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Identifying Locally Important Farmland: A Novel Approach to Cooperative GIS Analysis

Abstract

Geographic information systems can be powerful and highly utilitarian tools for making land use decisions. However many local units of government may lack skills in the use and understanding of the capabilities of GIS. As an Extension educator, one could showcase GIS skills or educate the local units of government in terms of what GIS can do. By working with local government, educators could help develop basic and realistic expectations for GIS technical services. This support could reinforce Extension educators place in the decision-making process and facilitate the development of land use decisions based on real data and local input.

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Introduction

The conservation of undeveloped land is a critically important (Hymann & Leibowitz, 2000; Strager & Rosenberger, 2006). Likewise, it is important for local government to recognize the value of good farmland. It is also important that local people participate in land use decisions (Pou, 1977). As such, farmland of local importance (one of several USDA recognized farmland categories) must be designated by a local unit of government (U.S. Department of Agriculture, Natural Resources Conservation Service, 2013). As local government initiate such activities, they need to understand basic concepts of GIS (Sampson, 1995). However many local units of government may lack the technical expertise to use GIS technologies in making such decisions.

As Gocmen (2013) stated "Extension educators have a unique opportunity to aid communities using these technologies in a range of activities and fields, including agriculture, forestry, conservation, demography, community development, and planning." While, many Extension educators have a great deal of interest in GIS, others have limited knowledge or skills relative to its use (Watermolen, Andrews, & Wade, 2009). While GIS is well suited for activities such as mapping, examining the

distribution of soils, classifying vegetation, and modeling (Milla, Lorrenzo, & Brown, 2005), there is no guarantee that there is any local knowledge in its use or ability. As a final point, this is coupled with a lack of guidance in determining criteria for farmland of local importance.

"Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses" (U.S. Department of Agriculture, Natural Resources Conservation Service, 2013). But the U.S. Department of Agriculture, Natural Resources Conservation Service (2013) part 657.5 goes on to state "Where appropriate, these lands are to be identified by the local agency or agencies concerned." As such an agency, we are vested in the process and would be well served by local units of governments making informed decisions. Thus we should help in the process if we can.

Given these conditions, there are two basic solutions to bridging the GIS knowledge gap between local units of government and GIS-based evaluations. One solution is for a stakeholder to apply his or her resources to generate the needed recommendations. Another option is to provide the appropriate local unit of government with technical support in developing a plan for a proposed GIS based analysis. This solution can be independent of explicit GIS skills on the part of any local agency or agencies. In essence you need a novel, adaptable, and flexible pathway to either conduct your own GIS-based analysis or serve as a template for use when approaching contract GIS technical service providers.

Methods

The outline below describes in the broadest sense a novel GIS-based analysis that excludes land uses incompatible with current and future production agriculture and not land already developed. This approach examines local soils, extent of prime farmland, and farmland of statewide importance. This approach constructs local rules for selection or exclusion of soil map unit as candidates. By developing a list of candidates for farmland of local importance in a systematic fashion, it enables elected officials to make educated decisions as opposed to highly subjective choice. These proposed steps reflect the approach used in a recent review of Berkeley and Jefferson Counties in West Virginia.

Step One—Evaluation, Exclusion & Initial Ranking

- Examine the soil map unit descriptions and the extent of prime farmland and farmland of statewide importance.

- Use GIS to map areas for exclusion from analysis such as incompatible land uses, land zoned for non-agricultural uses, developed land, and locations targeted for development.

- Evaluate remaining land not listed as prime, unique, or farmland of statewide importance

Online GIS applications like Web Soil survey are extremely useful and underused tools for examining local soils. Understanding existing resources can be helpful in understanding your local farmland. Basic GIS functions such as clipping and reclassifying allow users to exclude areas based on any

number of characteristics. Often GIS software companies offer free software trials and online training. Additional support can be found with Extension specialists and other university faculty.

Step Two—Generating Exclusion Rules & Ranking Criteria

- Use expert knowledge of local production agriculture to define quality agricultural land.

  1. Generally flat
  2. Generally free of excessive rocks
  3. Comparatively easy to manage
  4. Not urban or industrial land

- Develop rules for exclusion based on local definition of quality agriculture land.

  1. Slope gradient 15% or less
  2. Dominate map unit component not rock outcrop
  3. Named map unit components can not contain urban, water, udorthents, or quarry
  4. Extent of less than 100 acres

Locally accepted definitions of quality agricultural land can reflect the local topography, local agricultural enterprises and any characteristics unique to your local community. Exclusion rules can be developed to reflect the basic characteristics of prime farmland and farmland of statewide importance as well as locally accepted definitions for quality agriculture land.

Step Three - Examine, Rank, Evaluate, and Recommend

- Apply exclusion rules and rank remaining map units by extent
- Examine and rank mapunits

  1. Evaluate mapunit descriptions via local definition of quality agriculture land and rank accordingly
  2. Note and eliminate map units with severe limitations, limited agricultural uses or management difficulties
  3. Rank remaining map units

- Visually evaluate mapunits

1. Examine candidates against aerial images — estimate or calculate the extent in use as agricultural land

- Generate final recommendation

1. Provide ranked list of candidates
2. Provide rationale for choices
3. Only recommend mapunits predominately used as agricultural land

Final examination of map unit descriptions and aerial imagery allows you to incorporate management concerns and current land use when ranking candidates. This generates a terminal ranking and allows local units of government to evaluate candidates in detail with the necessary information to make informed decisions. Whether they follow the recommendations or not, their decision will be an informed one.

References

Gocmen, Z. A. (2013). GIS in public planning agencies: Extension opportunities. *Journal of Extension* [On-Line], 51(4) Article 4FEA5. Available at: http://www.joe.org/joe/2013august/a5.php

Hymann, J. B., & Leibowitz, S. G. (2000). A general framework for prioritizing land units for ecological protection and restoration. *Environmental Management*, 25 (1), 23-35. http://dx.doi.org/10.1007/s002679910003

Milla, K. A., Lorenzo, A., & Brown, C. (2005). GIS, GPS, and remote sensing technologies in Extension services: Where to start, what to know. *Journal of Extension* [On-line], 43(3) Article 3FEA6. Available at: http://www.joe.org/joe/2005june/a6.php

Pou, J. W. (1977). Land-use planning: What's Extension's role? *Journal of Extension* [On-line], 15(4). Available at: http://www.joe.org/joe/1977july/77-4-a3.pdf

Sampson, S. A. (1995). Determining need for a geographic information system (GIS). *Journal of Extension* [On-line], 33(5) Article 5TOT2. Available at: http://www.joe.org/joe/1995october/tt2.php

Strager, M. P., & Rosenberger, R. S., (2006). Incorporating stakeholder preferences for land conservation: weights and measures in spatial MCA. *Ecological Economics*, 58 (10), 79-92. http://dx.doi.org/10.1016/j.ecolecon.2005.05.024

U.S. Department of Agriculture, Natural Resources Conservation Service. (2013) National soil survey handbook, title 430-VI. Retrieved from: http://soils.usda.gov/technical/handbook/

Watermolen, D. J., Andrews, E., & Wade, S. (2009) Extension educators can use Internet GIS and related technologies. *Journal of Extension* [On-line], 47(5) Article 5FEA2. Available at: http://www.joe.org/joe/2009october/a2.php