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National Cooperative Soil Survey

NCSS Newsletter

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Editor's Note

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You are invited to submit stories for future issues of this newsletter to Stanley Anderson, National Soil Survey Center, Lincoln, Nebraska. Phone—402-437-5357; FAX—402-437-5336; email—stan.anderson@nssc.nrcs.usda.gov.


Review of *The Earth Around Us*

By Carolyn G. Olson, National Leader, Soil Survey Investigations, National Soil Survey Center, NRCS, Lincoln, Nebraska.

The Earth Around Us: Maintaining a Livable Planet, edited by Jill Schneiderman and published in 2000 by W.H. Freeman, NY (455 pp., ISBN 0716733978, $27.95 hardcover), is definitely worth a visit whether your professional interests are in the earth sciences, in environmental policy decisions, or in the ethics of environmental sustainability or whether you just enjoy readings in the natural sciences. Jill Schneiderman has convinced an impressively diverse group of authors to participate in this endeavor. The book title is a reflection of her respect for Rachel Carson's views expressed in the book *The Sea Around Us* (Carson, 1979). In recounting Carson's view that science should be a part of everyday life, not separated from it, Schneiderman introduces this collection of works with the hope that these will present every reader with an engaging, yet serious, view of our earth, its resources, and our responsibilities as its residents.

The book is divided into seven titled sections: "Records of Time and History" "Scientific Judgments and Ethical Considerations," "Resources Reconfigured," "Local Manipulations," "Inventive Solutions," "Whole Earth Perturbations," and "Global Perspectives." Each section is introduced by a short paragraph summarizing key points. Within the sections are four or five chapters, each written by a different author from academia, the government, or the private sector. The diversity of authors and writing styles makes for an overall intriguing look at our environmental world. The chapters are short and concise, are easily read in one or two sittings, and are completely independent of one another. The subject matter is presented clearly, usually explained in laymen's terms. Some chapters are presented in a case-history format. The collection is targeted to attract those interested in the earth sciences as well as those in public policy decision-making positions with more limited scientific training. Also, it is written with enough technical background to appeal to the most seasoned scientist among us.

Appropriately, former MacArthur fellow Susan Kieffer sets the stage with a discussion of time scales in chapter 1. The definition of "rare" is treated as fluid, depending upon its reference to time scale. A "rare event" in the context of human lifespans is quite different from a "rare event" in earth history.

Individuals familiar with naturalist writer John McPhee and the late Stephen Jay Gould, a Harvard paleontologist, will enjoy chapters composed of excerpts from some of their larger works. In chapter 2, McPhee travels a portion of Interstate 80 from California to Nevada with geologist Deffeyes and vividly describes the incredibly different picture that he, the layman, and Deffeyes, the professional, each see in observing the same natural setting. McPhee then segues to a narrative on James Hutton, often called the founder of modern geology, and Hutton's early observations of the earth. Gould's excerpt discusses the human time scale relative to geologic time scales and suggests that if we are inclined to emphasize the human time scale, we must move toward an environmental ethic based on the "golden rule."

Each chapter in Part II gives the reader pause for thought. Almost imperceptibly, the authors skillfully weave philosophical arguments into scientific concepts that we, as scientists, have either taken for granted or have not taken the time to consider. Naomi Oreskes, a science historian from the University of California, San Diego, examines the use of computer models in the earth sciences to describe systems that are too large or complex to study by other means. She points out that the closer a model comes to full representation of a complex earth system, the more difficult it is to evaluate. The risk of wrongly supporting a false-theory model is only academic until the model is used as a basis for public policy decisions.

A few chapters deal specifically with Federal Government issues. In chapter 7, Gordon Eaton, former Director of the U.S. Geological Survey, describes how public needs and funding have increasingly shaped government-sponsored research through time. George Fisher, from Johns Hopkins, attempts to describe sustainability and faith as described by religion and what that actually means in terms of difficult choices in resource allocation, land use, and species diversity. Two chapters assess government-sponsored management of Federal lands.

Part III discusses our perception of natural resources, their availability, and whether we need to reevaluate development in the twenty-first century. Parts IV and V should be familiar to soil scientists and other earth scientists who regularly deal with public reaction to environmental issues large and small.

