

Soil Survey Division GIS Training Plan

March - 2007



The Mission

These four functions are the core mission areas of the Soil Survey Division:

1. Make an inventory of the soil resources of the United States;
2. Keep the soil survey relevant to ever-changing needs;
3. Interpret the information and make it available in a useful form; and
4. Promote the soil survey and provide technical assistance in its use for a wide range of community planning and resource development issues related to non-farm and farm uses.

The soil survey mission is accomplished with two basic functional roles of soil scientists: the soil scientist that is involved in soil survey mapping, database management, correlation, and data quality control and assurance; and the soil scientist involved in technical soil services. With the emergence of geospatial applications and tools it is recognized that an important additional functional role performed by soil scientists is as a GIS specialist focused on soil survey activities.

A soil survey program that is balanced across all mission functions requires soil scientists who are technically competent in new technologies and their discipline, including Geographic Information Systems (GIS).

The Plan

This plan is derived from the Soil Survey Division Training Strategic Plan, Goal 1-Objective 3- initiative 4:

Address list of new GIS related training needs, either as new course, new modules within existing courses, or utilize existing courses outside Soil Survey Division responsibility:. Also consider training needs inclusive of the Soil Resource Inventory Toolbox (SRITB):

- 3D visual techniques
- Digital remote sensing
- ERDAS Imagine
- Geodatabase management
- Data analysis, interpretive, and development tools (Spatial Analyst, 3D Analyst, Terrain navigator, Developing block diagrams, etc.)
- Projections and coordinate systems (existing ESRI training)
- Mobile computing

An assessment of what is in use and what training should be proposed was completed by a large group of soil scientists and GIS specialists via a

questionnaire. A small group then met to develop the plan using the assessments and other means.

The Methods

The Soil Survey Division's GIS training efforts will utilize a mixture of the following methods to enhance the ability of NCSS participants to carry out the soil survey mission.

Training is typically short-term learning that is intended to establish or improve a match between present job requirements and individual knowledge, skills and attitudes. Training helps people meet minimally acceptable job requirements or refine, upgrade, and improve what they do. **When employees complete a training activity, they should be able to apply the new learning immediately to their jobs.** Training will be in both **classroom** and **distance learning** formats.

A **job aid** is something that can be used on the job to improve performance. Examples include aids developed for specific tasks such as using GPS, use of Pedon PC, etc. Providing step by step guidance is done in lieu of face to face or online training.

The Fundamentals

Prerequisites are what a learner has to be able to do to qualify for a course. Other requirements may include access to tools, hardware or software that the student will need to apply the training after the course or an office work setting where a supervisor allows the learner to apply what is learned. It occasionally happens that a learner attends a course too early in their career, without the background necessary to grasp the training that is being provided. We will address the subject of prerequisites for each of our Soil Survey Division courses. ESRI has its own set of prerequisites for its training. The reader should reference the ESRI website for these.

A fundamental set of knowledge has been recommended. This applies to all employees but especially to newly hired employees. It includes:

- A basic knowledge of statistics
- Understanding Map Projections and Coordinate Systems (ESRI Virtual Campus)
- Introduction to ArcGIS 1 for USDA SCA (NCGC classroom course) or Learning ArcGIS Desktop (ESRI Virtual Campus)
- Basic Image Interpretation (NEDC distance learning offering under development)

Refreshing Skills

Refreshing training is a key aspect. The GIS world is very dynamic and hence difficult to keep abreast of changes as they occur. Efforts must be made to keep employees aware of advances in technology after they have completed training.

Learning Paths for GIS Training.

Training needs in GIS have been categorized into learning paths. **Exhibit 1** provides a schematic. **Exhibit 2** provides further information, building from the schematic. The Paths are identified by Roman numerals (I-IX). Items within each path are identified via Arabic numerals (1, 2, 3...) if sequential and by letter (a, b, c, ...) if not sequential.

