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Chesapeake, Pennsylvania State University

Farmland Protection and GIS

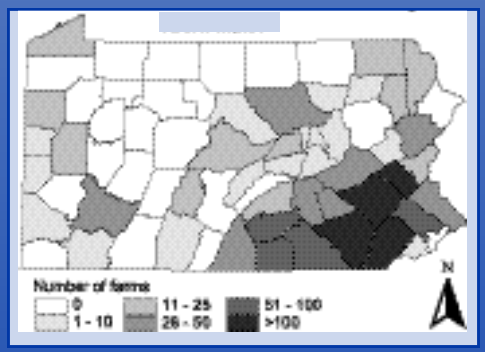
GIS Interface Helps Pennsylvania Counties Prioritize Farmland for Preservation

In Pennsylvania, counties have adopted a Land Evaluation and Site Assessment (LESA) ranking system to prioritize applications for the Agricultural Conservation Easements Purchase Program. An ArcView Interface developed cooperatively between Penn State RGIS-Chesapeake and the Cooperative Extension GIS program has automated this process, helping counties to increase efficiency and allowing them to evaluate numerous scenarios in a single session.

Farmland is under increasing development pressure from expanding metropolitan areas and suburban sprawl in many areas across the nation. In 1998, the Pennsylvania 21st century environment commission, a diverse panel of experts, identified urban sprawl as the most important environmental concern in the state. A look at the numbers shows why: Between 1982 and 1997, 1.47 million acres of farmland were developed in Pennsylvania, representing 94% of all newly developed land. (RFA-Dismal Sciences, 2000)

To protect this valuable land resource from rampant development, Pennsylvania is turning to the Agricultural Conservation Easement Purchase Program, a 1981 Agricultural Security Act measure that provides funding to purchase land easements. The program relies on state and local matching funds and is administered at the county level—each county decides what farmland will be purchased. As of July 2000, 42 Pennsylvania counties were participating in the program, preserving 1,342 farms, totaling 165,717 acres.

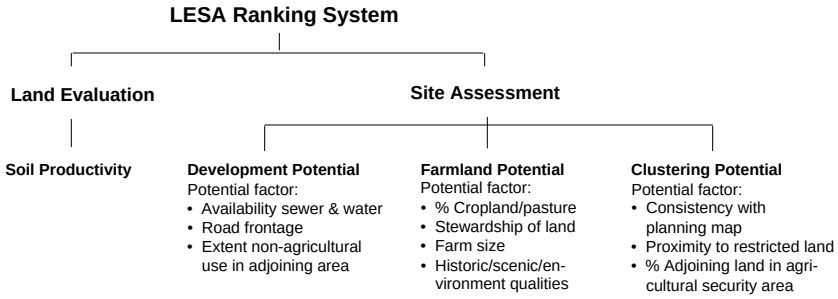
Number of farms in Pennsylvania Agricultural Conservation Easements Purchase Program
(as of 7/13/2000)



A Ranking System for Farmland Preservation

Each county in the Pennsylvania Agricultural Conservation Easements Purchase Program uses a farmland ranking system that prioritizes applications to the program. The two-part Land Evaluation and Site Assessment (LESA) ranking system evaluates and ranks farms on a 100-point scale. This system ensures a quantitative and consistent evaluation of all applications. (USDA–SCS, 1983)

The LE portion of LESA scores the agricultural productivity of soils on the farm, while the SA portion analyzes three categories: development potential, farmland potential, and clustering potential. Each factor in the ranking system receives a score and the sum of the weighted LE and SA scores determines the final farmland ranking. Each county has flexibility as it assigns weights to various categories and factors, as well as in defining additional factors.



LESA ranking system categories and factors in Centre County, PA

Calculating LESA farmland-ranking scores is time-consuming if performed manually using conventional hardcopy maps and planimeters. To streamline the process, Penn State Cooperative Extension GIS Program and RGIS-Chesapeake developed a GIS interface for LESA. Automating the ranking system makes prioritizing land for agricultural easements faster and more consistent. It also greatly increases the speed and efficiency of processing applications.

The ArcView LESA Interface

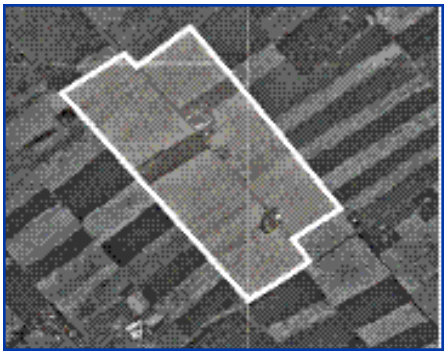
The GIS interface was developed using ArcView GIS software. This software program is routinely available in most county government offices in Pennsylvania and it provides an easy-to-use interface that is customizable using the Avenue programming language. While the data and criteria differ from county to county, the basic structure of the LESA application stays the same. It allows a user to identify a farm parcel and perform a LESA ranking in a matter of minutes. Expertise in GIS operation is not required.

How the ranking system works

Parcel Identification

The first step in the assessment process is parcel selection, which can be performed in two ways. First, if an existing data set of parcel boundaries exists, a parcel can be selected by entering its parcel identification number (PIN) or by pointing to it with a mouse. Currently, several counties in Pennsylvania maintain digital parcel boundary data, but most others have not made the transition from hardcopy maps. Alternatively, a technician can manually digitize the parcel's boundary using orthophotos and/or USGS scanned topographic maps as base maps for geographic reference. To digitize the boundary, the mouse is used to locate boundary lines visible on a monitor. Once a parcel is selected, either a portion of the parcel or all of it can be selected for assessment.