One of my favorite chapters is one about soils by Ron Amundsen, University of California, Berkeley. In this piece, Amundsen's deceptively engaging style reminds me of Garrison Keillor's story-telling from Lake Wobegon in *A Prairie Home Companion* and William Logan's book *Dirt: The Ecstatic Skin of the Earth* (Logan, 1995). In a friendly and unassuming manner, Amundsen makes some strong statements about the manipulation of soils. He uses terms seldom associated with soils, such as "domesticated" and "not reproducible." We are challenged to think about human-induced changes to soils, many of which are largely permanent.

Several chapters address water issues. The Edwards aquifer in Texas is explained in lay terminology along with its use and management. The answers to some serious questions posed here may determine the sustainability of the aquifer. Will it remain a viable water supply for future generations? Another chapter discusses the history of water catchment in the Catskill Mountains of New York State and damming of the rivers for the sole purpose of supplying drinking water to New York City. This was a domestic Three-Gorges-dam crisis of our own making, displacing people at one-quarter their land's worth in the early 1900s. It is the eastern USA equivalent of the debacle surrounding the diversion of water from Owens Valley, California, to supply Los Angeles, as described in Reisner's *Cadillac Desert* (Reisner, 1986).

In several chapters, coastal systems are discussed in the context of the mitigation of natural and manmade hazards. Nineteen of the twenty most densely populated counties in the USA are coastal counties. Development increases risks, vulnerabilities, and economic costs. These factors must be weighed against their impact on natural systems. Chapter 18 is a historical discussion of the dredging of New York Harbor and the subsequent location and relocation of sites for dredged material. Amusing, yet informative, chapters 16 and 17 illustrate the folly of trying to outbuild nature.

Paul Doss illustrates wetland identification and mitigation from a hydrogeologist's perspective. This chapter should strike a chord with soil scientists as well. Finally, no discussion of inland water would be complete without a chapter on dams. The twist here is that this case history describes the process negotiated by several public and private entities that has resulted in a positive environmental solution following a catastrophic dam failure.

Later chapters approach earth systems and our responsibilities as a population on earth from a more global perspective. Steven Stanley, a respected Johns Hopkins paleontologist, tackles the relation of climate, the ocean circulation conveyor belt, and ice age initiation. He warns of the consequences of increased use of fossil fuels. Kirsten Menking, Vassar College, examines thick Owens Lake sediments and addresses climate proxies through time. Robin Hornung and Thomas Downham aptly explain solar radiation, ozone depletion, and their consequences to human health and terrestrial biology.

Victor Baker's thought-provoking essay on the philosophy of science and deductive reasoning brings us almost full circle to McPhee's chapter connecting the observer and the observed in geology. E-an Zen discusses the transition toward sustainability that next generations will have to face and the difficult choices needed to be made by a globally aware populace. What entities can be sustained on a global basis that will meet the needs of a much larger but necessarily stabilized human population? What standard of living will be acceptable?

Finally, and most appropriately, C. Edward Buchwald summarizes this collection with his title question, “What else should my neighbor know?” He leads us in a discussion of the major issues of which we, as residents of the earth, need reminding: world population, urban growth, inappropriate consumption, and limits to natural resources. In a manner similar to E-an Zen’s earlier exhortation, we are reminded that the stewardship choices we make now will greatly impact our descendants and their ability to sustain a living planet.

As a whole, this book has only a few annoyances. The bibliography is listed in one section near the end of the book rather than at the end of each chapter, where access would be more convenient. It requires that the reader flip back and forth to find specific references. In order to effectively search the bibliography, the reader must recall the number or title of the appropriate chapter. As with any book consisting of chapters by authors from many backgrounds and different kinds of professional expertise, the reader is occasionally taken aback by differences in writing styles when moving from chapter to chapter.

Overall, Schneiderman has managed to collect a group of papers that are entertaining as well as informative. Each chapter has a message for scientists and laymen alike. We need to maintain a healthy respect for natural systems. The effect that humans have on nature has become increasingly devastating. A paraphrase of the question that politicians often ask their constituents as election day nears may be the best summary of this book’s intent: “Have we left the earth any better off than when we arrived?”

References

Carson, R. 1979. The Sea Around Us. Oxford University Press, NY. 250 pp.