Training needs have been built around 4 major functional areas within the soil survey program. These 4 areas are:

- MLRA Soil Survey Office (MLRA-SSO)
- MLRA Regional Office (MO)
- State Office, Area Office, and National Technical Support Centers (NTSC); i.e. those providing Technical Soil Services (TSS)
- NHQ and other centers (NGDC, NCGC, NSSC)

Then, probable positions within each functional area are used to recommend training. The MLRA-SSO and MO positions are derived from the staffing plan for the office structure initiated in October, 2006 (MLRA Soil Survey Restructuring Plan, page 31, Appendix A – MLRA Soil Survey Staffing Plan).

Exhibit 2 provides information for each Path and Item listed. It then provides the recommended training for each position within the functional area. It also provides a recommended sequence of training for new soil scientists. This accounts for approximately the first 3 years of employment and through a grade of GS-9.

Training Opportunities Available.

Exhibit 3 provides a listing of training opportunities available through the Natural Resource Conservation Service (NRCS). The source is indicated for each listing. The majority of the listings are associated with ESRI (Source of ArcGIS), NCGC, and NEDC. This listing will be updated on a regular basis to stay current with technology as it evolves. Path Related Training is listed as well as Electives,

which are currently sourced through ESRI only. It is categorized by Path and Item to relate to the other Exhibits.

Goals and Objectives

Strategic objectives define the desired state, desired condition, or direction to take for each goal that addresses GIS training for the Soil Survey Division. Initiatives are defined emphasis areas that are necessary to accomplish the objectives. Each objective has a baseline, or current condition, from which performance can be measured. The initiatives serve as guides to annual plans for soil survey operations.

Goal 1; Employees are given the opportunity to acquire and keep current knowledge, skills, and abilities in the area of GIS.

Objective 1: All NRCS Soil Scientists and their supervisors are aware of GIS training opportunities, know where to find information, and know how to maintain currency.

Baseline

NRCS currently provides a limited number of GIS-related training opportunities. GIS training is not fully integrated into core training for NRCS soil scientists. Employees have limited awareness of GIS training opportunities outside of the agency. Currency of training opportunities and the ability to “refresh” training are issues.

Initiatives

1. Make available to all employees the NRCS GIS Learning Paths and Advanced Electives schematic (**Exhibit 1**).
 - Provide a visual look at the learning needs and opportunities in GIS

2. Make available to all employees the NRCS GIS Learning Paths and Advanced Electives Information file (**Exhibit 2**).
 - Provide recommended training for 4 major functional areas by employee position
 - MLRA Soil Survey Office (MLRA-SSO)
 - MLRA Regional Office (MO)
 - State Office/Area Office/NTSC (related to Technical Soil Services)
 - NHQ and Centers
 - Provide recommended sequence of training for new soil scientists
 - Provide information to expand on each path and item

in the Learning Path Schematic (**Exhibit 1**)

3. Make available to all employees the NRCS GIS Related Training Availability file (**Exhibit 3**).
 - Provide information regarding ESRI, NCGC, NEDC and other sources for training opportunities in GIS.
 - Basic or standard training
 - Extra optional training
4. Develop the **soils.usda** website appropriately to provide access to:
 - Training schedules
 - Basic and standard GIS courses
 - Optional GIS training courses
 - GIS related Job Aids
 - Archived GIS training materials maintained with most current modules for refresher opportunities
 - Other GIS refresher opportunities
 - Procedures for registering for USDA contracted training with ESRI
 - Outside sources of opportunities for GIS learning
 - Outside sources of opportunities for earning credits towards an advanced degree related to GIS
 - Update the generic Employee Development plan to include GIS training and encourage states to do the same
5. Update **Exhibit 3**- NRCS GIS Related Training Availability on a regular basis to capture new opportunities as they come available
6. Review this GIS related training plan on a regular basis to stay relevant to advancing technology (recommend every 3 years)

Goal 2; Provide opportunity for all employees to achieve a fundamental knowledge base needed to perform in the GIS world.

Objective 1: All employees, especially new hires, meet a fundamental set of prerequisites necessary to perform GIS-related functions.

Baseline

Many NRCS soil scientists have a limited, if any, knowledge base in statistics. Basic knowledge, skills, and abilities necessary as prerequisites for GIS training are often not up to needed proficiency levels.

