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Editor's Note

Issues of this newsletter are available on the World Wide Web (http://soils.usda.gov/). Under Quick Access, click on NCSS, then on Newsletters, and then on the desired issue number.

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2009 National Cooperative Soil Survey Conference, Las Cruces, New Mexico

By Maxine Levin, NCSS Partnership Liaison, USDA, Natural Resources Conservation Service, Washington, D.C.

More than 177 soil scientists from NRCS and other U.S Government agencies, universities, the Cooperative State Research, Education, and Extension Service (CSREES) , and the private sector came together for the 2009 National Cooperative Soil Survey Conference, May 9 to 15, 2009, in Las Cruces, New Mexico. The attendees included soil scientists from the United States, Canada, Hungary, and Australia. The conference was hosted by New Mexico State University, the NRCS New Mexico State Office in Albuquerque, the MLRA Soil Survey Office in Las Cruces, Agricultural Research Service (ARS) Jornada Experimental Range, and U.S. Forest Service in Albuquerque. The theme of the conference was "Soil Survey—Ecological Relationships and Soil Change." The conference provided a forum for the partners of the National Cooperative Soil Survey to exchange ideas and a launching pad for several committees and working groups. There were four Standing Committees—Research Agenda, New Technology, Interpretations, and Standards. In addition, two working groups met to organize and discuss future activities—Soil Change Working Group and Sub-Aqueous Soils Working Group. Because of the location of the conference, the National Gypsum Task Force had a unique opportunity to showcase, through a forum and field trips, the work that they have done in the last 2 years.

This year there were three field trips. The first, on Mother's Day, was to the White Sands Missile Range. Dr. Curtis Monger (NMSU) and the NRCS

Las Cruces field crew took us on an incredible tour of the unique highly gypseous landscapes of this part of the world (figs. 1 and 2). We saw parts of the White Sands National Park and Missile Range that the public rarely sees (only in movies!) and gained a much better understanding of how these landscapes formed and how we might best represent them in soil maps and interpretations.

Figure 1.—Soil scientists wandering on White Sands dunes.

Figure 2.—Larry West, USDA, NRCS, with an auger in a White Sands interdunal area.

Figure 3.—Lunch break on the field trip at the Jornada Experimental Range.

The second field trip, on Tuesday, was essentially three tours and workshops that included demonstrations of field measurement techniques and documentation from the *Soil Change Guide*; demonstrations of the State and Transition Models of soils and vegetation on the Jornada Experimental Range (fig. 3) led by ARS Jornada; and demonstrations of “Soil Profiles and Landscapes of the Range” led by Dr. Curtis Monger. The Jornada Experimental Range finished the day with a barbecue at their field headquarters, where the students and international guest were thanked for their participation.

Wednesday afternoon topped off the conference with a field tour of a pecan orchard on the NM-TX border. On this tour New Mexico NRCS staff demonstrated Soil Quality/Soil Health Assessments.

Aside from the field trips, highlights of the meeting were the technology showcase and poster session on Monday and Dr. Alex McBratney’s keynote address on digital soil mapping applications; his Scorpan (Sc,p = f (s,c,o,r,p,a,n) + e) model; Latin hypercube sampling; and use of Mid Infrared Reflectance (MIR) and gamma radiometrics as new alternative remote sensing venues. The Research Agenda Committee had presentations: Iowa Infiltration and Ksat Studies (Thanos Papanicolaou, University of Iowa) ; Measurement of Soil Properties with VNIR Diffuse Reflectance Spectroscopy (Cristine Morgan, Texas A&M) ; and Alabama Dynamic Soil Property Research (Joey Shaw, Auburn University). These presentations focused the committee on priority research for the coming year. In addition, there was a forum on the emerging Soil Survey priority of Soil Carbon that was led by Nancy Cavallaro, CSREES. For the first time, the NCSS Conference also featured a Student Forum with students from around the country from Hispanic Serving Colleges. The Student Forum was organized and sponsored by Irma Lawrence of CSREES.

Details of the presentations, committee and task force reports, and recommendations from the standing committees are now posted to the Web (http://soils.usda.gov/partnerships/ncss/conferences/2009_national/index.html).

