2010 SOILS PLANNER

Benchmarks in the History of the National Cooperative Soil Survey

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

SOIL SCIENCE
SOCIETY OF AMERICA

As the U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) approaches its 75th Anniversary, the Agency reflects upon its past experiences and accomplishments and looks to the future. Since 1935, NRCS (originally the Soil Conservation Service) has helped America's private landowners conserve their soil, water, and other natural resources. The National Cooperative Soil Survey has inventoried soil resources and transferred technology into conservation.

The 2010 Soils Planner focuses on the history of the National Cooperative Soil Survey and its important contributions to conservation on the land. By tracing our roots, we will keep alive the spirit and passion of those who came before us, and lead a new generation of conservationists to keep our soil healthy and our Nation prosperous.

Dave White

Dave White
Chief, USDA-Natural Resources Conservation Service
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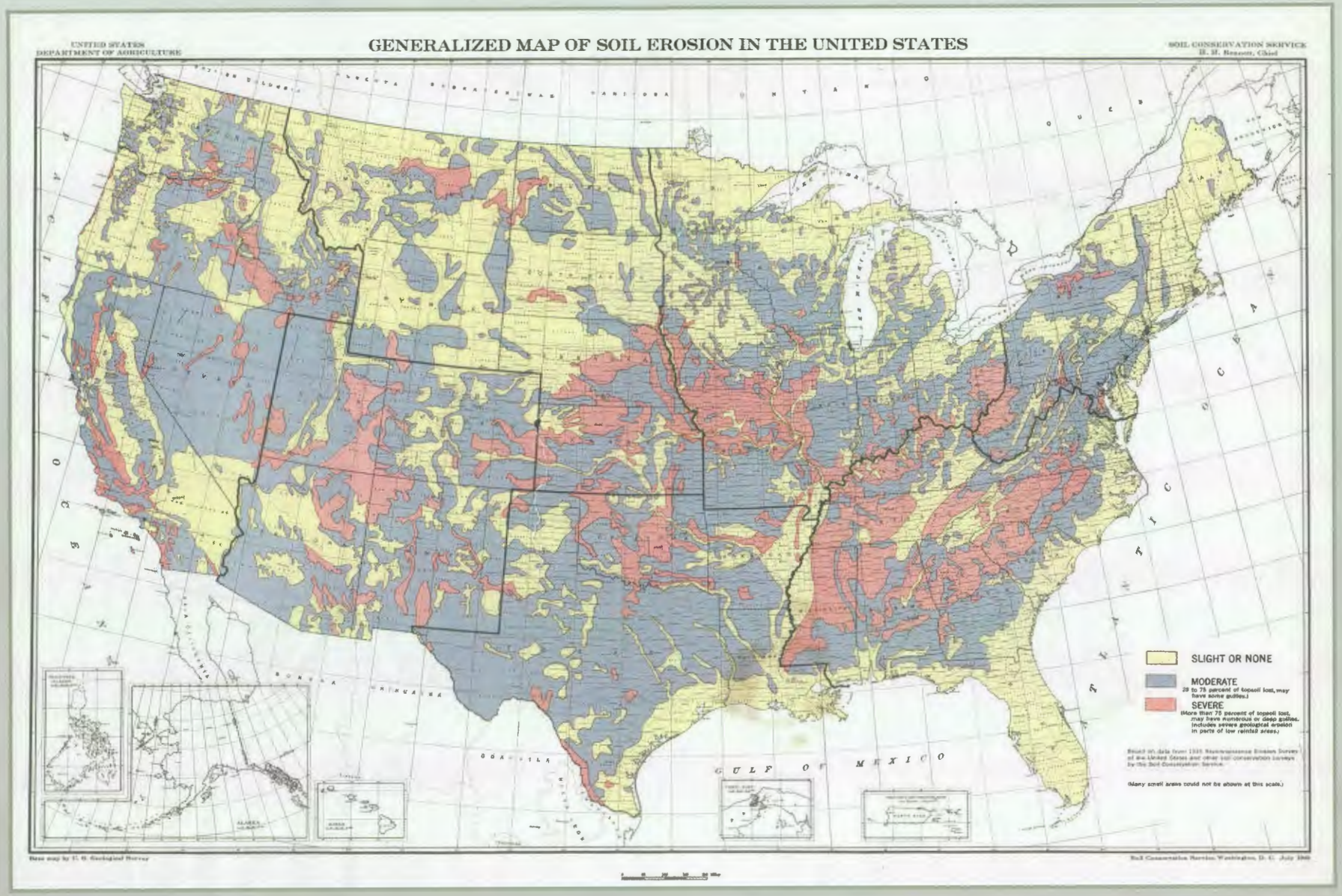
The Soil Science Society of America (SSSA) is an international scientific society that fosters the transfer of knowledge and practices to sustain global soils. SSSA is the professional home for more than 6,000 scientists in 80-plus countries, dedicated to advancing the field of soil science. As we join our colleagues at the 2010 World Congress of Soil Science in Brisbane, Australia, SSSA looks forward to continuing its leadership role in the discussion of our science and its applications to the world at large. SSSA is pleased to continue our active partnership with NRCS and the National Cooperative Soil Survey in producing educational materials such as the *2010 Soils Planner – Benchmarks in the History of the National Cooperative Soil Survey* for our members, the public, and the science community.

