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Soil Viewer Extension Brings Soil Data to Your GIS

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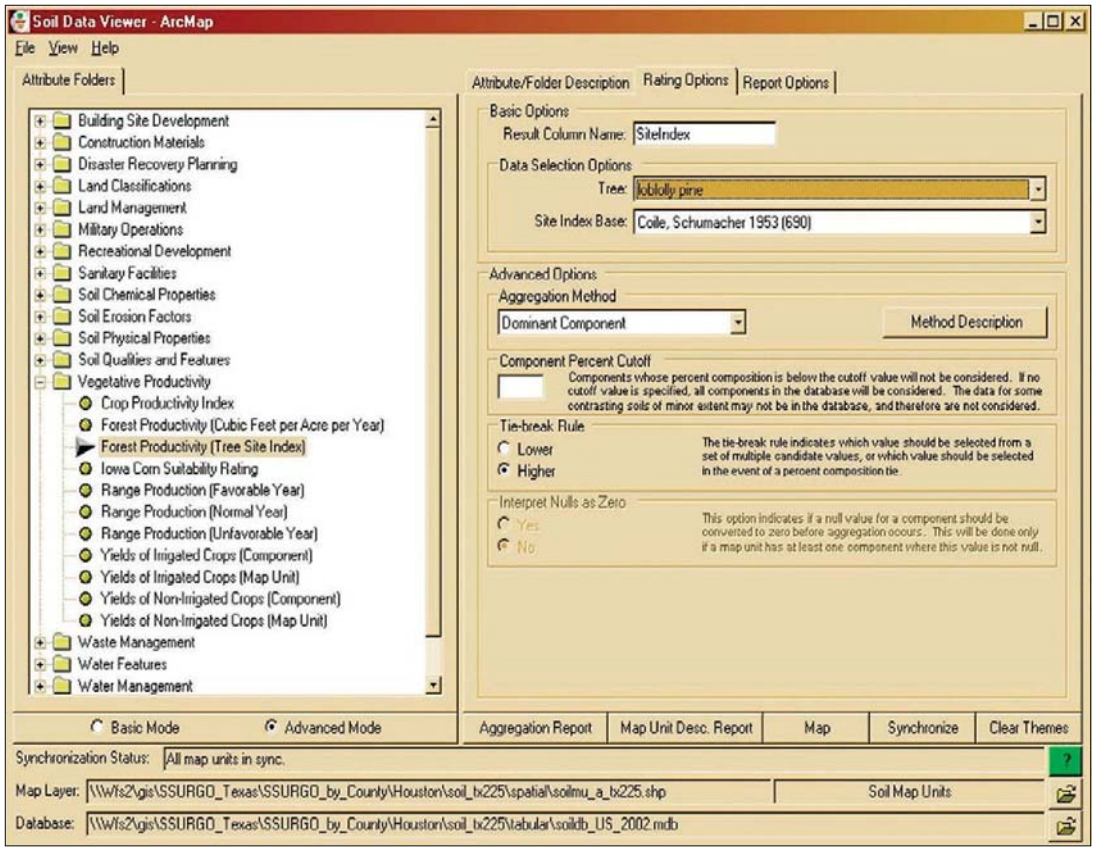
Field Tech: Soil Viewer Extension Brings Soil Data to Your GIS

By Jason Grogan, I-Kuai Hung, Jason Raines, and Yanli Zhang

Traditionally, foresters and natural resource managers used paper-based soil surveys to access critical soil information such as site productivity, hydrologic characteristics, suitability for road construction, and so on. With the advent of geographic information systems (GIS), the need for soil data in a digital format became obvious. However, the daunting task of digitizing the nation's soil surveys has taken many years. (To view a map of the areas where Soil Survey Geographic Database (SSURGO) is currently available, visit http://soildatamart.nrcs.usda.gov/StatusMap.aspx).

Unfortunately, SSURGO data are exceedingly complex, with more than 50 tables necessary to house the same information included in paper-based soil surveys. Due to the multiple uses of soil survey information, the digital database is not tailored toward any one specific use. There is no direct link within the data between a soil map unit and its specific site information, such as site index. Creating a digital soil map for a specific characteristic of interest is complex and time-consuming. Often, users resort back to the paper-based surveys for the tabular data to relate to the digital soil map rather than performing the difficult, if not impossible for novice users, task of linking the digital map with the characteristic of interest. Another inherent characteristic of soils data that makes linking soil map units to tabular data difficult is that many soil map units are made up of several soil types, resulting in a soil "complex." Determining the "actual"(single value) site index, or other soil characteristic, for a particular map unit is difficult due to the variability within the map unit.