Participants of the National Cooperative Soil Survey include representatives from the 1862 and 1890 land-grant universities, experiment stations, NRCS, the U.S. Forest Service, the National Park Service, the Bureau of Land Management, the Bureau of Indian Affairs, the Environmental Protection Agency, the U.S. Fish and Wildlife Service, the National Association of State Conservation Agencies (NASCA), the National Association of Consulting Soil Scientists, and western tribal colleges. The conference convenes every odd-numbered year to discuss issues of concern to the National Cooperative Soil Survey. ■

Conference at Harvard Kennedy School of Government

By Maxine Levin, USDA, Natural Resources Conservation Service, Soil Survey Division, Washington, D.C.

The conference "Geospatial Science & Technology for Sustainable Development in Africa: Partnerships and Applications" was held on May 28 and 29 at the Harvard Kennedy School of Government in Cambridge, Massachusetts. It was cosponsored by the Association of American Geographers, Office of the Geographer and Global Issues; the U.S. Department of State; and the Science, Technology, and Globalization Project, Harvard Kennedy School. The conference brought together representatives of public and private donor organizations, U.S. Federal agencies, universities, and industry actively engaged in the application of geospatial science and technology, specifically in Africa. Each participant had the opportunity to showcase use of GIS, remote sensing, and related geospatial tools, applications, analyses, and the benefits of their investments so far throughout Africa. For conference presentations, see: http://belfercenter.ksg.harvard.edu/publication/19107/geospatial_science_technology_for_sustainable_development_in_africa.html.

The purpose of this conference was to assemble U.S. agencies, private sector representatives, and university scientists as a follow-up to a Global Dialogues on Emerging Science and Technology (GDEST) Conference about African GIS Capabilities that was held in Cape Town, South Africa, in March 2008. GDEST is a joint project of the National Academy of Sciences, Division on Policy and Global Affairs' Program on Development, Security, and Cooperation, and the Office of the Science and Technology Adviser to the Secretary of State. The 2008 GDEST conference had three themes:

- Examining trends and opportunities for monitoring the environment and sustainability issues;
- How policies have been directly influenced by modeling, analysis, and visualization tools; and
- What are the constraints and approaches to obtain and share data amongst collaborators?

The follow-up conference at Harvard in May 2009 continued to assess developmental needs, identify barriers, and brainstorm potential projects to implement sustainable development programs in Africa. The group was uniquely configured to assess the work of both public and private sectors in the U.S. and to develop a strategy for future options involving collaboration and coordination of public policy applications across regions and themes. Included were private-sector geospatial enterprises (Microsoft, Google Earth, ESRI, and Trimble) and private foundations (Bill and Melinda Gates and Rockefeller), which are also attempting to meet the region's analytical and mapping needs as direct donors and collaborative partners.

In the past, USDA has not participated in these discussions and has left the lead to USGS as the Federal agency most involved in geospatial analysis. Though it holds most of the U.S. expertise in agricultural sustainability, USDA has held back in advertising its extensive capability in geospatial analysis as part of that expertise. Thus, USDA has often missed the opportunity to come to the foreground with USAID and the State Department to address regional development issues in Africa. The State Department has identified agricultural sustainability, production, and monitoring as key needs for geographical analysis.

USDA has the potential to play an important role in the development of agricultural sustainability in Africa through sharing of geospatial data and analysis. A partnership involving geospatial analysis of agricultural sustainability issues with the State Department, USAID, USGS, and several of the emerging private foundations (such as Bill and Melinda Gates and Rockefeller) would greatly benefit USDA in terms of both research and funding. Some of the data held by USDA and USGS would be useful for collaborative research in the domain of land cover, land use, and vegetation changes in Africa. These changes can be linked to climate change. ■

GPR Paper by Jim Doolittle and Others

From Soil Survey Division, "Weekly Update," July 6, 2009.

A paper presented by Jim Doolittle at the (SAGEEP) Conference sponsored by the European Near Surface Geophysical Society titled "Ground-Penetrating Radar Soil Suitability Maps" was selected as one of the best four papers at the Conference. The paper was co-authored by Bob Dobos, Sharon Waltman, Ellis Benham, Steve Peaslee, and Wes Tuttle and will be published in a special edition of the *Journal of Environmental and Engineering Geophysics*. SAGEEP stands for Symposium on the Application of Geophysics to Engineering and Environmental Problems. ■

NSSC Reaches Out to Engineering Organizations

By Linda Greene, Natural Resources Conservation Service, National Soil Survey Center (NSSC), Lincoln, Nebraska.

Staff from the National Soil Survey Center, Lincoln, Nebraska, recently exhibited at a international conference of the American Society of Agricultural and Biological Engineers (ASABE) in Reno, Nevada. This exhibit was part of the NSSC's ongoing outreach effort to introduce the NRCS and its Web-based soils applications to nontraditional customers. The intent of this effort is to increase awareness and use of the agency's soils information databases.