NB Comerford

Nicholas B. Comerford
President, Soil Science Society of America
www.soils.org



Soil Erosion Map, 1948

Soil surveying and soil science in the United States developed only a little more than a century ago. Soil science in the early 20th century brought together the tools of chemistry, physics, biology, climatology, geography, and other sciences to understand the complexity of soil as a biological and geological system. As the scientific field of soil survey was developing in the late 1920s, the soil conservation movement gained momentum creating a surge of interest in healing and protecting agricultural land.

Passage of the Soil Conservation Act on April 27, 1935, which created the Soil Conservation Service (SCS), predecessor agency to NRCS, established a nationwide program of assistance to farmers for soil and water conservation. Two years later on August 4, 1937, the first soil conservation district in the country was organized along the Brown Creek watershed in North Carolina. The establishment of soil conservation districts nationwide provided a framework for SCS to work with local people to put conservation on the land.

USDA began soil investigations in 1894; the soil survey program was merged into SCS in 1952. This merger combined soil survey and soil conservation to create a partnership that is flourishing today.

In this 2010 Soils Planner, we highlight the contributions of the National Cooperative Soil Survey to the soil conservation movement. Helping people help the land as well as helping people understand soil science and its importance to conservation are important goals for NRCS. Communities and local governments work with NRCS State offices and local USDA Service Centers to help protect their natural resources. To find out more about the soil in your State, county, or local community, visit the National Cooperative Soil Survey Web site at www.soils.usda.gov and click on the Web Soil Survey. For more information about natural resources and conservation in your own backyard, visit NRCS at www.nrcs.usda.gov or volunteer to help conserve natural resources locally by becoming an NRCS Earth Team volunteer. Call 1-888-LANDCARE to find out more about joining the Earth Team.

Origins of the National Cooperative Soil Survey

In 1893, President Grover Cleveland asked Charles W. Dabney to be Assistant Secretary of Agriculture and charged him with creating a nonpartisan, professional scientific corps at the USDA. Dabney created the Division of Agricultural Soils and chose Milton Whitney to be its director. Five years later, the Division of Soils initiated the National Cooperative Soil Survey, and USDA soil scientists began to systematically investigate the origins and properties of the Nation's diverse soils. These events marked the beginning of the USDA commitment to soil science and soil survey activities that continues to the present.

Charles W. Dabney (right), Assistant Secretary of Agriculture, circa 1895

Employees of the Bureau of Soils, 1922

2010 January

december

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february

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		Professor Milton Whitney, who inaugurated the National Soil Survey Program at USDA, with map showing progress of U.S. Soil Surveys			1 New Year's Day	2
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17	18 Martin Luther King, Jr.'s Birthday	19	20	21	22	23
24/31	25	26	27	28	29	30

Creation of the American County Soil Survey

Early soil surveyors tried to identify soils that were suited to particular crops. The potential for recommendations and interpretations led them to concentrate on small areas, such as counties or valleys, as opposed to broader State-level or regional studies. Unlike the soil surveys that related soil types to climate, vegetation, or geology, these locally focused soil surveys were based on the combination of many soil properties found on the landscape. In their quest to provide useful information to local farmers, these soil scientists left a legacy of a uniquely American series of county-based soil surveys.

Mapping soils with a plane table and alidade allowed one to sight a distant object and use the line of sight to draw a line in the direction of that object

Soil Survey, Texas Agricultural Experiment Station—note the plane table in the center of the photograph

2010 February

january

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march

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14	15 Presidents' Day	16	17	18	19	20
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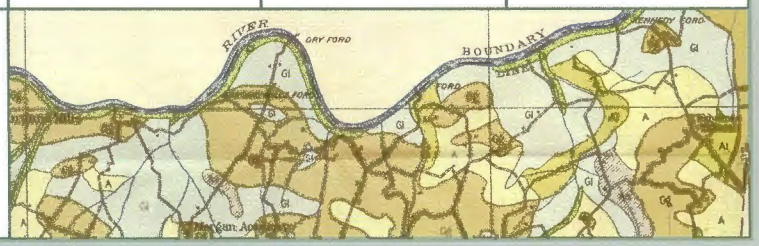
Soil Survey Map,
Union County,
North Carolina