Thankfully, the US Department of Agriculture's Natural Resources Conservation Service recognized the difficulties users were encountering when using the SSURGO data and created software, Soil Data Viewer (SDV), to aid in utilizing the data. SDV is an extension for ESRI's Arc Map that lets you create soil-based thematic maps and generate soil reports within the ArcMap interface. Using this extension, you can quickly and easily select an area of interest, generate a soil map for a particular characteristic, and generate general or very specific soil reports. SDV addresses the two problems mentioned in the previous paragraph. The complex process of linking the tabular data to the geometry is handled by the software. Additionally, a process called aggregation performs calculations (such as weight averaging) to produce values (such as site index) for map units made up of multiple soil types. SDV is available for free download at http://soildataviewer.nrcs.usda.gov/download52.aspx. Because of the flexible nature of the data and the application, we will not attempt instruction for operating the application; however, detailed instructions may be found in the Soil Data Viewers Online User's Guide.



The Soil Data Viewer interface showing the results of a query for loblolly pine site index.

SSURGO data for use in ArcGIS (or other GIS software), which may be downloaded from http://soildatamart.nrcs.usda.gov, includes both the tabular data (in Microsoft Access format) and the spatial data (in ArcView Shapefile, ArcInfo coverage, or ArcInfo Interchange format). To use the SSURGO data with the SDV extension, downloaded tabular data must be unzipped and loaded into a template Microsoft Access database. The template dataset may be downloaded from http://soildatamart.nrcs.usda.gov/Templates.aspx. It is recommended that you retrieve the template database beforehand, so that you can select a matching version of the SSURGO data. Instructions for downloading data, loading the tabular data into the database, and accessing the Soil Data Viewer Online User's Guide may be found on the same web page as the SDV download.

In short, the Soil Data Viewer Extension for ArcGIS takes the utterly confusing and nearly unusable SSURGO digital soil survey data and turns it into a product that is easy to use and extremely helpful to natural resource managers.

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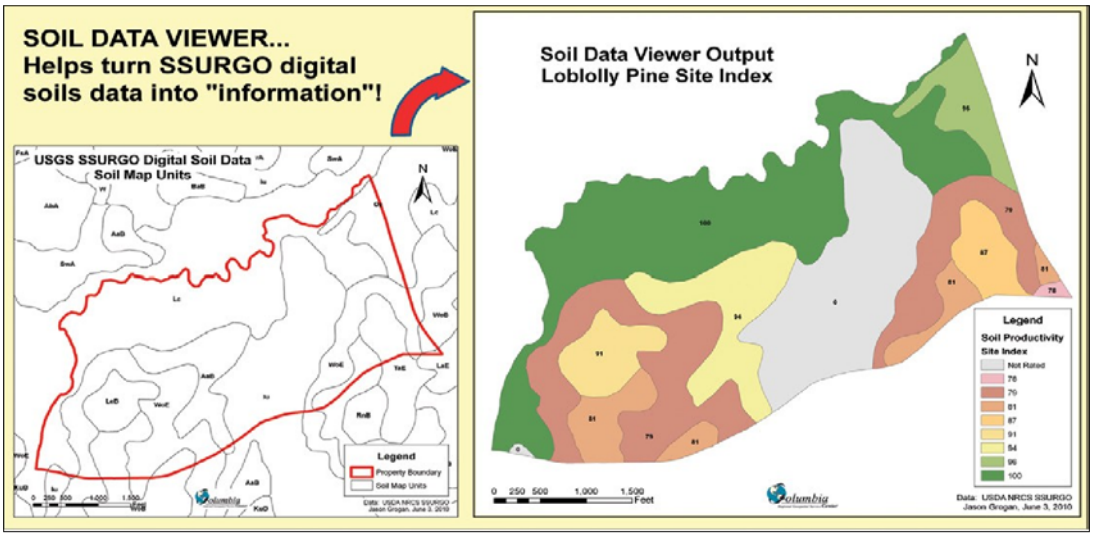

An example of Soil Survey Geographic Database soil maps of a forested property with and without the assistance of the Soil Data Viewer application.

Web Soil Survey

For non-GIS users and those needing quick and easy access to SSURGO Digital Soil Survey data and reports, the USDA's Natural Resources Conservation Service has built a web-based service with functionality similar to the Soil Data Viewer. Web Soil Survey lets you locate and delineate an area of interest, produce a soil map for this area, and create a report on the soils. The Web Soil Survey online application is available at http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx.