

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.



Aspects of a Use-Dependent Data Base

By Robert B. Grossman and Jim R. Fortner, Soil Scientists, USDA, Natural Resources Conservation Service, National Soil Survey Center, Lincoln, Nebraska.

Introduction

The traditional soil survey data base does not change with the use of the soil. Rather, it is intended to be applicable to the dominant land use of that soil in the survey area. The same data apply, whether a given area of the soil is used as cropland, rangeland, or forestland, whether the forestland is recently clearcut or an old stand, whether the rangeland is in excellent or poor condition, and whether the cropland is tilled by conventional or no-till systems. Differences in soil properties and hence in behavior may be large. These significant differences argue for a use-dependent data base.

Illustrative Data

Table 1 shows measured values and values from the soil survey data base for the near surface of Aksarben and Monona soils, which occur in the western Corn Belt. Cultivated and grass sites are compared. Figure 1 shows the sites for the Aksarben soils. Based on the nomograph method, erosion factor K is higher for the cultivated sites. Both soils are assigned hydrologic group B. The cultivated sites may be C or D. Differences in both hydrologic group and erosion factor K affect the method of screening for pesticide loss

used by the Natural Resources Conservation Service.

Implementation

Soil mapping.—No change would be needed.

Use groupings.—Grouping of soil uses is needed to make the number of alternatives manageable. Decisions would need to be made as to which land uses have values for selected soil properties that are sufficiently different to justify separation. The extent to which modeling could be used to predict use-dependent properties from use-invariant data is not clear. Differences resulting from various tillage practices might be modeled successfully. The difference between rangeland and cropland might not be subject to modeling.

Soil data records.—The records used for soil behavior would be a combination of use-dependent and use-invariant data. Identification of the use-dependent properties and determination of the depth to which use-dependence extends would be required.

NASIS.—The Natural Resources Conservation Service stores and manages data associated with the National Cooperative Soil Survey in the National Soil Information System (NASIS). The NASIS computer software is designed to be flexible and dynamic, so that, as new ways of describing and documenting soils are identified, the data base can be modified as needed.

NASIS currently accommodates the separation of soils into seven primary earth cover groups, such as crop cover, grass/herbaceous cover, and tree cover,

Table 1.—Comparison of near-surface properties between grassland and cropland for Aksarben and Monona soils¹

Property	Measurements		Current data base
	Grassland	Cropland	
Aksarben:			
Aggregate stability (pct) ²	95	10	N/A
Bulk density (g cm ⁻³) ³	1.20	1.35	1.35-1.55
Organic matter (pct) ⁴	6	3	2-4
K _{sat} (in hr ⁻¹) ⁵	0.3	0.02	0.6-2
Infiltration (in hr ⁻¹) ⁶	0.3	0.03	N/A
Structure ⁷	Moderate or strong fine subangular	Weak coarse blocky	N/A
Derivative quantities:			
Hydrologic group ⁸	B	D	B
K factor ⁹	0.32	0.44	0.32
Potential pesticide loss: ¹⁰			
Through leaching	Low	Very low	Intermediate
In runoff	Intermediate	High	Intermediate
Monona:			
Aggregate stability (pct) ²	85	25	N/A
Bulk density (g cm ⁻³) ³	1.11	1.44	1.25-1.30
Organic matter (pct) ⁴	3.6	2.9	2-4
K _{sat} (in hr ⁻¹) ⁵	0.13	0.07	0.6-2
Infiltration (in hr ⁻¹) ⁶	1.3	0.10	N/A
Structure ⁷	Moderate fine and medium subangular blocky	Weak coarse blocky	N/A
Derivative quantities:			
Hydrologic group ⁸	B	C	B
K factor ⁹	0.27	0.43	0.32
Potential pesticide loss: ¹⁰			
Through leaching	Low	Intermediate	Low
In runoff	Intermediate	High	Intermediate

¹ Aksarben: Typic Argiudolls, fine, smectic, mesic; 35-40% clay in Ap; 2-5% slope; low erosion; comparison of 25 or more years smooth bromegrass meadow and a short-term soybean-grain sorghum rotation under a no-till system; no surface-connected macropores.

Monona: Typic Hapludolls, fine-silty, mixed, superactive, mesic; 25% clay in Ap; 2-5% slope; low erosion; comparison of 10 years smooth bromegrass in the Conservation Reserve Program and a recent corn-soybean rotation under a no-till system; no surface-connected macropores.

² Method 4G1, Soil Surv. Invest. Rep. 42.

³ Maximim 0-20 cm.

⁴ 0-20 cm.

⁵ Amoozometer—constant level borehole device. Water column 10-25 cm.

⁶ Steady ponded. Small double ring device. Wetted previous day.

⁷ Weakest 0-20 cm.

⁸ Based on K_{sat} of the near surface if it is lower than that in the subsoil.

⁹ Nomograph method using texture, organic matter, structure, and permeability.

¹⁰ Goss and Wauchope. 1990. Proc. 3rd Nat. Res. Conf. on Pesticides.



Figure 1.—Aksarben soils, southeast Nebraska. Grassland is on the left; cropland, on the right. The ruler case in the lower photos is 5x5x2 cm.

as a means of making use-dependent separations; however, very little use of this capability has been made to date. Secondary categories, such as row crops, close-grown crops, and hardwoods, also are available. Additional categories can be added to these separations, and other levels of separation can be added as needed. Changes in the data model can be made if a new manner of displaying the data becomes necessary.

Advantages

1. The accuracy of interpretations would be increased.

2. Users would be empowered to select the most applicable soil property dataset.

3. Implementation would of necessity bring technical soil services and soil mapping activities closer together.

4. Plant scientists and agronomists would become more involved in the soil survey program.

5. Field experimental studies generally are use-specific. The results of these studies would be more directly applicable to use-dependent data bases than to use-invariant data bases.

6. Use-dependent data can be classified for evaluation of soil quality.

7. A use-dependent data base would provide a large body of information about the state of America's land.

Summary

A use-dependent data base should be feasible. It would give customers the latitude to select the dataset most applicable to their soils instead of the present obligatory data base. Further, it would facilitate the evaluation of soil quality. Establishment of an operative use-dependent data base would require much work and would be a complex, multifaceted undertaking. ■

ISCO Symposium and Tour

By Henry Mount, Soil Scientist, USDA, Natural Resources Conservation Service, National Soil Survey Center, Lincoln, Nebraska.

A National Soil Survey Centennial Symposium was held at the Lied Center in Nebraska City, Nebraska, on May 19, 1999. This symposium was the start of an International Soil Conservation Organization (ISCO) tour. In addition to scientists from the United States, 22 conservation leaders from Europe, Africa, and Asia attended the symposium.

Headlining the list of 10 speakers for the symposium, Maury Mausbach, NRCS Deputy Chief for Soils and Resource Assessment in Washington, D.C., gave the keynote address. Other speakers included—

- Robert Manley, former professor at the University of Nebraska, who gave an outstanding presentation entitled “The Settlement of the West: The Role of Soils.”
- Douglas Helms, NRCS Historian at Washington D.C., who presented “History of the National Soil Survey.”
- Dave Lewis, Soils Professor and Chair of the Horticulture Department at the University of Nebraska, who presented “The Science of the National Soil Survey.”
- Bob Ahrens, National Leader for Soil Classification and Standards at the National Soil Survey Center in Lincoln, Nebraska, who gave a presentation entitled “Current Techniques in Soil Survey.”
- Chuck Gordon, MLRA Leader in Bozeman, Montana, who presented “Current Applications and Interpretations.”
- Dave Anderson, from the Information Technology Center at Fort Collins, Colorado, who presented “Soil

Survey Information, Data Delivery and Modeling.”

- Dayle Williamson, Director of the Nebraska Natural Resources Commission in Lincoln, who presented “Future Challenges: Geographic Information Systems.”
- John Doran, Research Soil Scientist for the Agricultural Research Service in Lincoln, Nebraska, who presented “The Role of Soils in Sequestering Carbon.”
- Paul Johnson, former chief of the Natural Resources Conservation Service, who gave an inspiring talk entitled “The Case for a National Soil Quality Policy.”

A tour followed the one-day symposium. A bus carried the participants from Nebraska City to Independence, Columbia, and St. Louis, Missouri, on May 20 and 21, then to Cahokia Mounds (fig. 1), Lexington, and Champaign, Illinois, on

May 22. On May 23, the participants were bussed to Purdue University for the start of the ISCO meetings.

Combinations of historical, cultural, and agronomic research stops were integrated into the tour. The first stop, on May 20 at the Truman Library in Independence, Missouri, provided the participants the opportunity to examine the significant collected works of President Harry S. Truman. Dennis Potter, NRCS Soil Scientist in Missouri, provided leadership during the next stop, which was at Le Bourgeois Vineyards outside Columbia. Dennis displayed a monolith of Menfro soils, which was well received.

Stops at the University of Missouri on May 21 included two long-term erosion research areas—the Miller-Duley plots and Sanborn Field. Next, the participants were shown the Marbut soil map of Missouri—an awesome construction made of plaster of Paris.



Figure 1.—At Cahokia Mounds in Illinois, the participants scaled Monk’s Mound, the tallest and largest earthen mound in the world.



Figure 2.—At a stop in Champaign, Illinois, Dr. Loit Reintam creates a painting of the Drummer series, the Illinois state soil.

This huge map (25 by 25 feet) is priceless in its significance to the history of the Soil Survey Division. The participants viewed additional erosion plots at Kingdom City, Missouri. Dr. Gene Alberts, Research Soil Scientist for the Agricultural Research Service in Columbia, provided leadership for the stops on May 21. Bill Pauls, NRCS Soil Scientist in Missouri, explained the soils and landscapes between Kingdom City and St. Louis. He also showed an excellent video on the Dust Bowl for the foreign scientists before we arrived at our hotel near the Gateway Arch.

On May 22, Dr. Renita Dalan, Archaeologist for Southern Illinois University, presented her research at the Cahokia Mounds Visitor's Center before the group climbed Monk's Mound. She explained how her research integrates into the soil survey activities of Sam Indorante, NRCS Soil Scientist at Carbondale, Illinois. Bob McLeese, NRCS State Soil Scientist for

Illinois, explained the soils and landscapes between Cahokia Mounds and Champaign, Illinois. At a stop near Lexington, Illinois, Mike Kelley gave details on the world-class no-till operation on the Jim Kinsella farm. He noted that more than 60,000 people have visited the farm since it became open to the public. The ISCO tour stops concluded at Champaign, where the Morrow Plots and soil pits at the University of Illinois South Farms were examined (fig. 2). Dr. Bob Darmondy provided leadership in the discussion at the stops in Champaign.

Any extended tour involving foreign scientists requires concerted planning and, at best, is a difficult process. Planning and execution of the ISCO symposium and tour was made easier by Earl Lockridge, Jim Fortner, Rick Bigler, and Gary Muckel from the National Soil Survey Center; Dr. John Gilley from the Agricultural Research Service in Lincoln, Nebraska; and Max Schneff, SWCS Director at Ankeny, Iowa. ■