c. 1928-1933

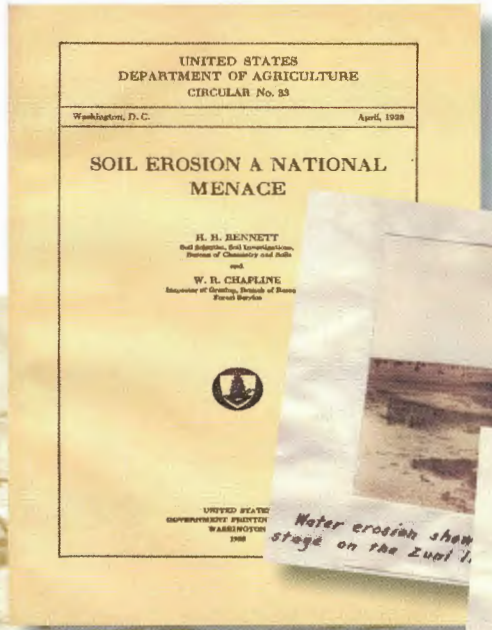
Soil Conservation Crusade

No other person did more to alert the country to the problem of soil erosion than Hugh Hammond Bennett. Bennett joined the USDA Bureau of Soils as a soil surveyor in 1903. Through his work, Bennett became deeply aware of the problem of soil erosion and its destructive effects. In 1928, he co-authored the USDA bulletin "Soil Erosion A National Menace" that attracted widespread attention and established Bennett as the Nation's foremost crusader for soil conservation. His efforts resulted in the creation of the Soil Erosion Service in 1933 and its subsequent transformation into the SCS in 1935, with Bennett as Chief.

1881-1960

Hugh Hammond Bennett

Soil Erosion A National Menace— The cover and two entries from Bennett's 1928 report



UNITED STATES
DEPARTMENT OF AGRICULTURE
CIRCULAR No. 33

Washington, D. C. April, 1928

SOIL EROSION A NATIONAL MENACE

H. H. BENNETT

and

W. R. CHAPLINE

Water erosion sho
stage on the Zuni

Destructive erosion on the road to Crown Point from Gallup. Eastern Navajo Indian Reservation

Wind erosion, South Dakota

2010 March

february

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april

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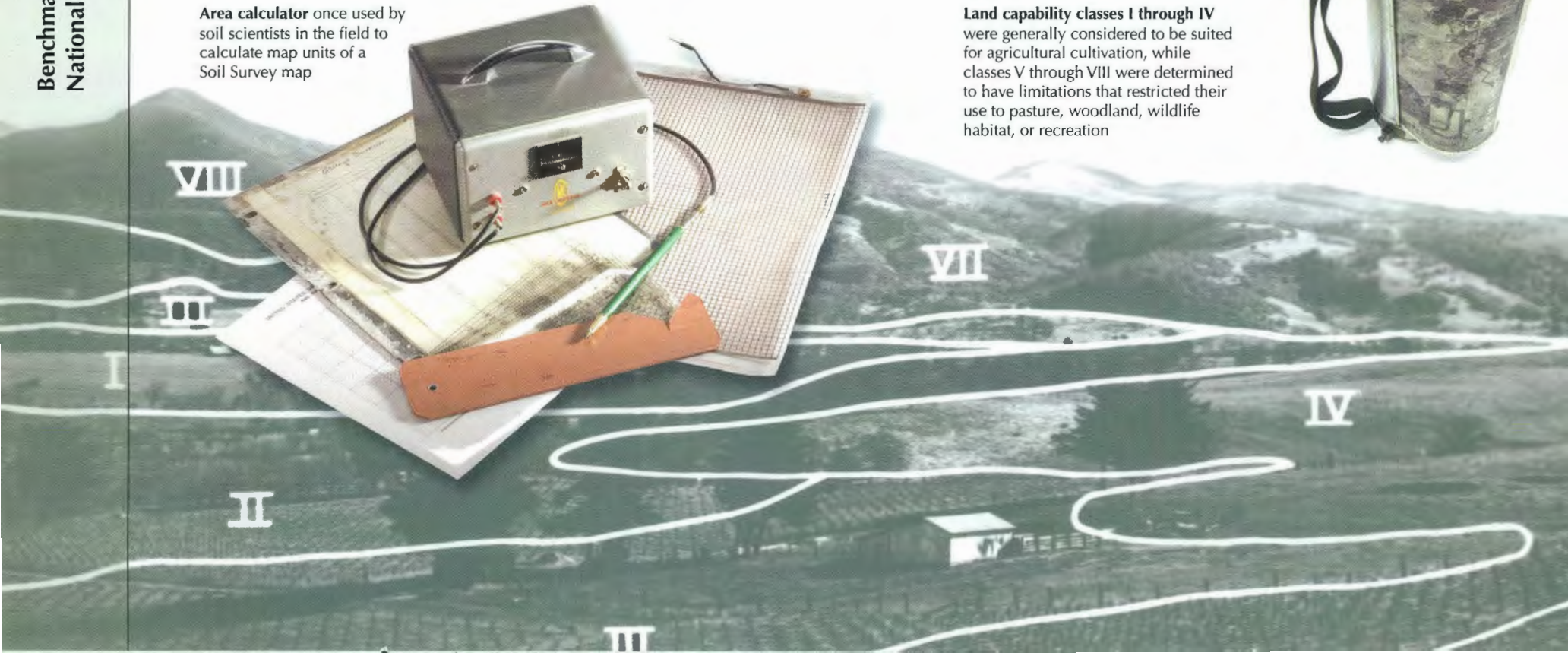
Conservation farming in practice