Keillor, G. “It was a quiet week in Lake Wobegon,” from A Prairie Home Companion, National Public Radio weekly series.

Logan, W.B. 1995. Dirt: The Ecstatic Skin of the Earth. Riverhead Books, New York. 202 pp.

Reisner, M. 1986. Cadillac Desert: The American West and Its Disappearing Water. Viking Press, NY. 582 pp. ■

An Editing Assignment

Supplied by John Kelley, Soil Data Quality Specialist, USDA, Natural Resources Conservation Service, Raleigh, North Carolina. John cannot remember who wrote this description. He thinks that it “probably came from TN or NC.” He calls it “a little editing assignment.”

722G—Pigeonroost-Rock outcrop complex, awful steep

This unit consist of fairly deep, dry, awful steep soils and sandstone rock ledges, which are might-nert straight up-and-down. Slopes range from 0 to 90 percent, mostly they are closer to 90 percent.

Typically, the surface layer of the Pigeonroost soil ain’t bad, if it wern’t so steep and rocky. In most places, you have to crawl up and slide down. This is dangerous, not only because you risk breaking a laig, but there are plenty of bodacious rattlesnakes ready to put the bite on the slider or crawlers.

The subsoil, in most places, is a gooey, sticky mess. I don’t know what it is in other places, cause it’s got so many rocks in it I can’t dig. Water, which is good for drinking, oozes out in some places. The rock cliffs act as a barrier to both man and beast. If you’re up you can’t get down; if you’re down, your can’t get up.

Generally speaking, this stuff ain’t good for nutin’ cept growing trees. Consequently, the U.S. Forest Service owns a whole bunch of this stuff. Thesoils are so steep and move aroun so much that the trees have to grow in odd shapes just to stay on the mountain. Sometimes they are in the shape of a bow. Tree mortality, usually the result of falling off the mountain, is quite high. Green briers grow to might-nei big-round as a corn stalk. Lots of purty blossoms grow in the ground cover.

These areas ain’t no trouble to manage. Most folks try to stay out of um. Sometimes, however, a young, inexperienced logger will try to harvest the best of the worst trees. Them that don’t get snakebit, usually go busted, sometimes from falling off rock bluffs. Artifacts, from logging operations, are scattered plum through the delineation. Occasionally, a bearded, unkept forester wanders out, some, however, don’t.

These areas are well suited to some kinds of wildlife, specially short lagged varmits and crawling critters. Long legged critters can’t make a go of it. Pizen snakes are common to many.

Capability classification - Bad

Woodland group - Worse ■

Central States Forest Soils Workshop

By Jeff Glanville, Soil Scientist, USDA, Natural Resources Conservation Service, Columbus, Ohio.

The 22nd annual Central States Forest Soils Workshop was held October 15-17 in northwest Ohio. Over 130 registered participants saw a variety of soils and land uses.

After registering Tuesday afternoon, we were introduced to northwest Ohio by some excellent presenters. Much of northwest Ohio is in what was known as the Great Black Swamp, referring to the conditions before drainage carried away much of the surface water. This area is the former lakebed of Lake Erie, where glacial ice blocked drainage to the

Profile of Spinks fine sand, Maumee State Forest.

east. The land is generally very flat. Dunes, beach ridges, and other sandy deposits are on the higher parts of the landscape.

The heavy textured soils on this flat landscape generally were poorly drained in the past. Starting around 1850, agricultural drainage and ditches provided a means to remove excess water and grow crops, and the forest was gradually cleared. Today, only a few small forests remain.

Maumee State Forest was the first stop Wednesday morning. It is the only State forest in northwest Ohio. It is located in the Oak Openings region, which is basically a big sandy area. The dominant soils in the forest are those of the Ottokee, Tedrow, and Granby series. Here, we saw a 50-year-old pine plantation being thinned by low-impact equipment. Lab data from the Spinks soils pit here showed fine sand textures from the surface to a depth of 60 inches and a clay content ranging from 1.5 to 3.9 percent.

