Science Dept., SDSU, Brookings, SD.
Mr. R. Gelderman, Manager of Soil and Plant Analysis Lab, Plant Science Dept., SDSU, Brookings, SD.
Dr. J.H. Gritzner, Assistant Research Geomorphologist, RSI, SDSU, Brookings, SD.
Dr. J.L. Heilman, Research Soil Physicist, RSI, SDSU, Brookings, SD.
Dr. M.L. Horton, Soil Physicist, Professor and Head of Plant Science Dept., SDSU, Brookings, SD.
Dr. W. Jensen, Inorganic Chemist, Professor, Chemistry Dept., SDSU, Brookings, SD.
Dr. A. Klingebiel, Soil Scientist, SDSU Consultant, SDSU, Brookings, SD.
Dr. R. Kohl, Soil Scientist, Associate Professor, Plant Science Dept., Brookings, SD.
Dr. D. Malo, Soil Scientist, Associate Professor, Plant Science Dept., SDSU,Brookings. SD.
Mr. D.G. Moore, Asst. Director, Head of Education and Training, Head of International Training, RSI, SDSU, Brookings, SD.
Mr. V.I. Myers, Director and Professor, RSI, SDSU, Brookings, SD.
Dr. F.A. Schmer, Assistant Director, Hydrologist, RSI, SDSU, Brookings, SD.
Dr. R. Vigil, Plant Scientist, Associate Professor, Plant Science Dept., SDSU, Brookings, SD.
Mr. M.E. Wehde, Manager Auxiliary Service, RSI, SDSU, Brookings, SD.
Dr. F.C. Westin, Soil Scientist, Professor, Plant Science Dept., SDSU, Brookings, SD.

6.2 NON-SDSU STAFF

Dr. B. Anderson, Professor of Forage, Nebraska State University, Lincoln, NE.
Mr. G. Brockmiller, Farmer, Freeman, SD.
Mr. R. Cip, Center Pivot Irrigation, Farmer, Geddes, SD.
Mr. M. Consentino, Geographer/Remote Sensing, University of California, Santa Barbara, CA.
Dr. B. Dahnke, Agronomist/Soil Scientist, North Dakota State University, Fargo, ND.

Dr. W. Draeger, Chief of Training and Assistance, EROS Data Center Sioux Falls, SD.
Dr. J. Estes, Professor of Geography/Remote Sensing, University of California, Santa Barbara, CA.
Dr. J. C. Harlan, Vegetation Research Scientist, Remote Sensing Center, Texas A and M, College Station, TX.
Dr. R. Heller, Professor of Forestry, University of Idaho, Moscow, ID.
Dr. G. Holmgren, Soil Chemist, Vermillion, SD.
Dr. G. Hoffman, Agricultural Engineer, Soil Salinity Laboratory, Riverside, CA.
Dr. R. Jackson, Soil Physicist, Tempe, AZ.
Dr. H. Jones, Program Director of Renewable Remote Sensing, NASA/Ames Research Center, Moffett Field, CA.
Mr. W. Johnson, Farmer, Geddes, SD.
Dr. K. Langren, Professor of Geography/Remote Sensing, North Dakota State University, Fargo, ND.
Dr. A. Lewis, Geographer/Remote Sensing, Oregon State University, Corvallis, OR.
Dr. Joseph Lintz, Professor of Geology, University of Nevada, Las Vegas, NV
Mr. Reed Nolte, Farmer, Wecota, SD.
Dr. S. Morain, Geographer/Remote Sensing, Technical Application Center, Albuquerque, NM.
Dr. L. Mosher, Professor of Forage Crops, Nebraska University, Lincoln, NE.
Mr. M. Monfoid, Irrigation Farmer, Springfield, SD.
Dr. D. Mouatt, Arid Lands Geographer, Arizona State University, Tuscon, AZ.
Dr. M. Mounir, Head of Plant Production Dept., Desert Institute, Cairo, Egypt.
Dr. R. Mower, Geographer/Remote Sensing, North Dakota State University, Fargo, ND.
Dr. I. Podmore, South Dakota State Chemist, University of South Dakota, Vermillion, SD.
Dr. M. Ridd, Chief of Remote Sensing, Utah State University, Salt Lake City, UT.
Mr. B. Rieckman, County Extension Agent, Charles Mix County, SD.
Dr. J. Saurez, Geochemist, Soil Salinity Lab, Riverside, CA.
Dr. J. Schubert, United Nations Consultant for Remote Sensing Center, Buenos Aires, Argentina.
Dr. J. Taylor, Professor of Range Science, Montana State University, Bozeman, MT. Commodore Tasso, CNIE, Buenos Aires, Argentina.
Dr. S. Waller, Associate Professor of Range Management.
Dr. E. Wingert, Cartographer, University of Hawaii, Honolulu, HA.