Initiatives

1. USDA-NRCS should request OPM to revise the qualification standards for the GS-470, Soil Science series to include college credits (recommended minimum of 3 semester hours) in GIS in addition to the 30/15 requirement. Assurance should be included that current employees without GIS credits could substitute training to meet GS-470 series requirements.
2. Encourage all employees to have a basic understanding of statistics by:
 - a. Having previously completed a statistics course, and/or
 - b. Taking a basic level statistics course through the USDA Grad School program (correspondence course), or a local college/community college, and/or
 - c. Complete training or Job Aid offered by the Soil Survey Division (not currently available)
3. Encourage all employees to complete the following training:
 - a. Understanding Map Projections and Coordinate Systems (ESRI Virtual Campus)
 - b. One of the following:
 - i. Introduction to ArcGIS 1 for USDA SCA (NCGC classroom course) or
 - ii. Learning ArcGIS Desktop (ESRI Virtual Campus)
 - c. Basic Image Interpretation (NEDC distance learning offering, under development)

Objective 2: A “floor” level of GIS training for all new employees in soil survey is recognized and routinely expected to be accomplished in the first 3 years (recommended) of employment.

Baseline

Most employees, and certainly new employees, do not currently have the necessary knowledge, skills, and abilities to function in ArcGIS to proficiency levels necessary for agency goals for use of ArcGIS in soil survey.

Initiatives

1. Application of soil survey information (Path I)
 - a. Utilize existing Job Aids and On the Job Training to be able to utilize the Web Soil Survey and Soil Data Mart (Path I-Item 1)
 - b. Complete the course "Soil Technology: Applications of Soil Data Viewer and ArcGIS in Technical Soil Services (currently a NTSC supported classroom course) (Path I-Item 1)
2. Geospatial Database Fundamentals (Path II)
 - a. Complete the course Understanding Map Projections and Coordinate Systems (ESRI Virtual Campus; also a prerequisite as noted in Goal 1, Objective 1, Initiative 2) (Path II-Item 1)
 - b. Complete one of the following:
 - i. Introduction to ArcGIS for USDA SCA (NCDG classroom course) or
 - ii. Learning ArcGIS Desktop (ESRI Virtual Campus) (also a prerequisite as noted in Goal 1, Objective 1, Initiative 2) (path II-Item 2)
 - c. Complete the course Digital Soil Survey: Mapping and Updating (NEDC course; will be renamed in near future) (Path II-Item 3)
3. Remote Sensing (Path III)
 - a. Complete the course Basic Image Interpretation (NEDC distance learning course-under development; also a prerequisite as noted in Goal 1, Objective 1, Initiative 2) Path III-Item 1)
 - b. Complete the course Introduction to Digital Remote Sensing (NEDC classroom course) (Path III-Item 2)
4. Geospatial Analysis (Path IV)
 - a. Complete one of the following options:
 - i. Working with ArcGIS Spatial Analyst 9 (NCGC classroom course) or
 - ii. Learning ArcGIS 9.x Spatial Analyst (ESRI Virtual Campus) plus applying the NCGC additional materials (Path IV-Item 1)

5. Field Techniques (Path V)
 - a. Utilize Job Aids and on the job training to be able to use Global Positioning Systems and interface GPS with ArcGIS and Pedon PC (Path V-Item A)
 - b. Utilize available Job Aids and on the job training to be able to use available mobile computing hardware with software in use (Tablets, PDAs, Laptops) (Path V-Item B)
 - c. Utilize available Job Aids and on the job training to be able to use Pedon PC for data entry and analyzing data as it accumulates (Path V-Item C)

6. Database Administration (Area VI)
 - a. Complete the course Creating and Maintaining Metadata Using ArcGIS Desktop (ESRI Virtual Campus) (Path VI-Item A)
 - b. Complete the course Creating, Editing, and Managing Geodatabases for ArcGIS 9 (ESRI Virtual Campus) (Path VI-Item B)

7. Specializations (Path VIII)
 - a. Utilize available Job Aids and on the job training to be able to use the Soil Resource inventory Toolbox (SRITB) (Path VIII-Item C)
 - b. Utilize available Job Aids to be able to complete advanced geoprocessing techniques such as spatial joins, relates, etc. (Path VIII-Item D)

Goal 3; Enhance existing training content and develop new training where necessary, include emphasis on interpretations, updating spatial data, new technologies, USDA programs, law and public policy, and other aspects of a well balanced soil survey program.

