

Introduction

The *Soil Survey Manual* provides in a single document the major principles and practices needed for making and using soil surveys and for assembling and using data related to them. The term “soil survey” is used here to encompass the process of classifying, mapping, and interpreting natural three-dimensional bodies of soil on the landscape as performed by the National Cooperative Soil Survey in the United States. The Manual is intended primarily for use by soil scientists engaged in the classification and mapping of soils and in the interpretation of soil survey maps and data. It is an especially important reference for soil scientists early in their careers as they learn the many complex aspects of making a soil survey. It is also an important reference for experienced soil surveyors who want to review the details regarding many of the standards used in soil survey. For example, the chapter “Examination and Description of Soils” contains the accepted terms and definitions for specific soil properties that are used when describing soil profiles in the field as well as extensive information describing each soil property and the proper procedures for observing or measuring it in the field. This makes the Manual an important companion to other soil survey references such as the *National Soil Survey Handbook*, the *Field Book for Describing and Sampling Soils*, and the *Keys to Soil Taxonomy*.

Although the Manual is oriented to the needs of those actively engaged in preparing soil surveys, workers and students who have limited soil science experience or are less familiar with the soil survey process can also use the information. Teachers, researchers, and students of soil science and related disciplines, especially those interested in pedology, soil morphology, soil geography, and the science underlying soil survey, will find this manual useful. Resource specialists, such as wetland scientists, foresters, and agronomists, and others who use soil surveys in their work can refer to the Manual to better understand how soil surveys are made and how to interpret the technical information they provide. Parts of the Manual, especially those concerning the description of soils in the field and the soil properties considered when predicting soil behavior under a specific use, have been adopted by private-sector soil scientists as standards to follow in their work. The *Soil Survey Manual* has proven to be an important source of information for government agencies, nongovernmental organizations, and private-sector resource specialists in other countries involved in soil survey projects. Since the information contained in the Manual describes all facets of the soil survey process, it is an important guide for developing proposals to conduct soil surveys and to create detailed plans for projects in other parts of the world.

The Manual serves as the guiding document for activities of the National Cooperative Soil Survey, a cooperative undertaking led by the United States Department of Agriculture that includes other Federal and State agencies, universities, non-governmental organizations, and private-sector soil scientists interested in making soil surveys and/or interpreting and using soil survey information. The original Federal authority for the soil survey of the United States is contained in the record of the 53rd Congress, Chapter 169, Agricultural Appropriations Act of 1896. The authority was elaborated in Public Law 74-46, the Soil Conservation Act of April 27, 1936, and again in Public Law 89-560, Soil Surveys for Resource Planning and Development, September 7, 1966. The Manual is the primary reference on the principles and technical details used by the local, State, and Federal contributors to soil surveys authorized under these acts.

Since the third edition (1993) of the Manual was printed, significant changes have occurred that affect the ways soil surveys are made. Because of these changes, a major revision of the Manual was essential. Many parts have been revised, some parts have been extensively rewritten, and some new sections have been added.

In the United States, greater emphasis is now placed on the maintenance and modernization of previously completed soil surveys. Because of this, some soil scientists are now evaluating and improving existing surveys rather than making new soil surveys. The wide application of computer technology, in both the office and the field, has led to a proliferation of electronic data sources, including digital elevation models (DEMs), light detection and ranging (LiDAR), digital geology maps and vegetation maps, and multi-spectral remote-sensing data. The electronic data sources, combined with computer models that capture and apply knowledge of the interaction of the soil-forming factors, have allowed soil scientists to partially, and in a few cases totally, automate the soil mapping process. This has had an important impact on the scientist's ability to formalize and document the soil-landscape models used to produce soil survey maps. It has also led to improved consistency in the maps produced using these methods. A new section describing digital soil mapping is included in this version of the Manual.

Greater attention is also being placed on recognizing anthropogenic influences on soils. This version of the Manual has updated horizon nomenclature for human-altered soils as well as a new section describing some of the challenges and techniques in conducting soil surveys in areas where soils are significantly disturbed. Soil surveys have also been conducted to a greater extent in shallow water subaquatic areas in some parts of the country. A chapter describing the new field procedures used for this work has been added to the Manual. In addition, tools used for proximal sensing of soil properties, such as ground-penetrating radar and electromagnetic induction, have been increasingly used in special soil survey field studies. Information about these and other techniques is presented in this version of the Manual.

Given the rapid pace of technological change, a bound, hard-copy version of the Manual is no longer considered the best way to disseminate the information. The information is now electronically distributed and stored; however, users also have the option to "print-on-demand" individual parts or the entire document. The user can view each section of the Manual as a stand-alone chapter or view the entire document, in which the sections are arranged to correspond to the approximate chronological order of the work required to complete a soil survey. The reader has the choice of focusing on individual parts of interest or exploring the larger picture of conducting a soil survey project from beginning to end.

Citation and Authorship

Previous editions of the *Soil Survey Manual* (1993) simply listed the author as the Soil Survey Staff (originally the Soil Survey Division Staff). The contents of the Manual represented the collective contributions of many people over several decades. This new version of the manual continues to recognize the innumerable past contributors by including the Soil Survey Staff as an author for chapters that retain significant portions of the previous publications. These chapters contain information that has been used for decades as well as new information related to improved methods and/or new terminology.

For existing chapters, individuals responsible for revisions are cited as authors in addition to the Soil Survey Staff. For new chapters, individual contributors are cited and the Soil Survey Staff is not included. The entire manual was revised and edited by Dr. Craig Ditzler and Dr. Larry West, USDA-NRCS, retired.

Recommended Citations

For individual chapters, provide authors and chapter title. For example:

Adamchuk, V.I., B. Allred, J. Doolittle, K. Grote, and R.A Viscarra Rossel. 2015. Tools for proximal soil sensing. *In* Soil Survey Staff, C. Ditzler, and L. West (eds.) Soil Survey Manual. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 18. Available at <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcseprd329418> (verified Day, Month, Year).

For the complete manual:

Soil Survey Staff. 2015. Soil survey manual. C. Ditzler and L. West (eds.). Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 18. Available at <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcseprd329418> (verified Day, Month, Year).