

SoilView: Development of a Custom GIS Application for Publishing Soil Surveys

Allan Johnson and Mike Wigginton

Abstract

Currently, digital soils information can be obtained from many sources. Numerous websites serve digital soils information but often users need their own GIS software and considerable knowledge to view the data. A planned IMS Web Soil Survey site will eliminate the need for GIS software, but will rely on a fairly fast internet connection. The Indiana Natural Resources Conservation Service (NRCS) office has published more than 200 project areas on CD-ROM utilizing a customized run-time version of ArcView accessible to novice computer users and most available computers. Using a customized ArcView application on CD-ROM, the user can access information easily through many unique tools, without needing web access. Future plans for this project include migrating to an ArcGIS format.

SoilView History

The first effort to provide tools making ESRI-format Soil Survey Geographic Database (SSURGO) data easier to use resulted from discussions with the Illinois National Cooperative Soil Survey (NCSS) staff with input from soil survey users. Their vision was to make this information more easily accessible to the general public. An agreement was made between ESRI and the Illinois Soil Conservation Service (now NRCS) to produce a viewer of soils information that could be distributed freely to the general public. In the mid 1990s, the Illinois Soil Conservation Service GIS Specialist worked with ESRI programmers to create a viewer using ArcView Data Publishing (AVDP) that would allow users to view digital soils information over an orthophotoquad image base without requiring the user to obtain proprietary GIS software. The name "SoilView" was coined, and the first county publication using AVDP was distributed on CD-ROM in 1999.

The first viewer used a runtime version of ArcView that could be operated independently and distributed freely on a CD-ROM. Initial versions were designed to be installed on the user's computer hard drive while later versions ran directly from the CD-ROM. Modern versions of SoilView can be run from the CD-ROM on Win-95, Win-98, Win-NT, Win-2000, or Win-XP computers.

SoilView 2.7

Note: The soils data in this product were captured at a specific scale. Deviations from this scale could cause misinterpretation of the soils information. Refer to the soils metadata document, located in the Documents menu of this program, for more information. The soils data on this CD are not copyrighted.

The imagery on this CD may be from different time periods. Changes in cultural features, such as mining operations, urban development, and new water bodies, may not be shown on the imagery.



When SSURGO soils data became available for a number of counties in Indiana the need arose for an interim product readily available to users. NRCS staff from Indiana worked with staff from NRCS in Illinois and came up with an acceptable plan. An NRCS Cartographic Technician in Indianapolis began working with the SoilView project in September of 2003. Since that time support has been provided to interested states. To meet user needs and increase functionality, comments and suggestions from users in nine states (see Figure 1) have been incorporated.

STATE	Number
Indiana	59
Iowa	47
West Virginia	31
Illinois	16
Wisconsin	14
Michigan	17
Minnesota	2
Maryland	3
Maine	1
Total	190

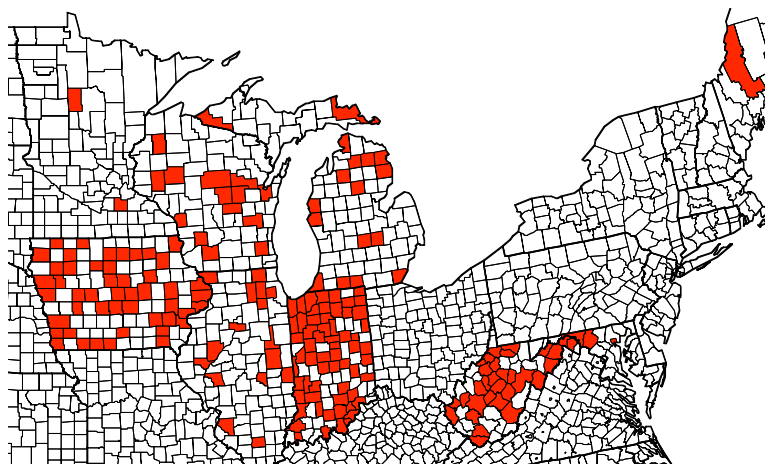


Figure 1. SoilView Products Published 1995-2005 by State (estimated 6/5/2005).

SoilView Features

The SoilView product is designed to bring several data layers together, including soils layers, an annotation layer, USGS topographic quads and orthophoto quarter quads, roads, streams, railroads, civic boundaries, and water bodies. Standard GIS functions such as pan, zoom, identify, and simple overlaying capabilities are available to take full advantage of the powers of GIS.