Land Capability Classification

When the Soil Erosion Service started operations on September 19, 1933, Director Hugh Hammond Bennett needed soils information to recommend soil conservation methods to farmers. County soil surveys published by the Bureau of Soils covered only a portion of the country. To meet farmers' needs, SCS staff developed groupings of soils under the "land-use capability" classification concept. Each land-use capability classification related soil to the combination of practices required for sustained production and facilitated the rapid growth of the soil conservation movement. After the merger of the Soil Survey Division with the SCS in 1952, Charles Kellogg directed that all soil surveys include the land capability for each soil type.



Area calculator once used by soil scientists in the field to calculate map units of a Soil Survey map

Land capability classes I through IV were generally considered to be suited for agricultural cultivation, while classes V through VIII were determined to have limitations that restricted their use to pasture, woodland, wildlife habitat, or recreation

Map case for field use

2010 April

march

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may

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23/30	24/31	25	26	27	28	29

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	Portable Wheatstone Bridge, formerly used to measure soluble salts in soil			1	2	3
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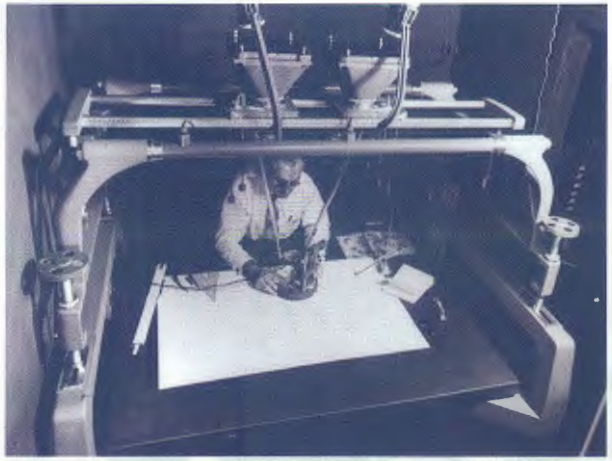
18	19	20	21	22 Earth Day	23	24
25	26	27	28	29	30	

Aerial Photography

The National Cooperative Soil Survey pioneered the use of aerial photography for making soil maps during the 1920s. The first county soil survey based entirely on aerial photographs was made by Thomas W. Bushnell of the Jennings County, Indiana, Agricultural Experiment Station in 1929. Bushnell recognized the advantage of aerial photography over the conventional method of soil mapping using a plane table and alidade. Surveyors found that using aerial photographs allowed them to make more accurate maps in nearly half the time. As airplanes and cameras became more reliable in subsequent decades, the use of aerial photography for soil mapping became a standard practice for soil surveyors.



Stereoscopic plotting instrument used to make contour maps from aerial photographs

"pocket" stereoscope, left—3D glasses used to view aerial photography

2010 May

april

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june

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Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	Using an aerial photograph to create a conservation survey soil map					1
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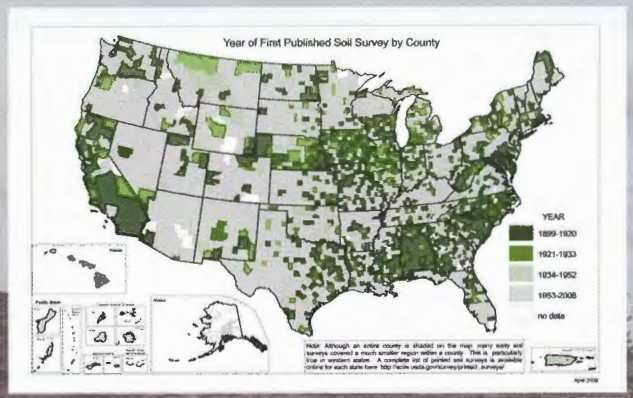
23/30	24/31 Memorial Day	25	26	27	28	29

Unification of the Soil Surveys

Secretary of Agriculture Charles Brannan unified USDA soil survey work in 1952 when he transferred the Soil Survey Division to the SCS. The merger linked the soil survey with a principal user group, soil conservationists doing conservation planning on farmlands. After the merger, the soil survey program increased staff and expanded its operations to support soil and water conservation and efficient land use. This work was supervised by Charles Kellogg, and his methods influenced the development of a basic scientific method for performing soil surveys that is widely used today.



