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Issue 11

National Cooperative Soil Survey Newsletter

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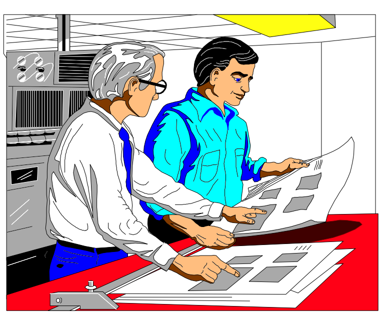
Editor's Note

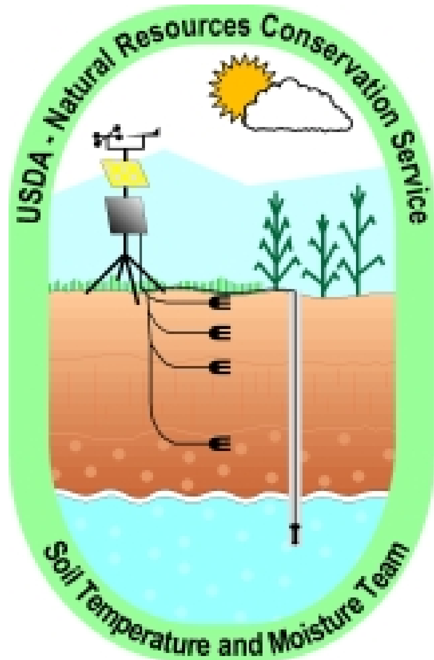
Issues of this newsletter are available on the World Wide Web (www.statlab.iastate.edu/soils/soildiv). Click on NCSS and then on the desired issue number of the NCSS Newsletter.

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.



Soil Moisture/Soil Temperature Pilot Project Nears Completion

By R.F. Paetzold, Research Soil Scientist, Natural Resources Conservation Service, National Soil Survey Center, Lincoln, Nebraska.



Soil water status and soil temperature are critical parameters for many applications, including continental-scale climate models, soil classification, and drought assessment. The Soil Moisture/Soil Temperature (SM/ST) Pilot Project was proposed in 1990 to test the feasibility of establishing a national soil-climate monitoring program that meets the growing demands of the global climate change community, modelers, resource managers, soil scientists, ecologists, and others. The project, a cooperative effort by the Resource Inventory Division and the Soil Survey Division of the Natural Resources Conservation Service, was to examine network communications, sensors, data collection electronics, station maintenance, data management, system interfaces, and management of a large national program.

Installation of 21 stations (in 19 states) began in 1991 and was completed the following year. Air temperature, relative humidity, precipitation, solar radiation, windspeed, soil temperature, and soil moisture were measured at 6-hour intervals initially, then hourly toward the end of the project. Soil temperature and soil moisture were measured at depths of 2, 4, 8, 20, 40, and 80 inches. Later, the 80-inch soil moisture measurement was dropped. Many changes were made to the original design, in response to lessons learned during the course of the project. The original soil-moisture sensors were replaced with sensors of a completely different design. A more robust and versatile datalogger was selected to replace the initial data-collection electronics. Every aspect of the measurement system was evaluated critically and improved where practical.

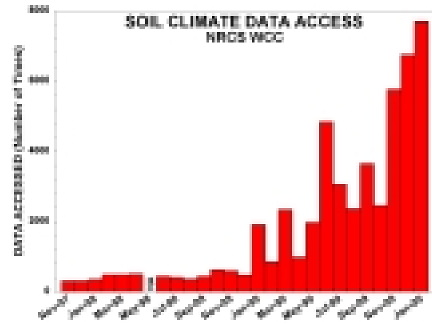
Data from each site were transferred to master stations daily by the meteor-burst communications technology proven in the SNOTEL program. From master stations, data were transmitted via telephone to the central computer facility at the National Water and Climate Center (NWCC) in Portland, Oregon. After the processing of raw sensor output to useful units, the data were evaluated to ensure that all station sensors and electronics were functioning within reasonable limits. Algorithms to process and evaluate the data were designed, and computer coding was developed to accommodate the algorithms. Much of the quality control is still performed by hand, although progress continues to be made on development of software to accomplish this tedious task.

Much of the effort during the 10-year project revolved around evaluating and modifying instrumentation and field methods. Initially, the focus was on developing an operational plan, site selection, and instrument (sensors, communications, data collection systems, etc.) selection. The next tasks were site and soil characterization and station installation. During the early and middle years of the project, emphasis was on system performance. Many difficulties involving operational aspects of individual stations were addressed. Problems with soil moisture sensors were observed at all stations. What initially was considered a sensor calibration problem turned out to be an interface problem involving compatibility between the soil moisture sensors and the data collection electronics. At one time or another, all stations experienced failure of the precipitation sensors. The problem, a culmination of many small effects, was difficult to solve.

As problems with field hardware performance and efficiencies were identified, requests were made to instrument manufacturers to make major product changes. Campbell Scientific, Inc., and Meteor Communications Corporation worked together to make their dataloggers and meteor-burst telemetry compatible. Vitel, Inc., introduced a new model soil-moisture sensor designed to our specifications. They also changed their data-processing software in response to our needs. The Soil Temperature and Moisture Team continues to work with manufacturers on ways to make their products compatible with our needs.

The mid and later stages of the Pilot Project saw increasing emphasis on data management. Processing of incoming data is needed to convert the raw sensor outputs to relevant climatic information. Accomplishment of this conversion required the development calibration curves and associated computer algorithms for each sensor. Data-processing programs had to be written. After the processing was complete, both raw and processed data were stored on the computer. Examination of the processed data provided quality control and identified malfunctioning system components. Initially, user requests required NWCC to send data directly to individuals. Beginning in 1998, data were made available via the Internet through the NRCS NWCC home page.

Demand for Pilot Project data has been strong from the beginning. Users were told repeatedly that this was a pilot project designed to explore the feasibility of establishing a large-scale climate monitoring program, not a data collection effort per se and that the data collected were primarily for evaluation of the project, not for general use, and should be considered unreliable. Still, users DEMANDED that the data be released, even though we considered it to be of questionable quality. This project was one of very few sources of this type of data and the only national-scale monitoring effort in place. Toward the end of the project, this became the most extensive “long-term” data set available. Data downloads from the Internet have steadily and dramatically increased from the first. News of the availability has spread only through word-of-mouth and Internet searches by users. Uses of the data are many and varied, ranging from continental-scale climate models to snake hibernation studies, from satellite-platform remote-



sensor calibration to soil classification. The list goes on and on. Users include research scientists, NRCS field personnel, private industry, and consultants. One request for data came from an energy (oil) company. They indicated that they thought the next crucial commodity would be clean water and they intended to prepare for the demand. It is anticipated that when enough data become available (adequate spatial coverage and sufficient length of record) to define “normal” years, the data will be extremely valuable for defining drought and monitoring the extent and severity of drought events. We constantly receive requests for more data, data from additional locations, and additional soil properties. We have received money from other government agencies and universities to install additional soil climate stations as part of SCAN (Soil Climate Analysis Network), a continuous climate monitoring program that is an outgrowth of the SM/ST Pilot Project. The enormous worldwide demand for soil-climate data of the type produced by the project suggests a definite and immediate need for a national network of monitoring stations. The STM Team now manages more than 100 cooperative soil-climate stations. More than 50 have been installed in direct response to NRCS requests. The project resulted in the accumulation of a great deal of experience in instrumentation, large-scale project management, and data management. Thus, there has been a strong demand for this expertise from others interested in establishing monitoring programs of all sizes.

The Pilot Project successfully demonstrated the feasibility of a national NRCS data-collection program for gathering needed soil-climate data. Technical challenges associated with sensors, interfaces, data transmission, and data management have been solved. The Soil Temperature and Moisture Team hopes that the SCAN program will be funded and that the Pilot Project stations will be upgraded and converted to SCAN stations. SCAN would be a highly visible program enhancing the prestige of NRCS and providing a much-needed service to a wide range of users. ■

One View of the Future

By Thomas E. Calhoun, Program Manager, Soil Survey Division, Natural Resources Conservation Service.

What is our vision for the National Cooperative Soil Survey program?

The initial soil survey of private lands in the U.S. is almost complete, and we continue updating out-dated surveys. In these updates we are looking at soils to greater depths than we used to, and we are updating surveys on the basis of MLRA's rather than counties. Our objective now is to keep surveys current rather than redoing them after 25 years. These mechanics are important, but are we really doing anything very different from what we have done in the past? It is time for us to shift our focus to the future and help people get the maximum use from all the information we have collected over the past 100 years. Rather than merely adjusting the way we go about our business, we need to guide the soil survey program in directions that will keep it viable and valuable to the American public. One of my favorite statements is, "Destination is not a finite place. Rather it is a compass by which you judge how far you've come." Now, after 100 years, we need to adjust our compass and move toward a new destination.

