

ArcGIS & FARMLAND ASSESSMENT

Thomas P. Ricker

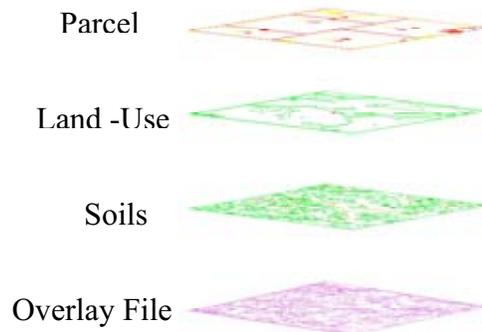
Abstract: ArcGIS can be used as a potent tool for analysis and support of mass appraisal. We will review basic GIS concepts of control, coordinate systems and accuracy, and talk about their impact on mapping soil types and land use. We'll demonstrate how through a union, these three thematic layers and their attribute data can be overlaid to determine soil types and land-use content on a per parcel basis. This presentation will demonstrate the true analytical powers of ArcGIS and how they can be used to solve everyday assessment problems in farmland environment.

Introduction:

With old, inaccurate and outdated parcel maps, along with old outdated soil maps farmland assessment can be tedious and in many cases inaccurate. Also, in most cases both of the above mentioned maps are at different scales. The task of calculating soil areas within parcel boundaries and the assessment amounts that come about from these calculations can be tedious, inaccurate and inconsistent. GIS is a tool that can bring this task into a fast, easy and consistent method of calculating farmlands and their soils for assessment purposes.

Old & New

The old manual way of calculating farmland assessment was anything but accurate. The use of a tracing pillimeters or counting square grids over a soils map was the method of choice for calculating the area of soils. This information then had to determine where the certain soils fell within a certain parcel boundary. GIS is now the new tool made for farmland assessment. GIS uses different types of maps in a digital form with each representing various types of data such as; parcels, soils, and land-use. This information is brought together in one overlay format for easy analysis for assessment.



Creating Themes & Accuracy

Creating themes for use in GIS can be done in many different ways. The method as to how the themes are compiled is set by the creator of the data. The creator must determine what is the overall use of the themes and it's information and what is available for funding to complete the conversion or creation of these themes. These themes are only as good as the data it is compiled from. The old adage "Garbage In Garbage Out" is so very true. If the information is old, outdated and inaccurate due to lack of research and limited monumentation, the information produced from GIS will be the same. There are those who may think that because this bad information is in a GIS system the inaccuracies will be corrected? NO.

Mapping themes are created to meet that organization's needs. The need by local government for accurate parcel information is essential. The parcels mapped on a cadastral base should match as close as possible to the tax roll the parcel data it is based on. Accurate line work and the area it represents are very important to a local assessor. Soils information is not compiled for the sole use of local government such as assessor. Others will use this information who do not need the accuracy of the parcel data.

Creating themes and knowing the themes information potential and their limitations is essential to good GIS analysis.

Parcel Data:

The parcel data is compiled from recorded documentation such as surveys, with assistance from aerial photography. The format is a vector style format and is usually in state plane coordinates system. The parcel boundary is what isolates the geographic area for a certain parcel. This parcel data is the most important layer for GIS & Farmland Assessment. The other layers of soils and land-use are important but the parcels are the foundation of the overlay file. This layer breaks down the other information such soil type and land-use type out and assigns it to the individual parcels.

A quality parcel base should be up-to-date and match the tax role as much a possible. With good research, quality compilation, and regular maintenance, the parcel map should be a quality set of data that will build in value and be used again and again. With quality data and good maintenance and enormous use in the parcel base, the equity of the data will keep growing and growing for an organization.

Soils Data:

The soils data is information developed by the Federal Government under the direction of the NRCS. The process that is used to compile this soils data is drastically different from the parcel data. The control for the soils data is less accurate in both positional and relative than most parcel base maps. The information is developed from DOQQ's (Digital Ortho Quarter Quads) existing soils survey information and some specific fieldwork. The boundaries that are depicted in the soil data are representational lines and could have an accuracy of + - 20 feet. The data can come in two formats; the first is digital that was mentioned about above and secondly hard copy prints.