Map illustrating the progress of Soil Surveys made between 1899 and 2008

2010 June

may

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july

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Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Soil Scientist Plater T. Campbell at work on a soil survey in Connecticut		1	2	3	4	5
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13	14	15	16	17	18	19
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27	28	29	30	**Soil conservation stamp,** 1959 (right) **Stamp honoring the 50th anniversary** of the soil and water conservation movement, 1984 (far right)		

Tools for Describing Soils

Over time, methods for describing soils have progressed from visual observations of soil characteristics to more accurate quantitative measurements of soil properties. This shift was made possible by the development of tools that standardized soil description, especially the Munsell color chart. Dorothy Nickerson, a one-time employee of the Munsell Color Company, worked as a color technologist for USDA during the 1920s, 30s, and 40s. She adapted the Munsell color chart, used by the Munsell Color Company to mix paints, for the identification of soils. First introduced to the soil survey in 1941, the Munsell color chart has since become a standard field tool used for identifying soils.

Soil Scientist
taking bulk density samples

Using a Munsell color chart
to determine soil color

2010 July

june

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august

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	Roy Simonson examining the small reference soil samples			1	2	3
4 Independence Day	5	6	7	8	9	10
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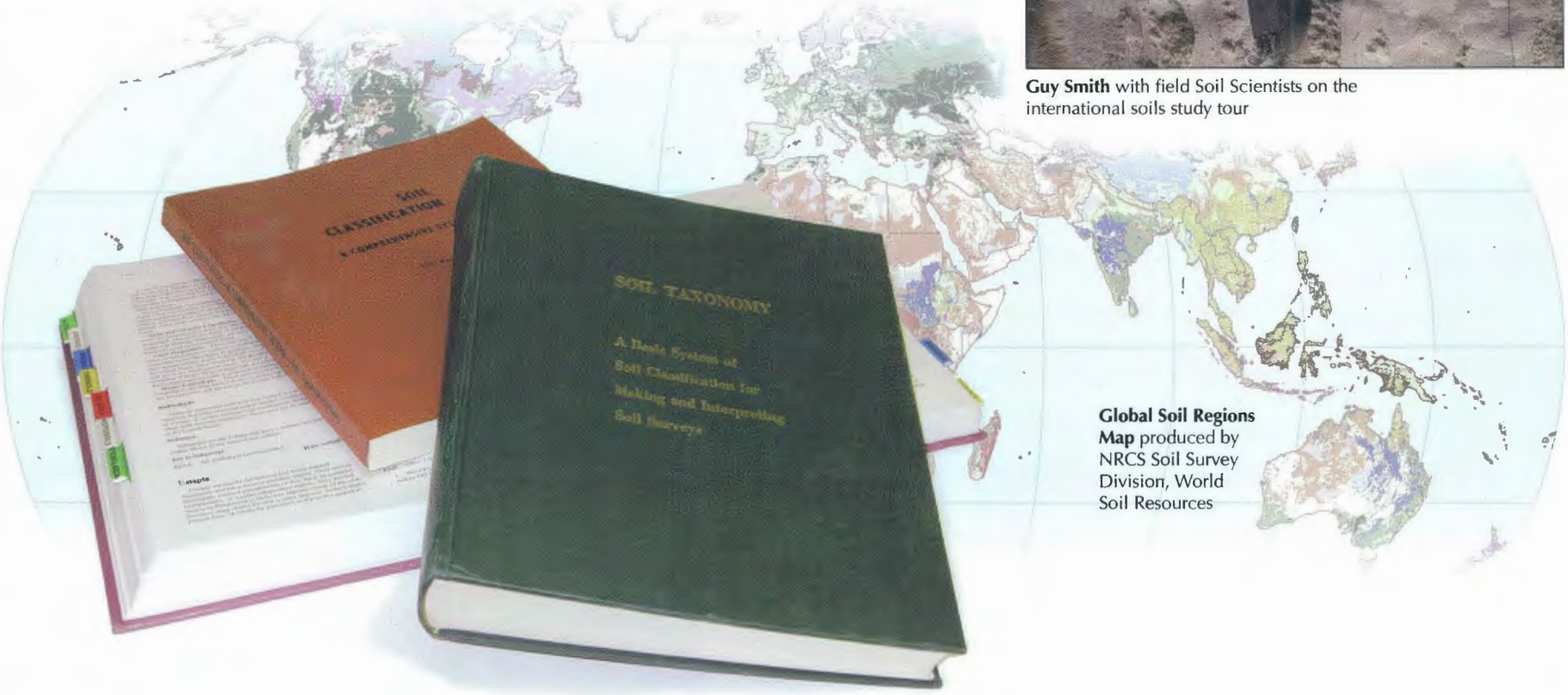
Soil Taxonomy

The science of soil taxonomy was developed in the 1950s and 1960s when Guy Smith led the effort to create a new soil classification system. This replaced the system first introduced in the 1938 Yearbook of Agriculture, which relied heavily on theories of soil genesis and subjective visual observations. Developed by Smith and his colleagues, soil taxonomy used standardized measurements that could be applied consistently across diverse environments by the more than 1,400 field soil scientists working on the Nation's soil survey at the time.