We are now at a starting point where we have the basic resource data necessary to begin to help the U.S. do some strategic resource planning. Having gathered this information, we have an obligation to explain to our citizens that soils are strategic, limited resources that we must sustain and use wisely if we are to meet domestic and international needs. We must help the American public to better appreciate the value of soil resources and must make NRCS an advocate and steward of the world's soil resources, not just an erosion-control agency. For us to do that, however, we must change the way we think.

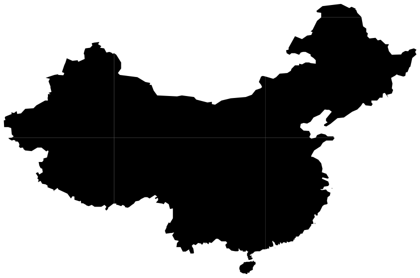
Controlling erosion became the focus of our agency with the 1930's Dust Bowl. In this new millennium we are still dealing with this legacy. Our programs remain focused on controlling erosion. We may give this program emphasis new names, such as "water quality," "air quality," "watershed planning," and "Environmental Quality Incentives Program," but the emphasis is still on erosion control. We have developed the technology to deal with these problems, so now what?

Look at the NRCS Strategic Plan. Eight strategic objectives are listed. Though they are all worthy objectives, they miss the point. There are many agencies having objectives and expertise that deal with land use. Our expertise is soil resource management and sustainability. There is no strategic objective in the plan for being stewards of the Nation's soil resources. Instead, the agency is an advocate for wetlands, grazing lands, wildlife habitat, watersheds, and cropland. The agency has chosen to develop its strategic objectives around land use issues rather than around our technological expertise for dealing with resource sustainability, management, inventories, and other technical concerns. We claim that soil information is our fundamental resource information, but we do not highlight its importance by identifying healthy, productive soils as our number one strategic objective.

NRCS, by design, is closely tied to our private-sector partners, who are concerned with land use issues, but I doubt that we both need to have the same agenda. Partnerships should benefit from the strengths that each partner brings to the table. NRCS brings science and technological expertise, and our private-sector partners bring land management and land use issues that are more political in nature. Those two agendas in combination can and should be very powerful in addressing worldwide strategic resource issues. Two examples of emerging world issues, one concerning food consumption in China and the other concerning tropical fruit production in the U.S, illustrate the potential benefits of this synergy.

As worldwide economies grow, the demands on U.S. agriculture are building. Although current commodity prices hardly support the theory of increasing demand, most forecasters still claim that significant increases in the demand for commodities are imminent.

Lester Brown, in a book called *Who Will Feed China? Wake-up Call for a Small Planet* (published by W.W. Norton & Company, New York and London, 1995), argues that China's improving economy (56 percent expansion between 1992 and 1995) enables her citizens to diversify their diets and consume more meat, eggs, and milk (the products of grain-fed



livestock). This diversification in a nation of 1.2 billion people could overwhelm the export capacity of the major grain-producing countries.

According to Brown, the cropland base in China is shrinking because of water shortages and the encroachment of infrastructure growth on farmland. He projects that China will lose about half of its grain-producing land by the year 2030. The resulting shortfall in grain production will be filled by imports. This development could change the world grain market from a buyer's market to a seller's market, resulting in worldwide inflationary rises in food prices.

Brown identifies not only a need to stabilize the world population but also a need to protect the agricultural resource base of soil, water, and climate systems. He calls for an international plan to stabilize soils at "T," or to farm soils sustainably and thus reduce the impact of the demand for increased grain production.

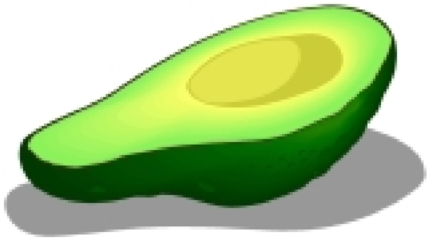
This book has caused considerable debate, including debate among the Chinese themselves on its accuracy. The strong demand for commodity crops has not occurred as rapidly as was anticipated because there was an unpredicted global financial crisis in the mid-1990's. As a result, many believe Brown to be an alarmist. Yet, the trends he identifies and the case he makes for wise resource management still appear to be valid.