NSSC staff members along with Nevada soil scientists Doug Merkler and Steve Herriman spent 4 days promoting the agency and demonstrating various Web-based soils applications with the use of computer workstations enhanced with plasma screens for easy viewing and learning. These "hands-on" workstations allowed visitors to use the computers to learn who we are, what we offer, and how to navigate the various online programs. The response was overwhelmingly positive, so much so that NRCS has been invited to submit a proposal to provide a "Continuing Professional Development" workshop at next year's conference in Pittsburgh, Pennsylvania.

The international ASABE conference attracted more than 1,400 participants. Of that number, 257 were from 42 foreign countries as far away as Australia, Bangladesh, Croatia, China, Ghana, India, Libya, Taiwan, and Thailand. Interaction with the international engineering community addressed the NRCS long-standing goal of

NRCS staff at an international conference of the American Society of Agricultural and Biological Engineers. From left to right, Joe Chiaretti, NSSC; Linda Greene, NSSC; Steve Herriman, NRCS, Nevada; and Karl Hipple, NSSC. (Absent is Doug Merkler, NRCS, Nevada.)

promoting the National Cooperative Soil Survey as the source of the accepted standards for soil classification and interpretation.

NSSC staff members plan to continue their outreach effort with other engineering organizations that include civil, hydraulic, and environmental engineers. ■

Job Tracking for ArcGIS (JTX) Workshop

From Soil Survey Division, "Weekly Update," August 24, 2009.

The Soil Survey Division sponsored a JTX Workshop "Introduction to Job Tracking (JTX) for ArcGIS," August 11-13, 2008, in Ft. Worth, TX. A total of 12 classroom students participated in the 2-day session. In addition, during the first day, about 16 individuals joined remotely for the general Introduction to Job Tracking. This workshop introduced the key concepts of Job Tracking, defining and linking jobs into workflows, assigning users to groups with privileges and also assigning jobs to individuals within groups. The workshop is a good example of how NSGD Team members are gaining new skills to help prepare and document workflow systems to make our field scientists more efficient and productive as they create more consistent MLRA soil survey products.

JTX was developed out of disaster-relief needs (NIMA following 9/11) for a workflow management tool that directly supported GIS operations and has since developed into a fully functional management and job-tacking application used for GIS intensive operations. Participants learned standard definitions for a "job" (unit of work performed by one or more people) and "workflow" (logistical organization of the job's tasks determining what work needs to be performed in order for a job to be considered a success). "Workflow management," the organization of tasks to ensure no step is missed, was also covered along with many details that effectively "automate" repetitive tasks to improve productivity. Participants learned that JTX workflows can also include non-GIS jobs, such as reviewing written documentation.

Some comments from the class participants include the following:

> Attempting to prepare workflows really forced us to understand what a job is and the sequence of jobs performed and by whom, from beginning to end.
>
> JTX reminds me of MSProject, but with spatial data.
>
> JTX operates a lot like the ArcGIS Model Builder.

Jennifer Sweet served as the technical point of contact for the JTX Workshop and made sure the class was successful for the participants.

Developing the NSGD supports NRCS and USDA goals of contributing digital soils information in a common Service Oriented Architecture (SOA) where reliable soils information services can be assimilated into many programmatic applications, such as the FOTG, more efficiently than is possible with current systems. ■

MLRA Soil Survey Office Research: Why Plan?

Larry T. West, National Leader for Soil Survey Research and Laboratory, National Soil Survey Center, Natural Resources Conservation Service, Lincoln, Nebraska.

Larry West

As the National Cooperative Soil Survey (NCSS) evolves beyond the initial inventory of the Nation's soil resources, MLRA Soil Survey Offices (SSOs) should and will be engaged in research and investigation projects to develop greater understanding of soil distribution, properties, behavior, and proper interpretation for use and management. Over the past 100 or more years, the NCSS has made appreciable contributions to our knowledge and understanding of soils. A great deal of data has been collected describing soil morphological properties, soil distribution, and the physical, chemical, and mineralogical properties of soils. From these and other data, a comprehensive system for classifying soils was developed as were other standards for evaluating soils and landscapes. Relationships have been developed among soil properties and interpretations of soil behavior, and responses to management have been established and tested. The NCSS has accomplished a great deal, but there is much left to do.