The next stop was the Lange Tree Farm. The dominant soils on this farm are those of the Ottokee, Spinks, and Granby series. The tree species planted since 1972 include red oak, white oak, eastern white pine, black walnut, and baldcypress. A windbreak with eastern white pine, American arborvitae, and Norway spruce was planted through the Northwest Ohio Field Windbreak Program. Lab data from the Granby soils pit here showed loamy fine sand textures from the surface to a depth of 60 inches and a clay content ranging from 3.9 to 5.7 percent.

After lunch, we saw a riparian buffer installed through the Conservation Reserve Enhancement Program and a field windbreak in the adjacent field. Dave Berna, retired Ohio NRCS forester, discussed the benefits of field windbreaks.

The Wednesday afternoon field stop was at the Ridgeville Corners wastewater site. This community in Henry County uses irrigation as a tertiary treatment of wastewater. A total of 26 acres of newly planted trees is irrigated, as well as 7 acres of existing forest. This project was a multi-agency effort, with materials or assistance provided by Maumee State Forest, NRCS Maumee Valley Resource Conservation and Development, the National Tree Trust, and several local Soil and Water Conservation districts. Most of this area is on Fulton soils. Lab data from the soil pits here showed dominantly clay textures in the Bt horizon and a clay content of around 65 percent.

The final forest soils field stop, on Thursday morning, was at Goll Woods State Nature Preserve. Goll Woods is an old growth forest, where a variety of site conditions enable different forest communities to exist. Here, we saw a soil monolith of Lenawee silty clay loam. Also, while walking on a nature trail, we saw big bur oak trees.

We went on a fine guided tour through the Sauder Manufacturing plant in Archbold. This plant makes a variety of residential and institutional furniture. Church pews appeared to be the main product of this particular plant.

This was an outstanding workshop. The food was good, the weather was decent, and the program and presenters were excellent. Thanks again to all who participated. ■

How Soils Can Become PM10

By Philip D. Camp, State Soil Scientist, and Jeffrey J. Schmidt, Community Assistance Coordinator, USDA, Natural Resources Conservation Service, Phoenix, Arizona.

PM10 is particulate matter that is 10 micrometers or less in diameter. It is commonly known as dust or fugitive dust. These particles are very small and can invade the natural defense mechanism of the human respiratory tract, penetrating deep into the lungs. Consequently, PM10 can cause a wide variety of health problems, especially in children, the elderly, and people with preexisting respiratory or cardiovascular disease.

Particulate matter consists of solid or liquid substances that are visible or invisible. These particles vary in shape and size, including large drops of liquid, microscopic dust particles, tobacco smoke, and aerosols. The

A wall of dust.

Dust resulting from land planing.

particles affect visibility and can be transported for long distances by winds. The small particles can be dangerous to human health because their size makes it possible for them to pass through nostril hairs and enter the lungs. The smaller the particle, the deeper it can penetrate into the lungs, where it can become lodged and cannot be easily, if ever, expelled.

The potential for soil to release dust into the atmosphere depends largely on the kind or size of soil particle and the condition of the soil surface. Suspendible particles are in most natural soils. Particles in the PM10 size range are often bonded tightly to other particles, making large aggregates. Energy (usually in the form of increased windspeed and/or traffic over the soil surface) is needed to break the aggregates into smaller particles. Destruction of the bonds can give way to the generation of fugitive dust. PM10 can be suspended, while particles greater than 80 um rarely stay in suspension because they are too heavy.

Soils have four main constituents: mineral matter, organic matter, air, and water. Minerals are the major constituents in soils and are derived from the parent material by weathering. Organic matter is derived mostly from decaying plant material that is broken down and decomposed by animals and micro-organisms living in the soil. Soils generally contain relatively small amounts of organic matter because of limited plant growth and rapid decomposition of dead plant matter. Air and water fill the pore spaces between the mineral and organic matter in soils.

Mineral particles range in size from 2,000 um to less than 2 um and are the bases upon which soil texture is determined. Soil mineral particles can be classified as sand (2000 to 50 um), silt (50 to 2 um), or clay (less than 2 um).

The textural class of a soil is ascertained by estimation of the particle-size distribution in the field through the "feel method" or analytically through laboratory measurement. Once the percentages of soil particles are ascertained, the soil textural triangle is used to classify the soil further. Field determinations are commonly within 3 percent of laboratory-derived values. Local soil surveys made available by the Natural Resources Conservation Service use these textural classes.