U.S. farmers are prepared to increase productivity and thus help meet increasing demands, but in doing so, do they know how to sustainably manage the more fragile margins of our soil resources, such as highly erodible lands? Is it not important to our Nation, before the impact is felt, to help people understand how they can continue to use their soils without degrading them? Yes, we need to help people understand the concept of resource sustainability and how to maintain soil quality. How intensively can soils be used before they pass the threshold of degradation? What must we do to get degraded soils back to a state of sustainability, and how much more would it take to reclaim them? This should be the forte of NRCS. We should develop these concepts, train resource managers in them, and help to develop conservation plans that use the concepts to conserve and sustain our resources and sustain the productivity of our soils.

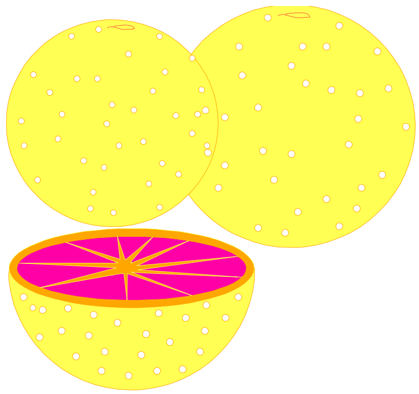
In a report on the *State of the World 2000, a Worldwatch Institute Report on Progress Toward a Sustainable Society*, Brown addresses global ecological challenges in this manner:

> Although the contrast between our civilization and that of our hunter-gatherer ancestors could scarcely be greater, we do have one thing in common—we, too, depend entirely on Earth's natural systems and resources to sustain us. Unfortunately, the expanding global economy that is driving the Dow Jones to new highs is, as currently structured, outgrowing those ecosystems. Evidence of this can be seen in shrinking forests, eroding soils, falling water tables, collapsing fisheries, rising temperatures, dying coral reefs, melting glaciers, and disappearing plant and animal species.

Brown may be an alarmist, but he cites many symptoms of declining ecosystem health that resource scientists in soil survey deal with on a daily basis.



Another scenario is in the political arena of land use. Production of tropical fruit (e.g., citrus and avocados) is endangered in the U.S. It is limited primarily to southern California, southern Arizona, south Texas, and south Florida. As southern California, southern Arizona, and south Florida become urbanized, tropical fruit production is being squeezed out, if you will. In southern Arizona the shortage of water is accelerating the loss. Many areas in south Florida are no longer used for tropical fruit production because of the need to prevent pollution of the Florida aquifer and to restore the Florida Everglades. South Texas remains the center of least change, but intensification of the regulation of labor



is driving many producers in the area to grow crops that are less labor intensive.

If these are important products for the U.S. consumers, where will they be produced? They will be imported. Is it not therefore important for this country to identify areas of the world with appropriate soil resources for these crops and to protect, improve, and sustain those resources? The technical expertise of our NRCS scientists can help to identify those areas for the politicians, who can deal with the land use issues.

The issues of food consumption in China and tropical fruit production in the U.S. both show that soil is a strategically important, limited, international natural resource that can be critical when wise land use decisions are needed.

Rather than standing on the sidelines and using our same old erosion-control know-how to repair the damage after the fact, NRCS should get ahead of the curve and develop the technology and information to help people learn to manage their more fragile resources in a sustainable manner. If we are truly to be advocates for the soil resource, we must shift the focus of our soil survey program and:

- Modernize soil surveys in ways that support a proactive application of information;
- Develop a totally digitized soil layer for the U.S. (at a minimum) as a tool for evaluation and extrapolation of ideas;
- Apply the concepts of soil quality;
- Develop indicators of sustainability;
- Establish threshold values for managing soils;
- Develop GIS tools to analyze for the most sustainable soil use alternatives;
- Establish a long-term program for monitoring soil health;
- Understand the dynamics of our land resources;
- Develop educational programs for the public;
- Develop cause-and-effect scenarios to help land managers predict the impact of management plans;
- Be prepared to tell people what they can do with their soil and other natural resources, not what they cannot do;
- Provide soil-function interpretations, such as soil as a water filter, soil as a degradation medium, and soil as structural support;
- Develop tools to assist farmers, communities, and watersheds in the development of a balance of soil functions most appropriate for their particular conditions;
- Be proactive in protecting strategic, limited soil resources; and
- By providing critical information, promote wise land use decisions that help to sustain the resource.