Additional custom tools and functions have been added to further enhance the product. Two buttons were created for changing themes from color to black and white to accommodate black and white or color printers. An "export image" button is provided for individuals with printers that do not have the memory to support ArcView printing. The images can be imported into MS Powerpoint, MS-Word, MS-Paint, or other image-supporting software and can be printed from there. One feature that many users asked for was the ability to calculate acres and perform weighted average calculations for various crop yields and yield indexes (see Figure 2). Three optional custom buttons allow the user to view a map unit description, to view a picture of the soil, or to view a block diagram of a soil landscape (see Figure 3). Another button allows the user to enter their PLSS description to zoom to a PLSS Section (see Figure 4). A "Thematic Map Viewer" button allows one to generate a suite of predefined thematic maps, such as flooding frequency, average corn yields, runoff potential, hydric soils, etc. (see Figure 5).

The product has been designed so that the presence or absence of particular themes, directories, or files determine which buttons appear on the user interface. Thus, users in areas that do not have township, range, and sections do not see the township, range, and section locator button, and projects that do not contain any pictures or block diagrams do not have buttons allowing the user to display pictures or block diagrams.

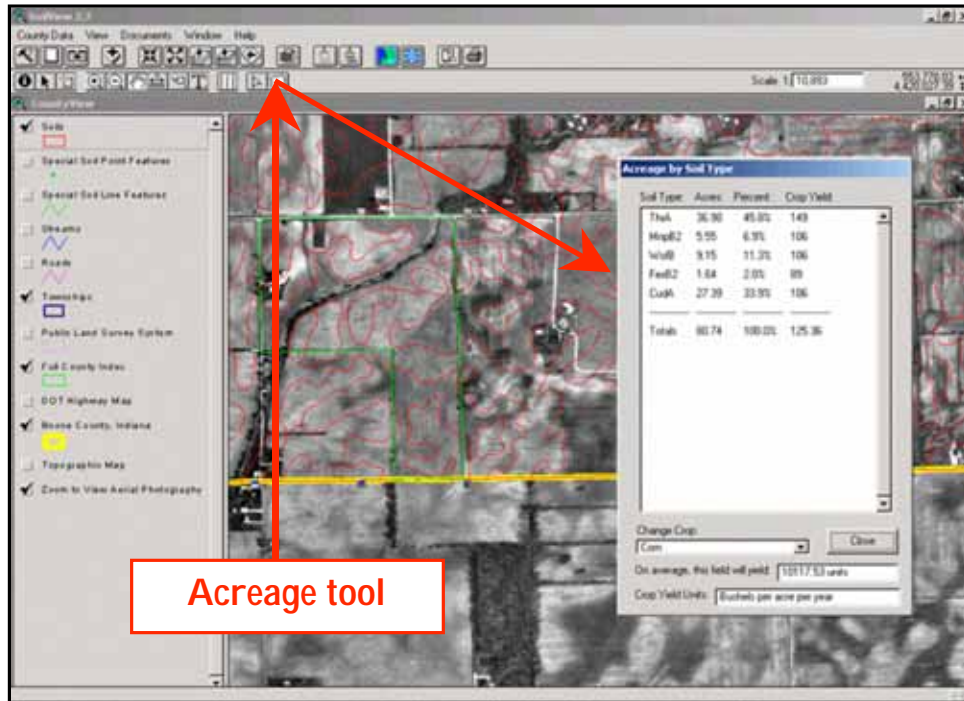


Figure 2. Acreage Calculations by soil type can easily be calculated for any user-defined polygon (indicated by green line).