7 SUMMARY REPORTS

Each trainee was required to participate in the generation of at least one report. The objective of this was to provide a period of reflection of the activities pursued during training. Certain of the procedures presented to the trainees are applicable to SAR and certain are not. It was the task of the trainee and his/her advisor(s) to determine which of the techniques was more applicable to SARG needs. Certain of the reports present results of the photo-image interpretation. These products were made available such that field checking and updating at later phases could be completed. A listing of reports follows:

1. Baba, M.S.A. Soil Testing and Plant Analysis Methods.

2. Daya, I.A. Aerial Photography and Remote Sensing for Soil Survey and a Preliminary Landsat Study for Tartous County, Syria.

3. Deiri, H.A. and A. Jaber. Remote Sensing Study of Landsat Imagery for Damascus County, Syria.

4. Hassoon, I. A Training Report in Range Management and the use of Remote Sensing.

5. Ismayl, S. and S.S.A. Shabab. Activities and Experiences of Syrian Irrigation Engineers.

6. Jabri, A. and W. Chihadeh. A Land Use and Remote Sensing Training Report. Science and Remote Sensing.

7. Khatib, K.A. Activities and Experiences During a Six-Month Fellowship Period at South Dakota State University.

8. Safi, A. and E. Tu Ameh. A Training Report in Soil Fertility and Remote Sensing.

9. Salaymeh, H. A Training Report in the Soil Laboratory.

10. Salaymeh, H. A Remote Sensing Training Report.

11. Sarraj, B. and A. Hassani. A Remote Sensing Study by Landsat Imagery for Hama County, Syria.

12. Shari, K. A Training Report in Irrigation and Remote Sensing.

13. Terchahani. H. Ground Water Training Program for Syrian Engineers.

8 EVALUATION OF THE TRAINING PROGRAM

The basic assumptions and statement of needs of the training program are listed in Section 3 of this report. This section serves to evaluate the program as implemented to determine if the performance and skill levels of the trainees was enhanced for the project objectives by the training tasks. Certain of the training efforts cannot be evaluated at this time since they dealt with developing acquaintances of U.S. resource scientists for long term benefit. An integral part of the training activity occurred during the field survey phases. These phases are now completed and a brief section is included for that evaluation.

8.1 METHOD OF EVALUATION

Since products other than the trainees reports are not available to observe, the evaluation was conducted through questionnaires (see Attachment A) detailing pertinent skill levels which parallel with the necessary survey steps (Section 3.3). Two separate evaluations were conducted: 1) through field staff in SAR who know the trainees' capabilities prior to training and had a chance to observe their skills after return to SAR and 2) through on-campus advisors who worked closely with the trainees during their tenure in the U.S.

8.2 EVALUATION RESULTS

Data are presented in Table 8-3 documenting in column A the relative percentage change in skill level resulting from the training activity and in column B the percentage frequency response of the various advisors in the U.S. In column A, the evaluations are by in-SAR U.S. experts who had the opportunity of knowing the Visiting Scientists before and after training. The scoring was based upon relative rate of change, i.e. if the initial evaluation for "Level of Field Experience" was "Fair" and changed to "Excellent", a rating of "3" would be assigned. The ratings were summed up for all the evaluations to obtain the total. The highest score assigned was 100% and the remainder adjusted as per relative ranking. The rankings in Column B are the frequency distributions reported as percentages for evaluation of all trainees by the various advisors in the U.S. institutions.

8.3 DISCUSSION OF EVALUATION RESULTS

In reference to Table 8-3, the responses listed in Column A are those of major interest. Those items of highest increase closely paralleled those of major emphasis during the program. Such items as academic understanding of their discipline, understanding of use of instrumentation, development of skills in mapping and survey procedures, and acceptance of remote sensing as a mapping tool are those of high ranking. These are the activities that were stressed during training and are of most importance to the successful completion of the survey. Such items as attitude changes, i.e., desire to conduct field work, ability to lead projects, or attitude toward the SARG project are of interest and should be considered in the remaining effort but are not critical to the successful project completion. These lower ranking elements are more of interest after the U.S. leadership leaves SAR as to the continued enthusiasm and incentive for future application of their developed skills. A question on item 3, level of field experience, is if the evaluators were fully cognizant that certain of the disciplines were not field oriented, such as the soil laboratory technicians. The soil mappers extensively increased their field experience since at least one-half of their training was in the field. However, the evaluation of U.S. advisors was that the level of field experience was low even after training. Comments upon this topic will be further relayed in Section 9. Please note that these evaluations are totally independent of opinions of the U.S. advisors. Also note that additional field training occurred during the in-SAR survey which was completed after this evaluation was made.