PM10 originating from soil is composed of clay particles and large silt particles. Soils with high amounts of these particles have a high potential to generate PM10. All soils that are high in content of clay have the potential to generate PM10 under the right conditions. The quantity of PM10 that is actually generated is closely linked to the management of those soils or the amount of mechanical disturbance. Soil disturbance changes soil structure. Soil structure is an important physical characteristic of any soil. It is produced by the aggregation of particles of sand, silt, and clay into larger units called "peds." A soil with a large amount of clay particles may generate low levels of PM10 if disturbance is limited or soil moisture levels are elevated. A soil with a low content of clay and silt, however, could generate noticeable levels of PM10 if frequently disturbed under dry conditions by traffic or tillage equipment.

When the soil is manipulated or disturbed by tillage, animals, weathering, or vehicular traffic, the natural soil structure can be destroyed. This destruction allows particles less than 10 um in size to be easily suspended in the air. As soil aggregates break away from larger aggregates and become smaller, their ability to be suspended in the air increases significantly. Increased traffic or surface disturbance increases the potential for these smaller particles to become fugitive dust. Clay content, relative humidity, soil moisture, and the speed and direction of the wind are among the factors that can affect the bonding strength between particles, which determines the amount of PM10 generated. ■

Lindo J. Bartelli: A Personal Commentary

By Robert Grossman, Research Soil Scientist, National Soil Survey Center, NRCS, Lincoln, Nebraska.

Of the group that guided the soil survey from 1960 to 1980, Bart ("Black Bart" to some) was the soil scientist who most strongly emphasized the customer and the need for a management which would achieve this emphasis. To Bart, function was more important than form. He wanted a soil survey that worked. He was not strongly concerned with genesis and taxonomy. It is no accident that he championed the development of the early S-5 forms. Bart was a modern soil scientist with a dash of the rebel and with an assurance, shared by many of his contemporaries, that came from having been in combat in World War II. He was very much a member of Brokaw's "Finest Generation." Also, he was comfortable with his heritage.

I met Bart while I was a graduate student at the University of Illinois, 1954-1958. Bart was the State Soil Scientist, having taken over for A.A. Klingebiel, who went to Washington as Director of Interpretations under Dr. Kellogg. I helped Bart with his Ph.D. thesis (SSSAP 20: 388-395, 1960). Bart would have me over for dinner occasionally. His wife, Sig, was a good cook, and as a graduate student, I considered a home-cooked meal a real treat. Bart and Sig had two daughters. Bart's family worked in the iron mines of the Upper Peninsula of Michigan. His wife was of Finnish extraction, which put her a rung up the ladder from Bart in the society of the Upper Peninsula. (The Finns were from the Petsamo Region, an important source of iron ore for Europe before World War II.) At the top of the ladder of workers were the miners from Cornwall, England; they could speak English and, hence, were the supervisors.

Bart brought great enthusiasm to his job as Illinois State Soil Scientist. He did stumble, however, when he bought surplus military shoulder bags, which he distributed to the soil scientists. Of course, they were named "Bart Bags" (pictured on page 1 of this newsletter). Bart left Illinois to become an assistant to Billy Ligon in the South, where he increasingly became involved in interpretations and subsequently in soil survey management. Bart eventually became Principal Correlator and, in that capacity, he actively supported the first S-5 forms, which Dave Slusher and Keith Young developed. These forms initially had only engineering, particle size, permeability, and perhaps shrink-swell class. Later, after Bart became Director of Interpretations, replacing A.A. Klingebiel, clay, bulk density, and organic matter were added. I had a role in that. I visited Washington and in 15 minutes, with Keith Young present, we added the three properties at my suggestion. Joe Nichols, who is now retired, recently told me that Bart liked the cell type generated in the MIAS system and gave him the go-ahead. Today, there is continued interest in cell maps (Zhu et al., 2001, Soil Sci. Soc. Am. J. 65: 1463). Fifty years ago, at the 1963 National Work Planning Conference, Lindo Bartelli chaired the committee "Soil Surveys in Urban-Fringe Areas." The title is extremely apt for an agency mission. It might be very applicable as the basis today for involvement in Homeland Security.