These hard copy prints can be scanned into a raster data format. The raster images can be converted from the raster file format to vector format that will be used in GIS for analysis purposes.

Reporting:

Once the overlay map is completed the data that is produced is compared, validated and calculated against and with data that reside in the reporting side. The reporting side houses various tables and functions that perform these comparisons, validations and assessment calculation tasks.

One of the tables used is the parcel table. This database holds parcel information such as parcel number, legal recorded acreage, active statues, agricultural class or non-agricultural class flags and some other historical parcel split information. The parcel information that resides in the parcel table is compared to the information that was produced by the overlay theme in the mapping application. Parcel numbers are checked in order to make sure that the map and the reporting side both have the same valid parcel number. The system also checks for valid soil and land-use types.

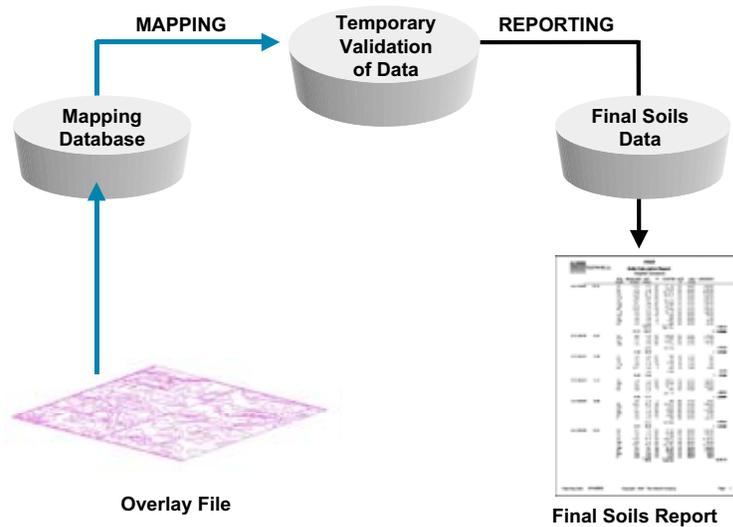
Comparing of acreages is a very important function of the GIS system and farmland analysis. With recorded acreage stored in the reporting application and calculated acreages from the mapping application a check and validation has to accrue between the map and the acreage within the parcel table. With parcels coming in at different acreages and compiled for very different sources, the comparison of a larger parcel is handled differently than a smaller parcel. Smaller parcels are more sensitive to comparison and validation. As you can see below a parcel with 5 acres or less has a higher percentage allowance difference between the map and the legal acreages, where parcels 50 or greater allows 4 percent.

- ❑ 5 acres or less allow 10%
- ❑ 5 to 20 acres allow 8%
- ❑ 20 to 50 acres allow 6%
- ❑ Greater than 50 acres allow 4%

These values are set in order to limit the number of parcels for comparison. The values are set so the once they are either drawn incorrectly or recorded incorrectly they are brought to the user's awareness for correction.

Once the validation is completed and the proper corrections have been made to the map and or the parcel table, the data is then sent to the final soils database. The data that is in this data base is the result of many different calculations. The final soils database takes the mapping side information and attributes the data to various values such as soil rating and non-tillable/use spot symbols per each agricultural parcel. The above values, such as soil ratings, can at anytime be altered and recalculated to this final soils data base for updated data and reports.

GIS & Farmland Assessment Workflow



Conclusion:

GIS with its ability to take various types of mapping themes and bring them together and then giving the user the ability to take this data and report on it per each individual parcel has improved the method and efficiency of farmland assessment calculations.

GIS relieves its users of the old tedious method of hand calculation each time a parcel is created. It also allows for easy data validation and/or modification to data that can then be recalculated over all of an organization's agricultural parcel data.

Thomas P. Ricker
GIS Project Manager
The Sidwell Company
675 Sidwell Court
St. Charles Illinois 60777
tricker@sidwellco.com