The evaluation by the U.S. advisors can be generally described that the trainees were average or better in all categories according to maximum frequency occurrence. One category should be mentioned in specific, that of level of field experience. The majority of responses were average or below. Even the soil mappers were not field oriented. They excelled in the academic and laboratory studies but had difficulty in applying the information in a field environment.

An interesting observation in Column B is that the distribution typically occurs over the entire range from excellent to poor. The trainees had a broad variety of backgrounds and levels of expertise. This posed a difficulty in designing appropriate instruction since the material was far too advanced for many in the group and too elementary for others. Individualized instruction was used to the extent allowed by available resources to overcome this difficulty.

Note that a general trend followed in the U.S. evaluations. Where attitude, knowledge of basic science, desire or acceptance were contained in the evaluation, the score was higher. Where ability was contained the score was generally lower. The group had the desire to learn but had evidently not had previous opportunities to advance their skills in relationship to their desires. This created a good environment for training.

8.4 GENERAL OBSERVATIONS BY EVALUATORS

Less than acceptable English language abilities reduced the effectiveness of the program by first causing the trainees to be divided into two groups. It continued to be a hindrance during training by causing a deficiency in understanding the materials presented. This could be partially offset by a sense of dedication to the activity but this was exhibited by only a limited number of trainees. This did not appear to result from the inadequate academic or discipline background, but rather from a lack of incentive to advance professionally. To the detriment of some trainees, they were, in some cases, assigned a discipline other than that which comprised their background.

It was difficult at times to establish and maintain regular U.S. working hours. Requests were constantly forwarded to observe both U.S. and Syrian holidays and to work less than normal hours. This was particularly true when field trips were required as part of the training. Naturally, dividing the group in two also reduced scheduling of field trips because the training periods did not parallel to optimal field season periods.

8.5 THE TRAINING PROGRAM IN SYRIA

All of the trainees except the range management and computer trainee returned to Syria by late April, 1981. The training program as originally formulated was to provide a continued training in the Directorate of Soils under the supervision of the U.S. contractor specialists. The scientific areas for continued training included soils, range science, irrigation, soils, laboratory, land use, soil fertility, and computer science.

Organized classroom lectures and field trips were included in a seminar for soils trainees, and other interested technicians from the Soils Directorate, in

March, 1981. Haluk Yuksel conducted a two week soil classification and mapping seminar, and Bruce Worcester a two day remote sensing seminar for about 15 technicians. The seminars were followed by three days of field trips in which field soil survey procedures and soil classification methods were demonstrated and discussed. A considerable variety of sites representing many soil types were included in the field trip. A detailed set of notes was printed in English and Arabic for the seminar on soil classification and mapping, as a guide to the most important fundamental aspects of soil science with particular attention given to technical problems of identification, classification and mapping of soils.

A valuable segment of the soils training program included the detailed 1:25,000 scale soil survey of the Tartous-Safita area. This survey was intended as training for Syrian soil scientists who would be left with the responsibility of continuing with the detailed survey after completion of the project. Two soil scientist-trainees participated, considerably fewer than the number who started in the program as "soil mappers". Nevertheless, the detailed 1:25,000 scale soil survey and report, and training of two scientists will serve as a good beginning for this formidable task.

As is listed in Table 8.2, five "soil mapper" trainees were scheduled for the entire training program and participation in the 1:500,000 scale soil survey, the 1:100,000 scale soil survey, and the 1:25,000 scale survey. The five trainees completed the training at South Dakota University (SDSU) but only two assisted extensively with the field survey, and one female trainee assisted with office compilation of data but was not involved in field work. The training program for "soil mappers" could have been more productive if more trainees had been included in the follow-on training in Syria.

The range management, irrigation, and land use field investigations were each assigned one trainee in Syria. These trainee-technicians were, in each case, an asset to the field programs and each, it appears, benefited by receiving the field training as a supplement to the SDSU training.