Bart wanted to succeed Dr. Kellogg but was not selected. I think that Bart would have moved the soil survey rapidly into management and interpretations and away from taxonomy and genesis. The irony is that as more modern soil surveys became available, Bart's leadership would have been increasingly valuable. Further, computers now have changed much and made it possible to execute Bart's vision.

Bart showed a marked capacity for growth in both people skills and technical skills. He became a good public speaker. His last professional position was as an administrator, School of Forestry and Wood Products, Michigan Technical University, Houghton. The position required very complex set of interactive skills, probably more than was required of an SCS manager. While in that position, he wrote a very fine paper on interpretations (Bartelli, L.J. 1978. Technical classification system for soil survey interpretation. Adv. Agron. 30: 247-289). The paper has not been properly appreciated, in my opinion. Bart came home scientifically (as well as geographically) with the publication of that paper. ■

Russian Fulbright Scholar Aids Northern Circumpolar Soil Database Development

From "NRCS Technology News," July-August 2002.

To further the development of the Northern Circumpolar Soil Database, Dr. Sergey V. Goryachkin from the Institute of Geography, Russian Academy of Sciences, Moscow, Russia, worked with the National Soil Survey Center (NSSC) in Lincoln, Nebraska, for 7 months under a Fulbright Grant. He was part of the Russian group that had contributed to the development of the Gelisol Order of Soil Taxonomy and the Cryosols of the World Reference Base for Soil Resources (WRB) in the late 1980s and early 1990s. That work had been an activity of NRCS, the International

Union of Soil Scientists, and the International Permafrost Association to improve the classification of soils with permafrost. While this activity was ongoing, they began creating a large soils database for the circumpolar region. Dr. Goryachkin's Fulbright Grant was to allow him to help improve the Circumpolar Soil Database.

Dr. Goryachkin analyzed the relationships among Soil Taxonomy and the Canadian, WRB, and Russian soil classification systems to determine whether information available in one could be combined with that in another and whether an overall database for many uses and users could be created. He found large differences in approaches among the four classification systems. For example, the Canadian system uses soil nomenclature that is closer to that of the Russian system than to that of the U.S. system, but the Canadian and Russian systems differ in their understanding and diagnostics of the gleysolic order and subgroups. In addition, the U.S. and Russian systems are very similar in their approaches to aquic and gleyic features.

In spite of these challenges, progress was made in the development of the Northern Circumpolar Soil Database. The Russian pedon database, which has 250 georeferenced profiles, was linked to the NSSC database. The Russian national map was correlated to the subgroup level of Soil Taxonomy, and, on this level, Soil Taxonomy worked very well. Dr. Goryachkin, together with NSSC staff, developed a map of subgroups of the Gelisol order using the Russian classification. Finally, the whole Northern Circumpolar Soil Database was fit into the four classification systems—U.S., WRB, Canadian, and Russian—mainly at the subgroup level of Soil Taxonomy or equivalent levels in the other systems. The database was tested in an application for vulnerability of northern soils to physical disturbances. The resulting map shows the areas that have a high potential for erosion, such as Iceland and the northern part of European Russia.

Having a Fulbright scholar at the National Soil Survey Center was a benefit to the NSSC and its activities in the National Cooperative Soil Survey. Dr. Goryachkin's visit has enhanced our contacts with many scientists in Russia, and his contribution while here increases the compatibility and flexibility of the northern soils database and the understanding of different soil classification systems. We hope that similar exchanges will take place in the future.

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New SOILS Web Site Online

From "NRCS Technology News," October 2002.

The new SOILS Web site (http://soils.usda.gov) has been developed by combining the popular National Soil Survey Center and Soil Survey Division Web sites. The reorganized site has a new look and offers many new features and functions, such as improved navigation and loading speed. The SOILS site not only provides user access to soil information, but also offers soil science educational material, standards for the National Cooperative Soil Survey, and a lot more.

Beginning October 1, 2002, all URLs previously linked to the site hosted by Iowa State University are forwarded to the home page of the new site. Users will need to establish a bookmark for the new site, hosted at the Fort Collins NRCS Webfarm.

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Standard Data Format Facilitates Use of Soil Survey Data

From "NRCS Technology News," October 2002.