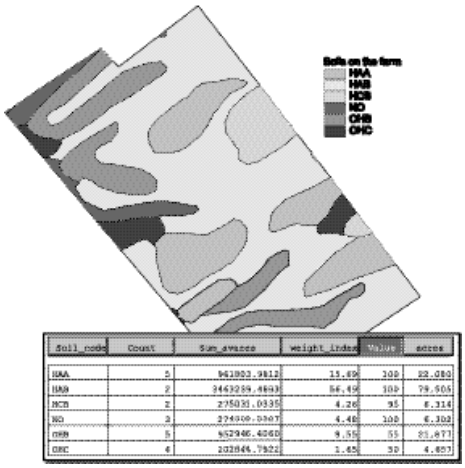
On-screen parcel digitizing



The LESA Ranking

Once a parcel is delineated, the system extracts GIS data from countywide databases that reside in the system and are necessary to conduct the assessment. The databases characterize areas within the farm boundary as well as areas surrounding the farm. Using associated data layers, the program examines LESA factors both inside the parcel (e.g., soil-productivity) and surrounding the parcel (e.g., proximity to surrounding development). The system allows the selection of multiple user-specified buffer distances to extract data surrounding the farm. Some factors used in the LESA assessment, such as farm stewardship, require a site visit to the farm. The system allows the entry of such additional factor scores through pop-up dialog windows.

Soils on the farm



Fast, Accurate Results

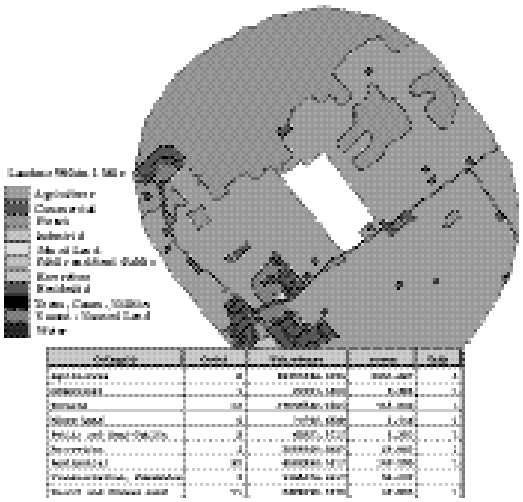
The program produces printable maps and tables for all relevant criteria used in the assessment. After all criteria have been scored, a final tally for the parcel is given and it is ranked in relation to other county parcels under consideration. The maps and tabular data provide a clear explanation to the landowner for the ranking score, thereby offering assurance that they are being treated fairly and consistently with respect to other landowners.

Once a score is tallied, the landowner may approve the parcel for consideration. If accepted in the easement program, the LESA-GIS interface produces required maps as well as an address list for all surrounding parcels. If, however, the farm ranks low relative to other farms under consideration, the landowner has some options to improve the farm's ranking. These include: 1) changing the farm boundary to include more productive soils and exclude less productive ones, 2) increasing the size of the farm, 3) agreeing to accept reduced compensation for the easements, or 4) excluding non-agricultural lands. The beauty of the LESA interface is that it allows the landowner and county officials to consider numerous iterations and scenarios within a single session and each can be saved for future consideration. This increases the likelihood that the farm will be thoroughly considered.

Land Evaluation		Development Potential		Farmland Potential		Cluster Potential	
Soil Value	78.74	Surrounding Uses	11.83	Productive Farmland	29.67	Significant Ag Areas	20
		Road Frontage	22	Stewardship	6	Restricted Land	8.2
		Water & Sewer	15	Farm Size	10	Ag Security Areas	40
				Other Qualities	4		
				Reduced Selling Price	7		
Total	*78.74*	*Total*	*48.83*	*Total*	*56.67*	*Total*	*68.2*
Weight	*40*	*Weight*	*10*	*Weight*	*40*	*Weight*	*10*
						Final Score	**65.87**

Sample LESAScoring for a Parcel

Surrounding land use



A Clear Advantage

This LESA-GIS interface offers county planners many advantages. First, the GIS provides rapid and consistent assessments. By automating the process, users can run multiple assessments on the same parcel, allowing them to do numerous "what-if" scenarios in a single session. This iterative process is critical in overall program success since delays in calculating rankings under optional scenarios tend to discourage landowner participation in the easement program. And, because the entire analysis can be done on a notebook computer, it can take place anywhere that's convenient to the landowner. In addition, a batch-processing option, which allows users to run simultaneous assessments on multiple parcels, can help to show trends in suitability across the county.

Although the ArcView LESAinterface is distributed at no charge to Pennsylvania county officials for use in the program, the heart of the application lies in its datasets. To run the analyses effectively a county must have robust data; the lack of GIS

databases of sufficient quality and scope is a major obstacle for many counties. Because accurate countywide data are critical to the assessment process, Penn State RGIS–Chesapeake and the Cooperative Extension GIS Program provide technical support to counties in database creation and maintenance.

About RGIS

The National Consortium for Rural Geospatial Innovations–Chesapeake Penn State is located on the campus of The Pennsylvania State University in University Park, PA. It is a USDA program designed to promote the use of geospatial information and technologies by communities in rural America. RGIS is dedicated to helping communities understand the concepts and benefits of using geospatial data as well as assisting them in all aspects of GIS development.

For more information

More information, tutorials, and a downloadable demonstration version of the LESAGIS software are available at http://lal.cas.psu.edu. The software is distributed by the Penn State Cooperative Extension GIS Program and RGIS-Chesapeake/Penn State. Contact Rick Day, RGIS–Chesapeake, 116 ASI Bldg, Department of Agronomy, University Park, PA 16802; (814) 863-1615 (phone) or by e-mail: r4d@psu.edu.

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RGIS–Chesapeake Penn State
The Pennsylvania State University
Land Analysis Laboratory
Department of Agronomy
116 ASI Building
University Park, PA 16802