The computer trainee, who was also one of the irrigation trainees, completed his computer training in August, 1982. A detailed account of that training is given in Volume 9 of this report. Training for this individual will continue for about four months in Syria after February 1, 1983, at which time the computer expert and the computer are expected to arrive in Syria.

Training in soils laboratory techniques and procedures was carried out at SDSU. This training is expected to continue at the Directorate of Soils under the direction of the soil laboratory expert, who is expected to arrive shortly in Syria. The Syria training for the laboratory trainees was delayed by the lengthy time required for receiving the new laboratory equipment which was purchased under this contract. The soil laboratory specialists are scheduled to spend two months in Syria setting up equipment and providing instruction.

The training program in Syria has been reasonably effective for those who participated. Even then, however, effectiveness of training could have been improved if those responsible in the Directorate had made training a priority program with sharp focus on continuing quality training for those who started in the program. In many cases, motivation for participation in continued training could probably have been improved if each individual had better knowledge of his or her future career possibilities. Detracting from the training program is the fact that many of the best scientist-trainees have left the Directorate for various reasons. Hopefully, those who have left for military duty will later return to the Directorate.

Obstacles to achieving the maximum benefit from continued training in Syria include (1) frequent cases of lack of motivation by trainees, (2) trainees leaving the project and/or the Directorate, (3) difficulty in getting field participation because of lack of indemnities for trainees, (4) trainees who live away from Damascus did not participate in the Syria phase of training, and (5) it was not possible for women trainees to participate in field programs.

Factors considered as plusses for the training program include: (1) Dr. Jouma Abdl Kareem, Director, and Dr. George Somy, Assistant Director, were helpful in providing assistance, as well as constructive suggestions, to the program, (2) valuable support in conducting laboratory soils analyses for the field samples was provided by Mr. Taha Delamey and his staff in the soil laboratory, and (3) those scientist trainees who were intimately involved with the field investigations were most helpful in all phases of the investigations.

9 SUMMARY AND RECOMMENDATIONS FROM TRAINING REPORT

The trainee to be instructed in the use of the computerized geographic information system has been selected and arrived in the U.S. on February 1, 1982. Equipment has been purchased by the project which will be used for information storage and map generation. The equipment is presently in the process of being transferred to the Directorate of Soils, Damascus, Syria.

As indicated by the performance evaluations, a significant increase in those skills pertinent to the Land Classification and Soil Survey of SAR Project resulted. However, the level of actual performance in relationship to project needs can only be evaluated after the project is completed. A significant portion of the practical training was completed in the field in SAR with the U.S. advisors of the survey. Since the total plan integrated the last project phases into the total training strategy, only those trainees who participated in this final phase were offered the complete program of technology transfer.

At times scheduling was a problem because of the desire of the trainees to celebrate Syrian holidays when class events were scheduled.

Language presented problems for the first few weeks for both groups. Both groups had individuals included that had such slight comprehension of written and spoken English that training was slow. We suggest that AID provide a better mechanism for screening candidates or establish higher standards. RSI has one staff member fluent (native language) in Arabic, but with a diverse group requiring specific training by many advisors, translation capability could only be provided in limited cases.

As evaluated by U.S. advisors, the group was average to good. They would not as a group be considered as project leaders but could probably perform well under the direction of an experienced project leader. They have touched upon the basics of remote sensing and can develop significant skills during the survey phase. If further projects relying upon remote sensing approaches are implemented in Syria, additional training efforts will probably be required. However, for repetitive observations using the simple analysis methods, they probably have the skill level required for project needs. Perhaps the training should have emphasized remote sensing for a longer period for a select two or three of the candidates.

A major difficulty occurred in that the original group of 18 candidates was divided into three subgroups who were in residence at three different periods. This served to dilute resources available for each group. As guest experts were available for short-term consultation, only one-half of the group could take advantage of the consultation. Secondly, the somewhat arbitrary definition of the training categories in respect to the trainees' backgrounds presented problems. The most noticeable was that the category of hydrogeology was filled by an irrigation engineer. Since the project had needs for a hydrogeology SARG counterpart, the definition of training activity was retained and filled with someone having his experience in the actual training discipline. With the individualized instruction available, the level of training material was tailored to his experience level. This resulted in graduates who had less-than-expected experience and knowledge in the end, but who did, at a minimum, increase their understanding of a discipline but often not to the level we expect of professionals in our field.