These items differ markedly from what we are doing now. We must help people understand soil. We must develop a dynamic soil survey program responsible to customers, consisting of internationally recognized soil scientists and support staff who understand and promote wise use of soil resources, provide global standards, and are of service to science and our Nation. ■

Soil Survey in the Twenty-First Century

By Horace Smith, USDA, Natural Resources Conservation Service, Soil Survey Division, Washington, D.C., and Berman D. Hudson, USDA, Natural Resources Conservation Service, National Soil Survey Center, Lincoln, Nebraska.

From its conception, the soil survey program in the U.S. has been oriented towards specific applications. A major objective of the earliest surveys was to identify lands that were suitable for the introduction of specific crops, such as tobacco (Gardner, 1998). Later, after the droughts of the 1930's caused great ecological damage and severe human suffering, soil surveys were increasingly used to plan conservation and erosion-control systems (Dumanski, 1993). More recently, soil surveys have been used to provide information for use in protecting wetlands, reducing pollution of waterways and ground water, controlling storm-water runoff, and many other environmental objectives.

Changing uses of soil surveys reflect—and often require—changes in our knowledge, concepts, and models of soil. Dumanski (1993) recently presented five models or conceptions of soil that originally were articulated to him by R.T. Meurisse. Each of these models presents a different framework or viewpoint for use in organizing knowledge about a soil system. The five models or viewpoints include soil as (1) a natural body, (2) a medium for plant growth, (3) a structural material, (4) a water-transmitting mantle, and (5) an ecosystem component. All of these models have had and will continue to have a place in the soil survey program in the U.S. Three of these models—soil as a natural body, as a medium for plant growth, and as a structural mantle—have been used for many years. The other two models—soil as a water-transmitting medium and as an ecosystem component—were recognized more recently and still are evolving rapidly as concepts. A strategy to guide the soil survey program in the 21st century must reflect each of these models. Accordingly, the ensuing discussion will address the potential role of each.

Soil as a Natural Body

The concept of soil as a natural body has its origin in the soil factor equation outlined by Dokuchaeiv (Glinka, 1927)

and Hilgard (Jenny, 1961). This well-known equation characterizes soil as a function of parent material, climate, organisms, relief, and time. It has served as a powerful and highly useful model. It led early pedologists to reason correctly that, by looking for changes in one or more of these factors as the landscape was traversed, one could accurately plot the boundaries separating different kinds of soil anywhere in the world.

The promise inherent in the original soil factor equation was given a more precise focus by Milne's (1936) introduction of the catena concept—the idea that soils are predictably related to landscape position. As a result of many years of soil survey experience, the soil factor equation and the catena concept evolved into a more applied and refined conceptualization—the soil-landscape model (Hudson, 1992). This model now serves as the primary medium for soil-based technology transfer. It also serves as the foundation for the other models to be discussed.

Mapping Surface Shape

The soil-landscape model is the scientific underpinning of the soil survey program. Therefore, improving the way we apply it can have immense benefits to soil science. There are several promising areas for future improvement in the next century. Hall and Olson (1991, p. 21), in a very insightful article, presented this disturbing but, we believe, accurate criticism of many current soil maps:

> Much effort has been expended on taxonomic classification of soils during the last few years but the importance of proper representation of landscape relations within and between soil mapping units has been virtually ignored. The same mapping unit is often delineated on convex, concave and linear slopes. This mapping results in the inclusion of areas of moisture accumulation, moisture depletion and uniform moisture flow within a given mapping unit.

These authors make an important point. Convexity and concavity of slopes are important determinants of water movement across the landscape and the relative availability of water to enhance soil formation and plant growth. The relative convexity or concavity of the land surface often affects plant growth more than the degree of slope. Many existing soil maps, however, do not adequately reflect the shape of the land surface. This defect is a result of an almost exclusive reliance on air photo interpretation to delineate landforms and slopes. With practice, one can do a reasonable job of identifying degree of slope. Even with a stereoscope, however, it is virtually impossible to determine land surface shape from an air photo. Fortunately, very recent technology will enable us to delineate areas differing in convexity and concavity very accurately and with great precision. For example, digital elevation models (DEM's) now available will yield a number of useful derivative maps, including slope percent, rate of slope change, aspect, and diurnal variation of sun energy on a slope. Wider use of DEM's and the recognition and delineation of soil map units based on surface shape—in addition to degree of slope—will result in more useful soil maps in the 21st century.

Characterizing Soil Boundaries

Soil scientists have long known that some soil boundaries are very "sharp," while others are very gradual or "fuzzy." In the past, it has not been possible to show different kinds of boundaries on soil maps. With modern geographic information system (GIS) technology, however, it is feasible to differentiate very distinct soil breaks on the landscape from those that occur more gradually. In the 21st century, the nature of the boundaries between soil areas on the landscape will be determined and stored as an attribute in GIS-based soil information systems.

Expert Knowledge Systems and "Fuzzy Logic"

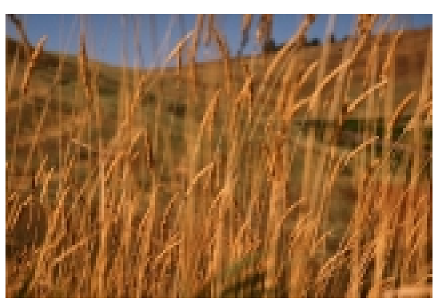
Hudson (1992) argued that application of the soil-landscape model suffers from a reliance on tacit knowledge. In the course of their work, soil scientists acquire much detailed knowledge about the soils and their distribution on the landscape. However, most of this knowledge is used only to prepare soil maps; very little of it is written down. A large body of scientific information now exists only on soil maps (not discernible to most people) and in the minds of astute soil mappers. As a result, each generation of soil scientists must relearn much of what previous generations have already discovered. A way must be found to avoid this problem. One possible solution is the application of expert knowledge systems using "fuzzy logic."

The concept of fuzzy logic expands the exact *if/then* rationale of Boolean logic to conditions of continuous variation in which classes may overlap (Burrough, 1993). This concept is applicable to soil survey. The proposed application method consists of a soil-land inference model combining the knowledge of local soil scientists (a knowledge base) with layers of information in a GIS (a physical data base). A computer program is written to link the local knowledge base with the physical data base in order to predict soil properties at any selected point.

The application of expert knowledge systems to the mapping of soils holds great promise. It can improve the accuracy and precision of maps. In addition, building local knowledge bases will force us to write down all of the information and concepts used by local soil scientists to make decisions while mapping soils. This requirement will reduce reliance on tacit knowledge. As a result, the efficiency of knowledge transfer among individuals and between generations will be enhanced. Research and development into the use of expert knowledge systems to apply the soil-landscape model more effectively must be a priority in the 21st century

Soil as a Medium for Plant Growth

This model has been used to predict the potential and limitations of land areas for plant growth, principally those used for food or fiber. Properties that can be used to predict suitability of soil as a medium for root growth have been emphasized. Examples are texture, available nutrients, available water, and soil density. This traditional model has been applied with such overall success that overproduction of food and inadequate markets are primary concerns in many developed countries. This bounty has not been without its costs. Soil erosion on farmland has long been recognized as a problem. Recently, agricultural runoff has been recognized as a source of phosphorus, nitrogen, pesticides, microbial organisms, and other constituents that can degrade the quality of aquatic systems. In the future, the focus of this model increasingly will shift from maximizing crop production to emphasizing an environmentally benign agriculture, which will require that fertilizer and other inputs be optimized to meet but not greatly exceed crop needs. If such trends continue, developing soil (and landscape) threshold levels for nitrogen, phosphorus, and other agricultural inputs will be a major task for soil survey in the next century.

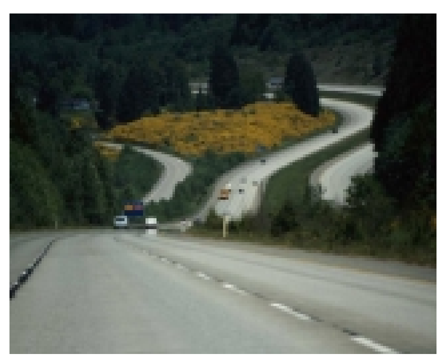


Precision Agriculture

Precision agriculture is growing rapidly in the U.S. This development was made possible by the convergence of several technologies, including yield monitors on harvesters, precise global position systems (GPS), and computers capable of storing large amounts of digital data. Adapting to the needs of precision agriculture will be a major challenge for the soil survey program in the U.S. For example, we must develop procedures and quality-control criteria for preparing very detailed soil maps. Precision agriculture includes temporal as well as spatial precision. Therefore, it will be necessary to gain a better understanding of temporal soil properties in the 21st century.

Soil as a Structural Mantle

This model relates to the use of soils for the infrastructure necessary to



modern societies. It has direct application to such diverse activities as urban and suburban development; construction of dams, highways, and airports; and onsite waste disposal. The model relies heavily on estimations of soil strength and plasticity as well as the soil's ability to transmit heat, water, and energy. The soil survey of the 21st century will require enhancements to the way this model is applied. Burrough (1993) stated that, compared with other resource-monitoring sciences, soil survey is notable because most of the information collected and presented to users remains qualitative in nature. That criticism is especially applicable to information used to support the model of soil as a structural mantle. Therefore, it is important that we identify the kinds of quantitative data needed to support this model and begin collecting it.

It also is important that the soil and the underlying material be characterized to a greater depth. The needs of the 21st century will no longer allow us to restrict our zone of investigation to the top two meters of the earth's surface. Such artificial boundaries, whether in our minds or on the landscape, can no longer be tolerated. The soil survey of the 21st century will require a concerted effort to study and characterize the soil and underlying material to whatever depth is needed to meet our scientific needs. All appropriate technology, including ground-penetrating radar and geomagnetic studies, will be employed.

Soil as a Water-Transmitting Mantle

Soil is recognized as a major component of the hydrologic cycle. It is a complex, highly organized, porous medium permeable to both atmospheric gases and water. Soil plays a vital role

in the partitioning of water on the landscape. This model has major implications for public health, watershed management, and environmental quality. The soil survey historically has provided measures or estimates of physical soil properties to be used in various models dealing with water movement. Pedotransfer functions commonly are used to derive input values for models. There is at least one major problem with this process. The soils information provided to modelers typically is limited to pedon data—measurements or estimates made at a single point on the landscape. This kind of limited information will not suffice in the future. A research program focused on understanding water-soil interactions at the landscape level must be an integral part of soil survey in the 21st century.

Soil as an Ecosystem Component

This is an emerging model of soil and a promising one for the future of the soil survey program in the U.S. It views soil as a dynamic, living mantle or membrane in constant interaction with the atmosphere, biosphere, and geosphere. This model postulates that the pedosphere is an essential part of all land-based life-support systems on earth.

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Language Matters

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

Bob Ahrens, Director of the National Soil Survey Center, sent me the following note, which is entitled “I or Me”:

> Knowing the case of a pronoun is imperative to proper grammar. Many people seem confused by pronouns, and one frequently hears “I’s” that should be “me’s.” For example, the subject of the sentence “Elvis and I are going to Memphis next week” is “Elvis and I.” “I” is the correct pronoun. The subject of the sentence “Are you going with Elvis and me?” is “you.” “Elvis and me” are objects of the preposition “with.” The correct pronoun is “me,” not “I.”

All I can add is that I am amazed when people who would never say “Me ate the sandwich” will say such things as “Elvis and me ate all the grilled peanut butter and banana sandwiches.” I am amazed not only by the poor grammar but also by the facts. I thought that Elvis died back in the 70’s. ■

Announcement: West Regional NCSS Conference

By Chris Smith, State Soil Scientist, Natural Resources Conservation Service, Honolulu, Hawaii.

The west regional NCSS conference will be held at the King Kamehameha Hotel in Kailua Kona, Big Island, from June 26 through 30. The theme of this conference will be”Understanding Today’s Critical Soil Resource Issues and Formulating the Best Strategies for Data Acquisition and Information Delivery.”

A midweek field tour conducted by Dr. Oliver Chadwick, University of California at Santa Barbara, will focus on the evolution of volcanic ash soils along a climatic gradient, how their properties are affected, and how selected interpretations for use change.

A preconference tour of the soils and geology of Volcanoes National Park will be conducted on Sunday, June 25.

A postconference tour on Saturday, July 1, on Oahu will depict the landscape and soil evolution of the Oxisols and Ultisols on the Wahiawa Plateau. ■