Objective 1: All unmet training needs for GIS for the Soil Survey Division's four mission areas are addressed.

Baseline

People in leadership do not need the same level of proficiency but do need to be aware of what training is being provided. Our current NEDC courses related to soil correlation issues do not include GIS as a tool to assist in making correlation decisions. Soil Data Viewer training related to Technical Services is not readily available to those outside the agency and those who do not have available travel funds to attend scheduled classroom sessions. Soil Data Viewer has applications for project soil surveys but training is not currently developed to address that use.

Initiatives

1. Develop "Executive Summaries" for each of the targeted 8 training paths or areas to provide awareness/understanding of GIS training to those in leadership and other positions.
 - c. Application of soil survey information
 - d. Geospatial database fundamentals
 - e. Remote sensing
 - f. Geospatial analysis
 - g. Field techniques
 - h. Database administration
 - i. Custom programming
 - j. Specializations
2. Develop a module for the Soil Correlation Course (SSD/NEDC) to address GIS application/use at the map unit level in the correlation process
3. Develop a module for the Correlation and Management of MLRA Soil Surveys course (SSD/NEDC) to address GIS application/use at the legend/MLRA level in the correlation process
4. Propose development of new course(s)
 - a. As NRCS and the NCSS approve methods and procedures, develop training to address Digital Soil

Mapping (Paths II, III, & IV-Item 4) as a course

- b. Adapt the current classroom course Soil Technology: Applications of Soil Data Viewer and ArcGIS in Technical Soil Services to be available online for users outside the agency and possibly those within.
- c. Adapt the current classroom course Soil Technology: Applications of Soil Data Viewer and ArcGIS in Technical Soil Services to be utilized by project soil survey staff and their possible uses of the Soil Data Viewer.

Objective 2: A comprehensive set of Job Aids is available to be used in lieu of training to address designated unmet guidance needs for GIS for the Soil Survey Division's four mission areas.

Baseline

ArcGIS users have, over time, developed procedures and guidelines to improve work related activities but have not generally made them available to others due mainly to a lack of a mechanism to do that. Certain tasks and procedures have not been addressed and would be enhanced if guidelines and procedures were developed where they do not exist now.

Initiatives

1. Solicit, from the states and partners using ArcGIS, materials that could be utilized as job aids
 - a. Anything in general
 - b. Specifically address:
 - i. Use of Web Soil Survey and the Soil Data Mart
 - ii. Use of GPS, interface of GPS with ArcGIS, and interface of GPS with Pedon PC
 - iii. Use of mobile computing technology such as tablets, PDAs, laptops, etc.
 - iv. Use of Pedon PC for data entry and analyzing aggregated data
 - v. Assistance in development of proper metadata
 - vi. To do advanced geoprocessing techniques such as spatial joins, "relates", etc.
 - vii. To do geoprocessing using Model Builder
2. Develop the following new designated Job Aids
 - a. Develop soil survey related materials that could be utilized with existing mathematics and/or statistics

- courses (See USDA Grad School offerings listed in Appendix II) or as a refresher for those who already have completed course work in statistics
- b. Develop soil survey related materials that could be utilized with existing geostatistics courses (not available within USDA as specific course) or as a refresher for those who already have completed course work in geostatistics
 - c. To help employees find GIS related training and job aids
 - d. To help employees perform queries and develop localized interpretations directly on the SDM
 - e. If don't find appropriate existing job aid(s), use of GPS, interface of GPS with ArcGIS, and interface of GPS with Pedon PC
 - f. If don't find appropriate existing job aid(s), use of mobile computing technology such as tablets, PDAs, laptops, etc.
 - g. If don't find appropriate existing job aid(s), use of Pedon PC for data entry and analyzing aggregated data
 - h. If don't find appropriate existing job aid(s), assist in development of proper metadata
 - i. If don't find appropriate existing job aid(s), to do advanced geoprocessing techniques such as spatial joins, "relates", etc.
 - j. If don't find appropriate existing job aid(s), to do geoprocessing using Model Builder