RSI considers that, even under difficult circumstances, a substantial gain in experience level was provided to SARG and to the Project. Since some of the graduating trainees are not presently assigned to the USAID Project, their gain in skills will not provide direct benefit to the Project but hopefully will provide an advantage to other SARG programs. For those who are assigned to the project, the skills should have a direct impact. Additional evaluation at the end of the present project should be conducted with evaluations of each individual prepared at that time.

TABLE 8-1
SAR Training Program Participants as Defined in the Project Paper*

Discipline	Months of Training	Number of Participants
Range Management	12	1
Soil Mappers	6	5
Soil Lab Technicians	6	3
Plant Ecologist/Agronomist	6	2
Irrigation Specialist	6	3
Hydrogeology	6	1
Soil Fertility	6	1
Soil Technicians	6	1
Mini Computer Specialist	6	1
Totals	60	18

* Please note that this was the original plan and not that implemented.

TABLE 8-2
Trainees In-Residence in South Dakota

NAME	TRAINING DISCIPLINE	DATES OF ATTENDANCE	MAJOR PROFESSOR
1. Inam El Daya*	Soil Mapping	May 5 - October 31, 1980	Dr. F.C. Westin
2. Hana Al Deiri	Soil Mapping	May 5 - October 31, 1980	Dr. F.C. Westin
3. Aiman Hassani	Soil Mapping	May 5 - October 31, 1980	Dr. F.C. Westin
4. Kheira Al Khatib	Soil Lab Technician	May 5 - October 31, 1980	Professor P. Carson
5. Said Sheikh Al Shabab	Irrigation	May 5 - October 31, 1980	Dr. L.O. Fine
6. Sabah Al Baba	Soil Lab Technician	May 5 - October 31, 1980	Professor P. Carson
7. Adib Jaber	Soil Mapping	May 5 - October 31, 1980	Dr. F.C. Westin
8. Bassam Al Sarraj	Soil Mapping	May 5 - October 31, 1980	Dr. F.C. Westin
9. Samir Ismayel	Irrigation	May 5 - October 31, 1980	Dr. L.O. Fine
10. Hassan Terchahani	Hydrogeology	May 5 - October 31, 1980	Dr. Perry Rahn
11. Hashem Salaymeh*	Soil Lab Technician	October 27, 1980 - April 27, 1981	Professor P. Carson
12. Khaled Al Shari	Irrigation	October 27, 1980 - April 27, 1981	Dr. L.O. Fine
13. Elham Tu Ameh	Soil Lab Technician	October 27, 1980 - April 27, 1981	Professor P. Carson
14. Widad Chihadeh	Agronomy/Fertility	October 27, 1980 - April 27, 1981	Dr. R. Vigil
15. Ayman Jabri	Agronomy/Land Use	October 27, 1980 - April 27, 1981	Dr. R. Vigil
16. Adib Safi	Soil Fertility	October 27, 1980 - April 27, 1981	Professor P. Carson
17. Imad Hassoon	Range Management	October 28, 1980 - July 25, 1981	Professor J.K. Lewis
18. Said Sheikh Al Shabab	Mini Computer Specialist	February 1, 1982 - Sept. 1, 1982**	Mr. M. Wehde

* Denote the group leaders for groups 1 and 2, respectively.
**Training is still underway at the time of this report.

TABLE 8-3
Evaluations of Trainees in-Syria-U.S. Staff and U.S. Advisors

	A 1)	B 2)				
	Change in skill level expressed as relative % for the 8 trainees still associated with SAR project.	% responses of U.S. Advisors for 17 trainees				
		Excellent	Good	Average	Fair	Poor
1. Academic understanding of discipline	100	9	26	39	23	3
2. Attitude toward need of Syrian soil and land use project	38	9	50	17	15	9
3. Level of field experience	8	9	12	34	21	24
4. Ability to take direction from supervisors	61	9	29	53	9	0
5. Ability to lead project of medium complexity	31	6	21	41	18	14
6. Desire to perform at high professional standards	77	8	46	26	20	0
7. Understanding of use of instrumentation typical to discipline	100	9	30	43	12	6
8. Understanding of basic sciences (math, physics, chemistry)	31	6	48	23	23	0
9. Ability to independently design programs for research and/or resource assessment	38	3	18	53	14	12
10. Ability to independently conduct a program which has been designed and outlined by others	54	6	23	50	12	9
11. Understanding of general survey and mapping procedures common to Syria	77	7	27	46	10	10
12. Ability to conceptualize country-level resources and problems (in contrast to site specific or knowledge of a limited area)	46	7	28	33	14	18
13. Knowledge of photographic interpretation as an aid to mapping	54	0	50	19	18	12
14. Knowledge of basics of remote sensing	46	0	40	32	16	12
15. Desire to finish projects on time	31	3	14	53	18	12
16. Ability to communicate ideas in publications	not sufficient information for evaluation	7	11	64	18	0
17. Cooperation with peer scientists on projects	61	3	40	42	12	3
18. Desire to conduct field work (where appropriate)	31	3	15	44	23	15
19. Acceptance of new and innovative technology	54	12	48	22	18	0
20. Acceptance of remote sensing as a mapping tool	100	4	61	23	8	4
21. Ability to learn and understand new ideas	54	6	44	35	15	0

