

A DOWN TO EARTH USE OF GIS AND GPS FOR SOIL SURVEY UPDATES A BRIEF SOIL SURVEY HISTORY

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The modern soil survey effort began in Ohio in 1950's and was completed in the 1990's. The surveys were done on a county by county basis, with each county having a published report. As new soil knowledge became available, it was incorporated in the on-going surveys. The result was a "patchwork" of 88 county soil surveys whose information ranged from current to almost 50 years old. Although the information in each of the surveys was current and correct for the time they were produced, new ideas, technologies and uses of the soil surveys were ever changing.

With the need growing ever stronger for soil information, county administrators were interested in updated soil surveys. Due to decreasing staffing levels within the Ohio soil survey, single county updates were not possible. In 1997, the Ohio program shifted its focus from producing single county surveys, to multi-county Major Land Resource Area (MLRA) based Soil Surveys.

An MLRA is a geographic area in which soil forming factors of geology, climate, and vegetation are relatively constant. Another factor in an MLRA region is that the dominant land uses are similar within the area. Ohio contains portions of 8 MLRA regions. The Marietta Project Office is responsible for MLRA regions of the Western Allegheny Plateau and Central Allegheny Plateau (124 and 126). These 2 regions stretch from Jefferson County in the Northeast to Scioto County in the Southwest, and incorporates all or parts of 22 counties. The dominant land uses in the Western Allegheny Plateau and Central Allegheny Plateau are small farms and forestry.

The lack of GIS and digital soil maps hampered the ability of the office to expand investigations due to the inefficiency and inability to view soils data over broad geographic areas. In 2001, ArcView and GPS technology became available to the Marietta office. With this change, soil scientists could investigate a soil series over several counties with much improved efficiency. One such investigation for the Marietta office was of the ancient Teays River Terrace system. The Teays terraces covered 20 counties in Southeastern Ohio. By using GIS technology, soil scientists were able to separate soil series based on elevations and landforms. New and historic data were located throughout the study area using GPS and other digital programs. With the use of digital technology, work efficiency, quality and accuracy has improved the Soil Survey.

The Teays River Terrace Study

A large river system called the Teays, drained much of Ohio in preglacial times. Locally, well-preserved remnants of this ancient river system occur in the form of abandoned valley segments, consist of deposits of alluvial (riverine and lacustrine) sediments. The Teays River flowed for 800 miles out of the hills of North Carolina, through West Virginia, into Ohio in Scioto County, north and west through Indiana, Illinois and into the Mississippi River system. For



between 2 to 65 million years, the river established itself as one of the oldest rivers known. When the first glaciers moved into Ohio nearly 2 million years ago, the Teays northerly flow was halted. The river system was dammed, creating a massive lake (Lake Tight). For thousands of years, Lake Tight deposited sediment in southeastern Ohio. Eventually the lake overtopped the confining hills and a new drainage system was created.

As the glaciers began to recede, melt water began flowing south reversing the flow of the Teays and draining Lake Tight. In its wake, the Teays left many sediments, some were very fine textured clays, others were silty, sandy or gravelly outwash. These sediments were the parent materials of several soil types that are present today and are found on many of the high terrace landforms found in southeast Ohio.

The sediments of the Teays River and Lake Tight were part of one of the studies conducted by the Marietta MLRA office. The goal was to separate the Teays sediment from the more recent river alluvium deposited by melt water from the glaciers and to create updated soil series and soil interpretations for those soils.

By researching historic geologic and pedogenic data, soil scientists were able to separate by elevation the sediments that were associated with the older Teays system from the more recently deposited sediments. GIS and GPS technology was an integral part of this study, and without them, the study would have been nearly impossible.

Seventeen counties in the southeast Ohio area had soils whose origin was of the Teays age. About 7 of these counties had digital soils available. All of the counties in the study area had a modern Soil Survey available, with vintages ranging from the 1960's to 2002. Soil scientists used the historic data from all of the surveys to obtain detailed soil descriptions of all of the Teays related material. The locations of the descriptions were geo-referenced using Terrain Navigator software, and a digital distribution map of all of the data was created. With the location of Teays related sediments, historic soil descriptions located and a knowledge of where the Teays river had flowed, soil scientists could now prepare a model for further study of the Teays sediments. By using the base elevation of the Teays sediment, an upper and lower boundary was established and a digital contour map that covered the entire southeast Ohio area was created.

After locating areas where data gaps existed, soil scientists would use the digital soil information, go to the sites, transect and describe the soils and use a GPS to mark the site. Then back at the office, they would download the information into ArcView. After all of this information was collected, an intelligent and accurate decision was made as to what the age and name of the soil type is.

By using GIS, GPS and other digital technologies, the Marietta Soils office was able to study the Teays age sediments and separate it from more recent material. The information can then be transferred to the counties where these soils occur. A more up-to-date soil survey can be published, and in-turn, users of the soil survey can make more intelligent decisions on how to use their land wisely.