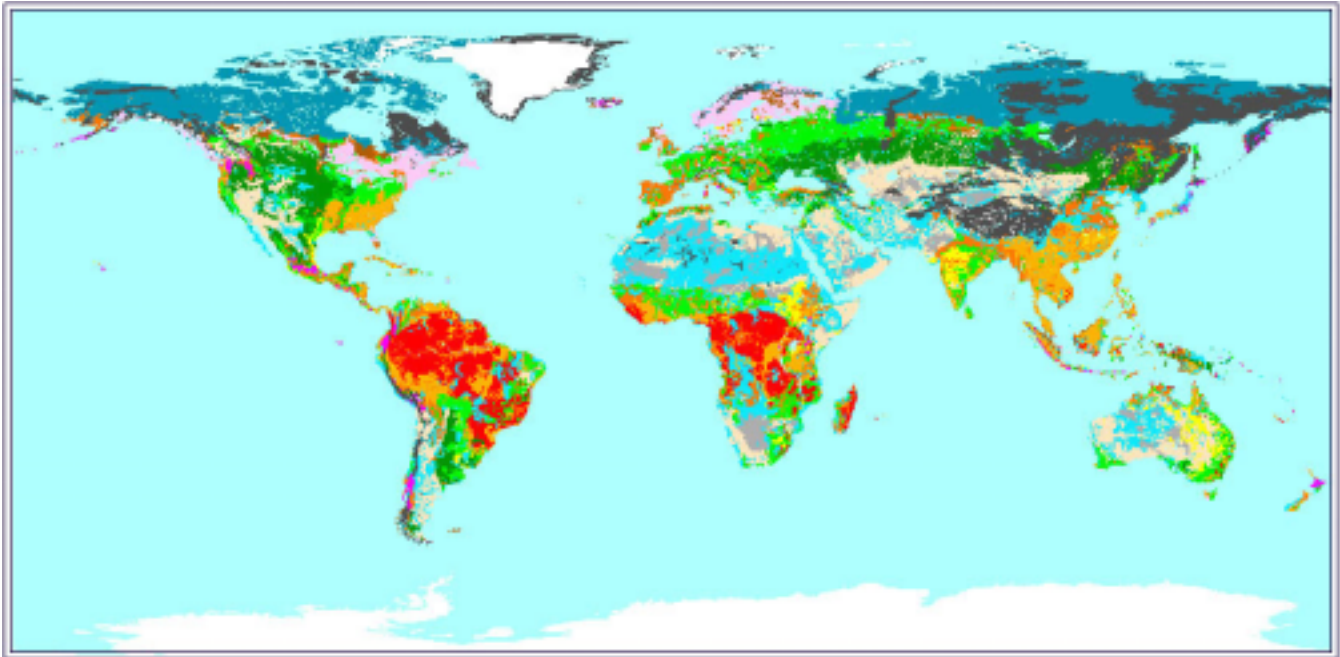
Soil Quality Thunderbook

By Craig A. Ditzler, Director, Soil Quality Institute, USDA, Natural Resources Conservation Service, Ames, Iowa

The Soil Quality Institute in Ames, Iowa, has distributed copies of "Soil Quality Thunderbook" to NRCS state offices for distribution to NRCS field offices. Copies also have been sent to Regional Offices, MLRA Offices, Institutes, the National Soil Survey Center, and NACD and RC&D leadership. The institute created the thunderbook to help field office personnel to identify soil quality information for their region and to organize the materials into a handy reference tool. Many of the institute's customers have suggested that a system is needed for organizing and filing soil quality information. The thunderbook can be used by field, state, and district personnel to customize a soil quality reference book that meets local needs.

Thunderbooks are a traditional agency marketing and educational tool. They have been customized and used by conservationists since the early years of the Soil Conservation Service (now called the Natural Resources Conservation Service). The "Soil Quality Thunderbook" has tabs and suggested topics for easy organization of soil quality material now and in the future and has references to sources of additional information and educational materials.

Copies of the contents of the thunderbook can be downloaded from the Soil Quality Institute web site—<http://www.statlab.iastate.edu/survey/SQI/sqihome.shtml>. For more information about acquiring or using the thunderbook, contact Cathy Seybold at seyboldc@ucs.orst.edu or 541-737-1786 or Ann Lewandowski at alewand@soils.umn.edu or 612-624-6765. ■



Soil Taxonomy, Second Edition

By Robert J. Ahrens, National Leader, Soil Classification and Standards, USDA, Natural Resources Conservation Service, National Soil Survey Center, Lincoln, Nebraska.

The second edition of *Soil Taxonomy* was published through the U.S. Government Printing Office in the summer of this year. A printed copy of this publication can be obtained from the following source:

Superintendent of Documents
 Phone: 202-512-1800
 FAX: 202-512-2250
 Web site: <http://www.gpo.gov>

Price: \$84
 Stock number: 001-000-04663-2

An electronic copy of the publication is available in PDF format on the World Wide Web under the Standards for Soil Survey link from the National Soil Survey Center home

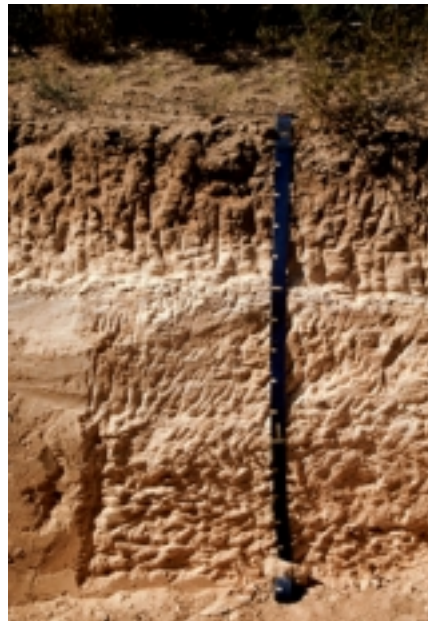


Figure 1.—A photo from *Soil Taxonomy* showing a petrogypsic horizon beginning at a depth of about 50 cm in a Petrogypsid from New Mexico. A petrogypsic horizon is a cemented or indurated accumulation of secondary gypsum.

page, which can be accessed from the Soil Survey Division home page (<http://www.statlab.iastate.edu/soils/soiltax/tax.pdf>). The PDF format consists of a text file, which is about 9,900 KB, and a map file, which is about 15,500 KB. Hyperlinks have been established between the text file and the map file; between the text and other publications, such as the *Soil Survey Manual* and the *Keys to Soil Taxonomy*; within and between chapters in the text; from the index to the text; and from photographs (fig. 1) and diagrams to the text. Acrobat Reader 3.0 or 4.0 is needed for access to the electronic version of the publication. The PDF files can be saved to a hard drive or server.

The National Production Services Staff, Natural Resources Conservation Service, Fort Worth, Texas, is duplicating a CD-ROM containing the electronic version of the publication as well as Acrobat Reader 4.0, which can be downloaded from the disk. Copies of this CD-ROM will be available for distribution in the near future. ■

Language Matters

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

Dangling Constructions

Most dangling constructions are participial phrases at the beginning of sentences:

“Walking to the store, a car nearly hit me at an intersection.”

Edited: “As I was walking to the store, a car nearly hit me at an intersection.”

Some dangling constructions are at the end of sentences:

“Onsite investigation is needed when planning the use and management of specific sites.”

The only noun that the words *when planning the use and management of specific sites* can modify is *Onsite investigation*. Edited: “Onsite investigation is needed when the use and management of specific sites are planned.”

Another kind of dangling construction is a dangling infinitive:

“In some areas the spoil material has been regraded to eliminate the highwall.”

The infinitive *to eliminate* is dangling. No noun in the sentence can perform the action indicated by the verb. Edited: “In some areas regrading the spoil material has eliminated the highwall.”

Another kind of dangling construction is a dangling elliptical clause:

“If drained, equipment can be used.”

The elliptical clause *If drained* illogically modifies *equipment*. Edited: “If the soil is drained, equipment can be used.”

“If cultivated, erosion is a hazard.”

The elliptical clause *If cultivated* illogically modifies *erosion*. Edited: “If the soil is cultivated, erosion is a hazard.”

“Reaction is very strongly acid to slightly acid, unless limed.”

The only noun that the clause *unless drained* can modify is *Reaction*. Edited: “Reaction is very strongly acid to slightly acid unless the soils are limed.”

“Most large stones are removed when converted to cropland.”

The clause *when converted to cropland* illogically modifies *large stones*. Edited: “Most large stones are removed when an area is converted to cropland.”

Note the dangling constructions in the following sentence:

“When used for recreational development, such as playgrounds, picnic areas, and paths or trails, sandy surfaces may be stabilized to prevent erosion and improve trafficability using placement of suitable topsoil or resurfacing.”

I count three dangling constructions: the initial “when” clause, the infinitive *to prevent*, and the words *using placement of suitable topsoil or resurfacing*. To identify the other errors in this sentence, compare the unedited and edited versions. Edited: “When the soil is used for recreational purposes, such as playgrounds, picnic areas, and paths or trials, adding suitable topsoil or resurfacing can stabilize the sandy surface layer and thus prevent excessive erosion and improve trafficability.” ■

Live Outcrop

By Chad McGrath, State Soil Scientist/MLRA Office Leader, USDA, Natural Resources Conservation Service, Portland, Oregon. From "Stories, Tales, and Bald-Faced Lies," edited by Henry Mount, Soil Scientist, USDA, Natural Resources Conservation Service, National Soil Survey Center, Lincoln, Nebraska.

During the 1970's in Idaho, soil scientists frequently requested geomorphology assistance from Dr. Roger Parsons, who was at the West National Technical Center in Portland. Dr. Parsons was considered by some to be the finest geomorphologist in the United States.

We had a soils/geomorphology stop in a valley. The question of the surrounding lithology was raised, and Dr. Parsons was quick to state it was a limestone valley.

"Why?" I asked.

"Because there is a limestone rock outcrop on that hillslope over there," Dr. Parsons beamed.

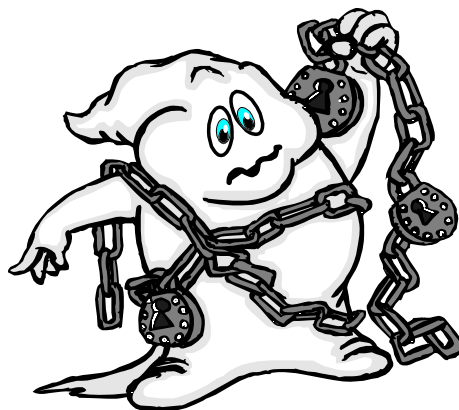
Several of us looked toward the hillslope where Dr. Parsons was pointing.

One more time I asked, "Where is that rock outcrop?"

"It's over there. Surely you can see that whitish line of limestone rock outcrop."

"Roger, you had better take a better look through these binoculars," I requested.

Dr. Parsons realized his error instantly while viewing through the binoculars. The whitish limestone rock outcrop was really a band of sheep grazing in single file on a trail. ■



HAPPY HALLOWEEN!

Punitive Justice

By Tim Gerber, Ohio Department of Natural Resources, Division of Soil and Water Conservation. From "Stories, Tales, and Bald-Faced Lies," edited by Henry Mount.

The Lawrence County, Ohio, Final Field Review was held in June 1988. After the review team spent a day in the field, the rest of the review was held at the courthouse in Ironton. Henry Mount represented the QA staff in Lincoln, and Larry Tornes was the correlator in Ohio assigned to prepare the final correlation document.

As the review team was arguing over

the Party Leader's manuscript, a policeman came up to our makeshift conference room with a young suspect in handcuffs. The policeman apologized for interrupting us, then placed the suspect behind bars, which were only 10 feet away from our conference table.

At first, we felt a little uncomfortable continuing the technical discussions, but soon we were back into the thick of a discussion over hues, values, chromas, classifications, and interpretations. I'm quite sure that one hour later, the young suspect felt he was given enough punishment for one day. ■

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