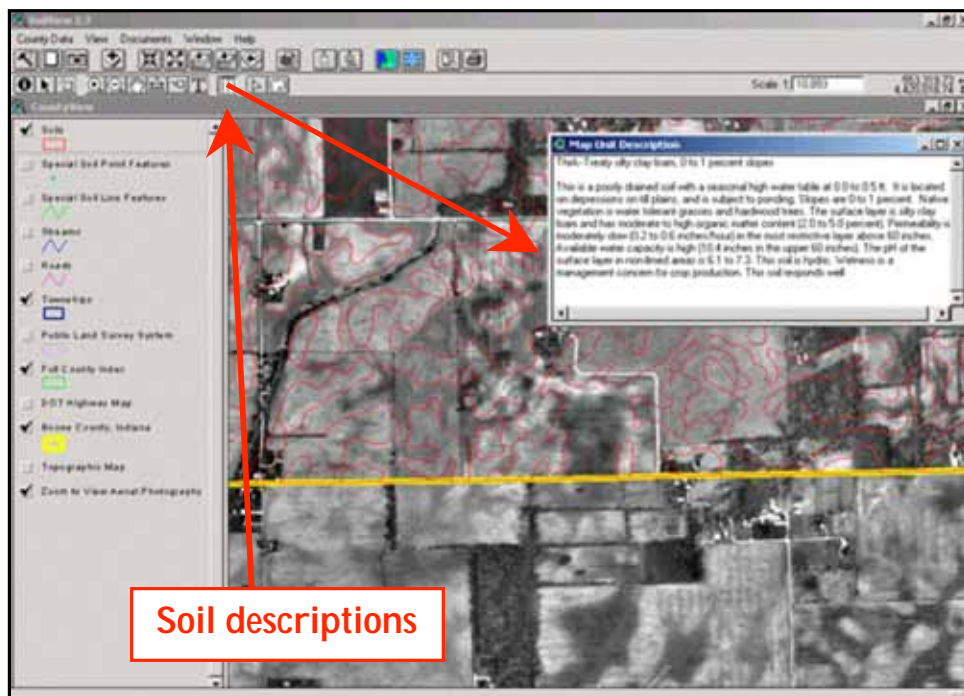


Figure 3. Map unit descriptions (soil descriptions) are available from a single button click.