Soil survey data exported from the National Soil Information System (NASIS) in the new SSURGO Version 2 format is the standard data delivery format for users of soil survey data. Since its introduction more than a year ago, the new data format has been integrated into the Customer Service Toolkit and Soil Data Viewer. RUSLE2 (Revised Universal Soil Loss Equation) and the Windows(c) Pesticide Screening Tool use it. Data exported from NASIS can be imported into Microsoft Access(c) using a database template available on the NASIS Web site http://nasis.nrcs.usda.gov/, and a full set of documentation for the SSURGO Version 2 format is available at http://nasis.nrcs.usda.gov/documents/metadata/ssurgo2_0.

All of this is good news for users of soil survey data. For example, application specialists at the Farm Services Agency (FSA) are working closely with scientists at the National Soil Survey Center to acquire soil survey data needed for the next Conservation Reserve Program (CRP) signup. Although much of their discussion is focused on the scientifically sound application of soil survey data, simply acquiring the appropriate data is an important consideration as well. Acquiring the data is no small task, given FSA's requirements—automate the ranking process as much as possible and use contemporary soil survey data that is consistent with the NRCS Field Office Technical Guide. The task is greatly facilitated by making soil survey data available in the same standard format used by the Customer Service Toolkit.

The next step in development of this process is for the models using soils data in the SSURGO Version 2 format to access the data directly as opposed to creating a subset with the model. Soil scientists have been working with model developers to help achieve this next important step. Once it is achieved, users of models can be assured that the soils data they are using is of the same vintage in all models they run.

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Soil Survey Images

By John Kelley, Soil Data Quality Specialist, USDA, Natural Resources Conservation Service, Raleigh, North Carolina.

The questions asked by those who prepare survey manuscripts include: "What kind of film should I use for the pictures?" "Can I use color film for landscapes?" "Can I use a digital camera?" The answers to these questions are not always simple.

First, the type of format to be used by the printer must be determined. Until recently, manuscripts were submitted in a camera-ready format. A camera-ready product is a paper copy formatted for traditional offset printing. Original images (color slides and black and white prints) are provided to the printer for mounting and printing. Today, many of the surveys are being formatted electronically as "pdf" files utilizing digital images. This format can be used for the traditional printed soil survey report, for CDs, or for posting on the World Wide Web.

What kind of film should I use for the pictures? If you are using a film camera, MO 14 recommends Fujichrome-Sensia II (100 or 200) for color pictures and Kodak-Tmax 100 for black and white pictures.

Can I use color film for landscapes? You may see a few surveys in the near future with all of the images in color, especially on the Web or in the CD version. If color images are used in the printed report, they will be grouped (as soil profiles are). Grouping the color pictures is a cost-saving measure. Because of the added expense, the option of color landscape pictures is not encouraged, except on the cover.

Can I use a digital camera? The electronically formatted manuscript can include both digitally captured images and images stored on film.

If digital images are acceptable, should I use a digital camera or should I continue to use film and scan and convert to a digital image? There are many high-quality digital cameras on the market today. These cameras are small, lightweight, and easy to use, and their images are immediately available for evaluation or use. However, the camera must be able to capture the image at a resolution suitable for publication. The resolution recommended by the Government Printing Office for printed documents is 300 dpi (dots per inch). Even though a printer dot is not the same as an image pixel, the dot and the pixel are roughly comparable. For example, a typical soil survey cover picture is 7.0 x 6.5 inches. For a quality image suitable for publication, the following formula would be used to determine the minimum number of pixels required:

[(7.0 in. x 300 ppi) x (6.5 in. x 300 ppi)] = 4,095,000 pixels

Thus, a quality picture would require a digital camera capable of storing a minimum of 4 megapixels, or 4 million pixels per image. Prices vary widely, depending on camera format (point and shoot or single lens reflex.) The cost of a 4.0+ megapixel camera ranges from about $375 to more than $5,000. A 4.0 megapixel camera is available on government contact for about $450.

The advantage of using film is that it can always be converted to a digital image and stored at any resolution needed in the publication. As a general rule, on-screen or Web-based photo images should be scanned at a resolution of about 72 dpi, images for CDs at about 150 dpi, and images for paper publication at about 300 dpi. The image should be scanned at the size (3x5, 5x7, etc.) needed for publication. ■