This ingenious system for classifying soils used observable, quantitative "diagnostic horizons and features" to group genetically similar soils together. The effect was to put all soil scientists—from the recently hired to the most senior—on an equal basis in their ability to classify soils in the field.

Guy Smith with field Soil Scientists on the international soils study tour



Global Soil Regions Map produced by NRCS Soil Survey Division, World Soil Resources

2010 August

july

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september

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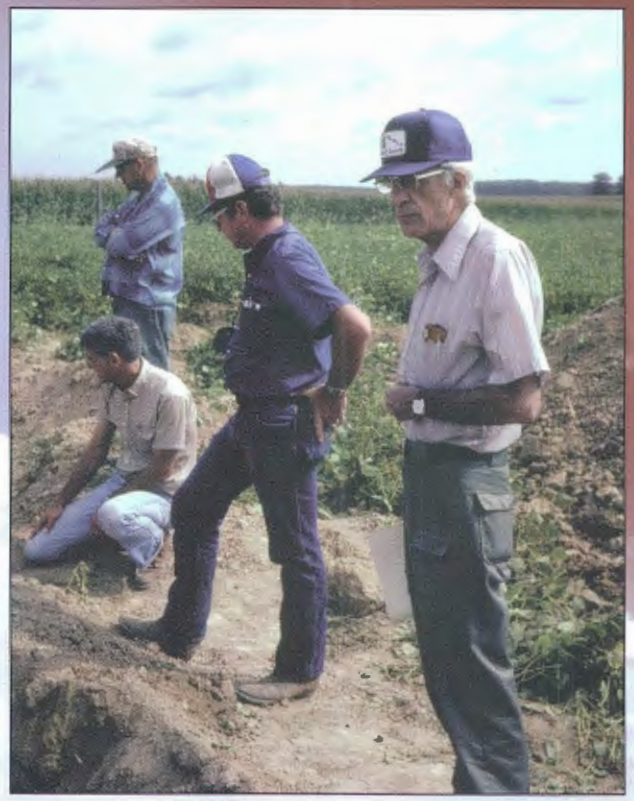
Soil Geomorphology

The scientific contributions of USDA soil geomorphology studies are largely the product of two successful research initiatives. The integration of soils and geomorphology research originated in the 1930s when the SCS Climatic and Physiographic Division brought soils and geomorphology researchers together to study soil erosion processes in Arizona, Mississippi, Kentucky, and South Carolina. This effort was continued after World War II by Robert V. Ruhe, who from 1953 to 1970 led soil geomorphology research in the Soil Survey Investigations Division with projects in Iowa, New Mexico, North Carolina, and Oregon designed to examine soil processes in different geographic settings. This research provided significant breakthroughs in the science of geomorphology, resulting in more accurate soil surveys.



Robert Ruhe, one of the key figures in the development of modern soil geomorphology, working with soil scientists in the field

Geomorphologic processes shape landscapes

2010 September

august

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october

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Soil Interpretations

In the past, people knew from personal observation and experience which soils made good bricks and which were too wet to produce crops or support buildings. In this tradition, modern soil survey interpretations provide detailed explanations of soil characteristics. Previously, soil interpretations were used mainly to determine the suitability of soils for producing crops, tax assessments in rural areas, and the identification of different land characteristics. Recent uses include precision agriculture, land development, and environmental cleanups. Soil interpretations are published in soil surveys and provide a critical link for users of the information.

Teachers attending a workshop on soil and water conservation at Grambling College