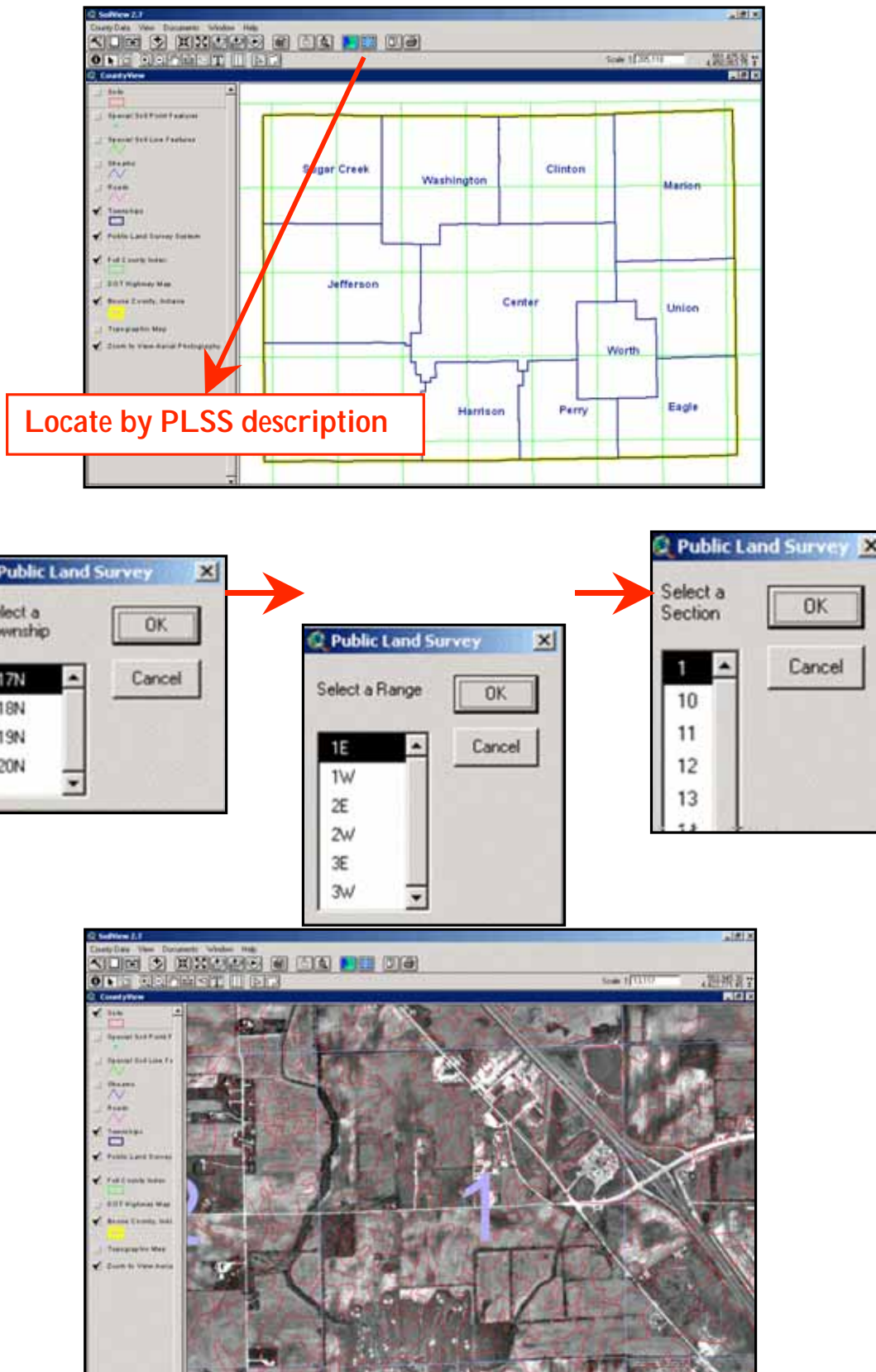


Figure 4. SoilView allows the user to locate an area by PLSS description.

Subsequent SSURGO Viewers

Subsequent efforts by NRCS to provide GIS tools using ESRI data formats included the "Soils Explorer," which relied on ESRI ArcExplorer tools and did not require the purchase of GIS software by the user. In the late 1990s, a single sample SSURGO 1.0 dataset was used to prepare a Soils Explorer demonstration product for 50 states. The current NRCS "Soil Data Viewer" GIS tool uses SSURGO version 2.x. It was developed to facilitate the use of soil geographic data in USDA Farm Service Centers as part of the [Customer Service Toolkit](#) and requires the use of [ArcView 3.x](#) software. [Soil Data Viewer](#) can be downloaded from the web.

Future Efforts

Approximately 2,000 digital soil geographic datasets (SSURGO 2.1) are presently available through the efforts of the NCSS, via the [Soil Data Mart](#). This website serves SSURGO datasets in ArcView shapefile format, ArcInfo coverage format, and ArcInfo Interchange file format. The user may also generate reports from the SSURGO datasets.

The current NRCS goal is to distribute soil surveys on the World Wide Web via a product called "Web Soil Survey." The Web Soil Survey is scheduled for release by the end of 2005. This website will use ArcGIS IMS technology to serve seamless SSURGO datasets. The user will be able to view, query, and/or download SSURGO data of any size and be allowed to save their workspace for future use. SoilView and other CD products will be valuable supplements to the Web Soil Survey when Internet access is not available.

Conclusion

When these applications were first developed, soil surveys were distributed only in hard-copy format (bound paper copies with text and fold-out maps). The average cost to print a single hard copy was between \$35.00 and \$75.00. Recently (2003), NRCS instituted a new policy discontinuing hard-copy publication of the county soil survey text. However, hard-copy soil survey maps are still printed using a lithographic process because users do not otherwise have a good way of getting a high-quality printed map. Printing large format orthophotoquad maps can cost as much as \$10 per square foot. SoilView CD publications cost just a small fraction of the printing costs.

At this time, the first 190 soil surveys using AVDP have been well received. The further development of the Web Soil Survey will reduce the need for CD products like SoilView, but for many users these products will provide a valuable supplement to the Web information. The goal of the SoilView project remains to provide the latest soils information in an accessible format for the general public.

References

Ferguson H. and Waltman S. W., 2005, SoilView – Accessibility of Soil Information, USDA-NRCS, National Geospatial Development Center, Morgantown, WV.

[NRCS This Week - 08/28/98](http://www.nrcs.usda.gov/news/thisweek/1998/980828.html) NRCS Soils Explorer Website. [Online].
<http://www.nrcs.usda.gov/news/thisweek/1998/980828.html>

[Customer Service Toolkit](http://www.itc.nrcs.usda.gov/toolkit/) Toolkit 2004 Home. Website. [Online].
<http://www.itc.nrcs.usda.gov/toolkit/>

[ArcView 3.x](http://www.esri.com/software/arcview/), ESRI. Website. [Online]. <http://www.esri.com/software/arcview/>

[Soil Data Viewer](http://www.itc.nrcs.usda.gov/soildataviewer/updates.html), Soil Data Viewer, downloads and updates, Website. [Online].
<http://www.itc.nrcs.usda.gov/soildataviewer/updates.html>

Author Information

Allan Johnson,
Cartographic Technician
USDA – Natural Resource Conservation Service
6013 Lakeside Blvd.
Indianapolis, IN 46278
Office: (317) 290-3200 .x376
Fax: (317) 290-3225
Email: allan.johnson@in.usda.gov

Mike Wigginton,
Soil Scientist
USDA – Natural Resource Conservation Service
6013 Lakeside Blvd.
Indianapolis, IN 46278
Office: (317) 290-3200 .x365
Fax: (317) 290-3225
Email: michael.wigginton@in.usda.gov