A major strength of the NCSS over the years has been the knowledge and expertise centered in the SSOs. Those of us at the National Soil Survey Center (NSSC) have ideas and concepts of important questions and potential research projects as do researchers at local universities. Soil Scientists in the SSOs, however, know and understand local soil conditions and thus are better equipped to identify important data needs and research questions. Thus, many research questions should originate at the SSO if the project is to be successful and results relevant. The NSSC, MOs, State Offices, and local universities can provide support and can help coordinate similar projects among SSOs, but the basic research questions should come from the scientists working with the problem every day.

Project planning is a vital component of any successful research program, especially if we have hopes for successful projects that span across SSOs and

MLRAs. Thus, the remainder of this epistle will attempt to describe the components of a project plan and reinforce the importance of each part.

The initial step for implementing any project should be a well-developed plan describing the work that is to be done. Many of you have been involved in preparing work plans that are submitted to the NSSC as part of annual requests for assistance. The work plans submitted with the request for assistance should be considered as a brief overview of the project that the NSSC uses to plan staff workloads and allocate resources. The full project plan should be more comprehensive, have considerably more detail, and be used as a road map to progress from the initial concept to project completion.

The focal point of any project plan is the objectives of the project. These objectives are simply the question or questions that the project is attempting to answer. There may be only one objective, and there seldom should be more than three. There may be more than three questions related to the project, but too many objectives will dilute project focus and may result in incomplete results. Thus, only the most important questions should be the focus of the project. The remaining questions can be held for subsequent projects. The same is true for new questions that may arise during the course of the project. Pursuit of new objectives before the original ones have been fully addressed often results in an unsuccessful project.

Mission drift is a common ailment among any group attempting to do research. When I was a new staff member at the University of Georgia, I had the opportunity to work with Russ Bruce, a well-respected Soil Physicist with ARS. During research planning meetings, the discussion would often divert to other research possibilities or to collecting data that were important but not directly related to the project being discussed. Russ would listen patiently for a few minutes, but he would always refocus the group by simply asking, “What is the question we are trying to answer?” That is the purpose of project objectives—to serve as a reminder of the focus of the project. If the objective is central, questions about sites, methods, data needs, etc. become much easier to answer. If the data do not address the question, they are not needed. That does not mean the data in question are not important, but a new project or objective that relates to the data should be formulated.

Related to the objectives is the question of what you hope to learn from the project or the expected outcomes of the project. In other words, what data, relationships, or knowledge do you expect when the project has been completed? If the objectives do not relate to the desired outcomes, the objectives and outcomes should be reevaluated and modified so that the project achieves the desired results.

Once the objectives of the project have been established, the next step is to determine what data are needed to meet the objectives and how these data will be collected. Questions may include what soils, map units, and/or landscapes will be evaluated? Are these Benchmark soils? Can the data be extrapolated to other similar soils and landscapes? Does the project require regular morphological observations, use of GIS techniques to delineate landscapes with particular attributes, sampling and analysis of pedons, installation of wells or piezometers (there is a difference and the choice is related to the data desired), measurement of saturated hydraulic conductivity (Ksat), or any other related question? Are multiple types of data needed, e.g., Ksat and laboratory analyses? The choices are endless, but if the objectives are well defined, the types of data needed are usually clear.

Once the types of data needed to address the objectives have been selected, specifics of the observation or sampling scheme need to be indicated. If pedons are to be sampled, what laboratory analyses are needed to answer the objectives? Is there benefit to additional laboratory analyses even if they are not directly related to the objectives of the project? How many pedons will be described to evaluate morphological properties? How many will be sampled? At how many locations will Ksat be measured? Are replicate measurements needed? At how many sites will seasonal water tables be monitored? The answers to these questions depend on the objectives of the project. If the objective is to statistically evaluate differences among soils, more replicates will be required than if the objective is to understand the relationship of a property to parent material or landscape differences.

If replicate observations or samples are needed to meet project objectives, how will the replicates be located? Numerous schemata are available for locating observation or sample sites, including sites that fit the central concept of the soil and/or landscape, systematic observations along a transect or in a grid pattern, and random observations across the area of interest. New methods to locate replicate samples based on GIS analysis are also available. All of these have advantages and disadvantages, and the final choice should be the one that best and most efficiently meets project objectives.