Soil scientists taking soil borings to map soils on a Gulf Coast marsh range

2010 October

september

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november

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		Soil interpretations are important for urban land use planning			1	2
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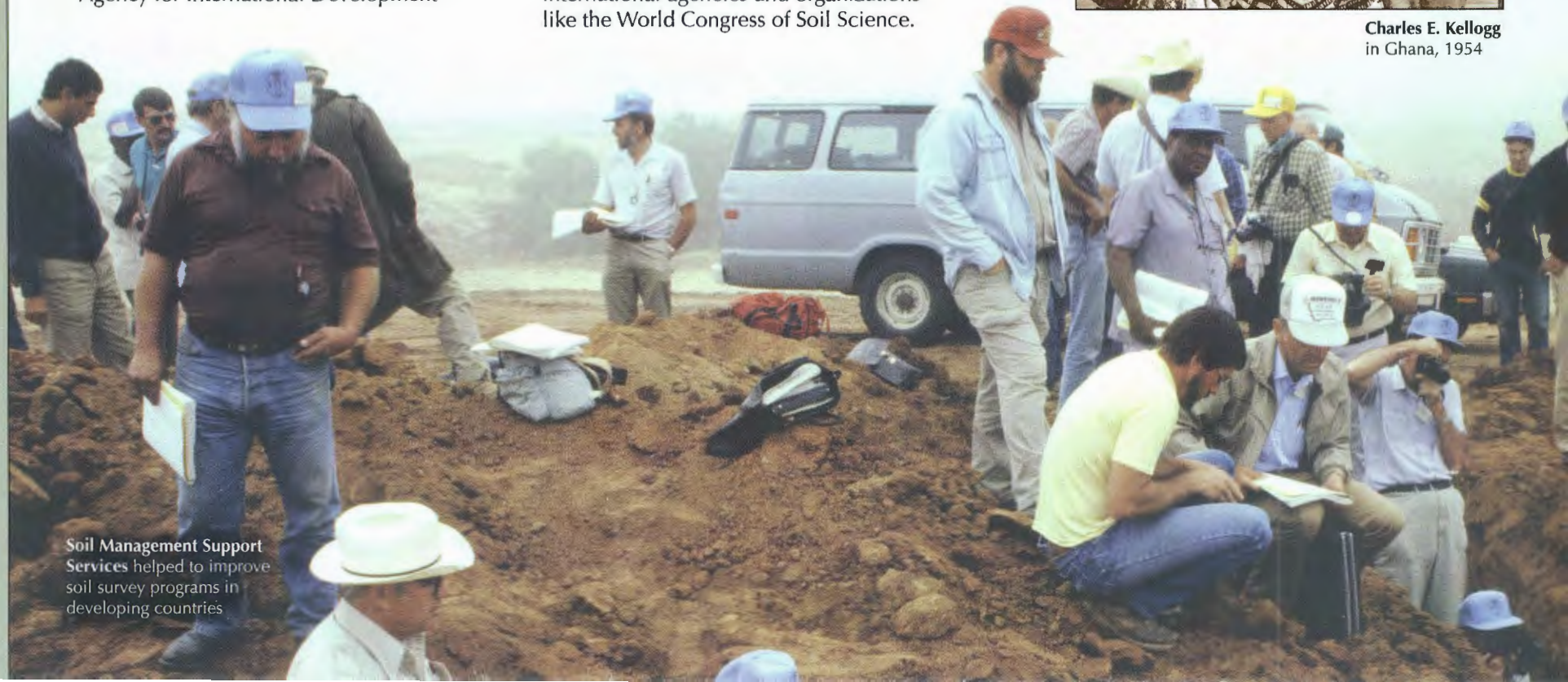
International Assistance

Throughout its history, the soil survey has provided assistance to foreign countries. During the 1910s and 1920s, Hugh Hammond Bennett worked in many Central and South American countries. In the 1930s, James Thorp wrote a soil survey of China. Through the 1940s and 1950s, Charles E. Kellogg initiated studies of tropical soils and worked to assist developing countries to achieve food self-sufficiency. In the 1970s, the U.S. Agency for International Development funded the Soil Management Support Services (SMSS), which has organized workshops and training courses around the world. SMSS staff sampled soils in more than 100 countries. These samples were analyzed by the USDA National Soil Survey Laboratory and used to develop the Global Soil Regions map adopted worldwide as a standard reference resource. Today, study of the world's soil continues through the efforts of international agencies and organizations like the World Congress of Soil Science.

Charles E. Kellogg in Ghana, 1954



Soil Management Support Services helped to improve soil survey programs in developing countries

2010 November

october

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december

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21	22	23	24	25 Thanksgiving Day	26	27
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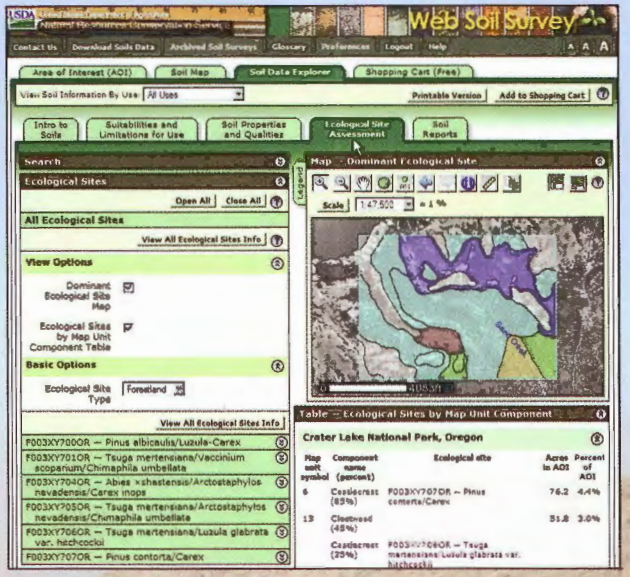
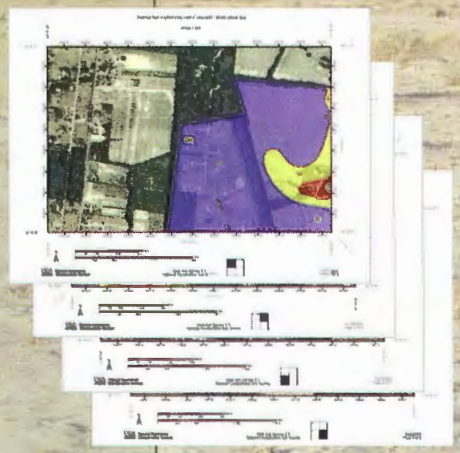
Web Soil Survey