1) Based upon evaluations of 8 trainees remaining on the SAR project at this time.

2) Evaluations of the 17 trainees in-residence during the training program.

ATTACHMENT "A"

QUESTIONNAIRE

THE RESULTS OF THIS QUESTIONNAIRE WILL BE TABULATED STATISTICALLY AND WILL NOT REVEAL ANY INDICATION OF THE EVALUATOR OR THE SPECIFIC VISITING SCIENTIST. IF YOU FEEL THAT YOUR GROUP NEEDS TO BE DIVIDED BY EXPERIENCE LEVEL, PLEASE FILL OUT AS MANY QUESTIONNAIRES AS YOU FEEL NECESSARY.

____

Discipline ________________ Ministry/Directorate ________________

List names of Visiting Scientists

A. Is your Directorate/Ministry ____ directly or ____ indirectly involved in the soil and land use inventory project for Syria?

B. Please rate by checking in one of five levels the Visiting Scientists as a group in terms of skills/attitudes prior to their training in the U.S. and after their return to Syria. Please evaluate in comparison to all other individuals under your supervision who have similar positions.

ATTRIBUTE	PRIOR					AFTER RETURN				
	Excellent	Good	Average	Fair	Poor	Excellent	Good	Average	Fair	Poor
1. Academic understanding of discipline	___	___	___	___	___	___	___	___	___	___
2. Attitude toward need of Syrian soil and land use project	___	___	___	___	___	___	___	___	___	___
3. Level of field experience	___	___	___	___	___	___	___	___	___	___
4. Ability to take direction from supervisors	___	___	___	___	___	___	___	___	___	___
5. Ability to lead project of medium complexity	___	___	___	___	___	___	___	___	___	___
6. Desire to perform at high professional standards	___	___	___	___	___	___	___	___	___	___
7. Understanding of use of instrumentation typical to discipline	___	___	___	___	___	___	___	___	___	___
8. Understanding of basic sciences (math, physics, chemistry)	___	___	___	___	___	___	___	___	___	___
9. Ability to independently design programs for research and/or resource assessment	___	___	___	___	___	___	___	___	___	___
10. Ability to independently conduct a program which has been designed and outlined by others	___	___	___	___	___	___	___	___	___	___

ATTRIBUTE	PRIOR					AFTER RETURN				
	Excellent	Good	Average	Fair	Poor	Excellent	Good	Average	Fair	Poor
11. Understanding of general survey and mapping procedures common to Syria	___	___	___	___	___	___	___	___	___	___
12. Ability to conceptualize country-level resources and problems (in contrast to site specific or knowledge of a limited area)	___	___	___	___	___	___	___	___	___	___
13. Knowledge of photographic interpretation as an aid to mapping	___	___	___	___	___	___	___	___	___	___
14. Knowledge of basics of remote sensing	___	___	___	___	___	___	___	___	___	___
15. Desire to finish projects on time	___	___	___	___	___	___	___	___	___	___
16. Ability to communicate ideas in publications	___	___	___	___	___	___	___	___	___	___
17. Cooperation with peer scientists on projects	___	___	___	___	___	___	___	___	___	___
18. Desire to conduct field work (where appropriate)	___	___	___	___	___	___	___	___	___	___
19. Acceptance of new and innovative technology	___	___	___	___	___	___	___	___	___	___
20. Acceptance of remote sensing as a mapping tool	___	___	___	___	___	___	___	___	___	___
21. Ability to learn and understand new ideas	___	___	___	___	___	___	___	___	___	___

C. Please note which of the candidates have assumed additional responsibilities and/or a different position since their return.

D. Does the new position or increased responsibility take advantage of their new skills and if so, which skills in particular.

E. How many of the Visiting Scientists are actively involved in the Syrian Soils and Land Use Program which is in cooperation with USAID?