We all have a desire to collect more data than may be essential to meet project objectives. We all want to be able to develop definitive answers to the questions being asked, and nonessential data often help to support conclusions derived from other data. If resources are limited, however, decisions must be made to separate the essential data from data that would be nice to have in case there is a question. Remember, the most expensive part of any project is the time spent in the field to install equipment, make observations, and/or collect samples. Laboratory analyses are relatively inexpensive, and if the analyses are to be done at Soil Survey Laboratory (SSL), laboratory costs should not be an impediment to any project.

Once the objectives and methods have been defined, data are collected. This is the easy and fun part of the project. Collecting the data will take time and effort, but proper planning will help to ensure that equipment and assistance are available to complete the data collection. It will also help to ensure that the data are appropriate and valid. Remember, bad data are worse than no data.

A question that is often not considered during the design of a project is, “How will the data be stored, analyzed, and disseminated?” We all know of instances where good data have been collected, quickly reviewed, and stuffed into a file drawer to never see the light of day again. Data are too expensive and too valuable for this to happen. At the SSL, great efforts are made to ensure that the laboratory data are stored in a manner that allows relatively easy access to the data. Efforts are being made to develop a similar system to facilitate storage of data collected by Soil Survey Offices in a central database that is easily accessible.

Beyond storage of raw data in a database, a thorough analysis of the data is needed to evaluate relationships among the properties measured and/or evaluate differences among soils or other variables in the project. If needed, statistical assistance is available through the NSSC and the SSL.

The last step of a successful project is dissemination of the results. In addition to internal reports that may be prepared, most of the results from various projects are suitable for presentation at professional meetings and/or publication in any of a number of outlets, including professional journals and Soil Survey Investigation Reports. Assembling data, preparing and presenting papers at meetings, and writing manuscripts for publication are not easy for many people, including me, but disseminating results through these types of outlets is a necessary evil if the data are to achieve their maximum effectiveness. I encourage all of us to make the presentation and/or write manuscripts for publication.

As the NCSS evolves beyond the initial inventory of the Nation’s soil resources, opportunities abound to develop a more comprehensive understanding of the soils that have been mapped. In light of potential climate change, the need to sequester carbon to mitigate greenhouse gases, and increased pressure to produce food, fiber, and fuel, the inventory and understanding of the soil resource are more important than ever before. Only with a concerted effort by all of us can we meet the needs of society while maintaining the quality, productivity, and utility of our soils. ■

Language Matters

By Stanley P. Anderson, Editor, National Soil Survey Center, Natural Resources Conserevation Service, Lincoln, Nebraska.

Back in the day when we started to generate soil survey tables out of Iowa State University (about 1975), we had to coin some terms for soil limitations because we were limited to 13 characters per limitation. If we exceeded 13 characters, the description would take up more than one line and wrapping problems would occur in these computer-generated tables. The coined terms included “percs slowly” (my personal favorite at 12 characters), “shrink-swell” (at 12 characters without the word “potential”), and “cutbanks cave” (13 characters). These terms encouraged soil survey authors to write the following kind of monstrosities, as if the coined terms were nouns:

> This soil is limited for septic tank absorption fields because of percs slowly.
>
> This soil is limited for buildings because of shrink-swell.
>
> This soil is limited for shallow excavations because of cutbanks cave.

We have since changed “percs slowly” to “restricted permeability” and “shrink-swell“ to “shrink-swell potential” and have managed to cope with the resulting wrapping problems. Until recently, we left the term “cutbanks cave” alone, as if it were free of errors. In fact, there are two problems with the term. One is the word “cutbanks,” and the other is the word “cave.” The definitions of “cutbanks” I have found indicate that the word describes natural cutting by streams. GOG, for example, defines a cutbank as “a steep bare slope formed by lateral erosion of a stream.” So, when we invented “cutbanks cave,” we applied the word “cutbanks” to excavations and hoped that our meaning would be clear because of the column heading (e.g., “Shallow excavations”). Our definition of the term perhaps points to the problem with the word “cave”:

> **Cutbanks cave.** The walls of excavations tend to cave in or slough.

This definition indicates that the process can include caving or sloughing. We did not have room to add “or slough” to the term when we invented “cutbanks cave,” but we are now free to describe all limitations more accurately. At the National Soil Survey Center, Bob Dobos and I agreed on what we consider a suitable alternative that consists of 25 characters (including spaces): unstable excavation walls. In the national interpretations, this is the way the limitation will be described in the column “Shallow excavations” and in other columns that involve digging holes in the ground. The new term lacks the poetry of the alliterative “cutbanks cave” but is more accurate. ■