The soil survey is a basic natural resource assessment for landowners to make land use decisions. Readily accessible local soil information is critical to informing conservation decisions for sustainable land use planning. The NRCS Web Soil Survey replaces the traditional printed soil survey books with an easy access, self-service system that retrieves local soil information. In a digital format that is continually updated with the most current official USDA soil survey information, it includes interpretative data for agronomic, forestry, recreational, urban development, and other uses. Web Soil Survey can display soil maps and interpretive thematic maps; data reports can be printed or saved individually to the customer's local computer or compiled into a specialized soil resource report. With this flexibility, individuals can customize reports or data files to their individual needs to address questions on potential land use.

The original Web Soil Survey was released for public use in August 2005; the current Version 2.1 was made available November 2008. To date, about 5.0 million customers and USDA staff have used the Web Soil Survey, averaging over 110,000 uses per month or about 4,200 per day.





The DUALEM 2 operates by electromagnetic induction, to measure the conductivity and magnetic susceptibility of the ground for soil profiling

2010 December

november

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january

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19	20	21	22	23	24	25 Christmas Day
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2010 Events

January
January 31-February 3, National Association of Conservation Districts Annual Meeting, Orlando, FL, www.nacdnet.org

February
February 2, World Wetlands Day, www.ramsar.org

February 16-20, International Erosion Control Annual Conference, Dallas, TX, www.ieca.org/conference/annual/ec.asp

March
March 3-6, National Society of Consulting Soil Scientists 23rd Annual Meeting, Amelia Island, FL, and Cumberland Island, GA, www.nscss.org

March 15-17, Chapman Conference on the Exploration and Study of Antarctic Subglacial Aquatic Environments (SAE), Baltimore, MD

March 17-20, International Conference on Soil Fertility and Productivity, Humboldt Universitaet, Berlin, Germany, www.uni-due.de//soil-fertility-productivity2010/index.shtml

March 18-21, National Science Teachers Association, Philadelphia, PA, www.nsta.org

March 21-26, 2010 National Collegiate Soils Contest, 50th Anniversary, Texas Tech University, Lubbock, TX.
Contact Wayne Hudnall, 806-742-4490

April
April 10-13, American Planning Association National Planning Conference, New Orleans, LA, www.planning.org/conference

April 22, Earth Day

April 27, 75th Anniversary of NRCS, establishment of the Soil Conservation Service

May
May 22, International Day for Biological Diversity

May 26-28, International Soil Science Congress, Management of Natural Resources to Sustain Soil Health and Quality, Samsun, Turkey, www.soil2010.omu.edu.tr
Contact Nutullah Ozdemir

May 24-26, 4th Global Workshop on Digital Soil Mapping, Rome, Italy, www.digitalsoilmapping.org/tag/rome/

June
June 6-10, National Cooperative Soil Survey, Northeast Region, Elizabethtown College, Elizabethtown, PA, www.soils.usda.gov/partnerships/ncss/conferences/

June 8-11, Clay Minerals Society Annual Meeting, Seville, Spain, www.sea-arcillas.es/2010TMC

June 14-18, National Cooperative Soil Survey Conference, North Central Region, Ohio State University, Columbus, OH, www.soils.usda.gov/partnerships/ncss/conferences/

June 17, UN World Day to Combat Desertification

June 20-23, Urban Environmental Pollution Meeting 2010, Boston, MA, www.uep2010.com

June 21-25, National Cooperative Soil Survey Conference, West Region, Las Vegas, NV, www.soils.usda.gov/partnerships/ncss/conferences/

June 27-July 2, Society of Wetland Scientists Annual Meeting, Salt Lake City, UT, www.sws.org/2010_meeting

July
July 11-16, National Cooperative Soil Survey Conference, South Region, College Station, TX, www.soils.usda.gov/partnerships/ncss/conferences/

July 18-20, 65th Annual Soil and Water Conservation Society International Conference, St. Louis, MO, www.swcs.org

August
August 1-6, 19th World Congress of Soil Science, Brisbane, Australia, www.19wcss.org.au

August 1-6, 95th Ecological Society of America Annual Meeting, Pittsburgh, PA, www.esa.org/pittsburgh

September
September 13-15, 8th International Conference on Geostatistics for Environmental Applications, Ghent University, Belgium

October
October 18-21, The Annual Conference on Soils, Sediments, Water and Energy, University of Massachusetts at Amherst, MA, www.umasssoils.com

October 31-November 3, Geological Society of America Annual Meeting, Denver, CO, www.geosociety.org

October 31-November 4, ASA-CSSA-SSSA International Annual Meetings, Long Beach, CA, www.acsmeetings.org

December
December 13-17, American Geophysical Union Fall Meeting, San Francisco, CA, www.agu.org/meetings

2011 Calendar

january

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References
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