

# Mapping cost-effective farmland preservation priorities

A project funded the USDA NRI Rural Development Program

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## BACKGROUND

With USDA funding (CSREES grant #2005-35401-15320), we are developing a mapping tool to help public agencies and private land conservancies locate opportunities for cost-effective farmland preservation. Our GIS-based approach ranks farms for their potential contribution to multiple values of concern to stakeholders, such as a viable local agricultural economy, open space, rural amenities and ecosystem benefits. The framework is general enough to address a range of land and water conservation objectives including wildlife habitat values. In this three-year project we will test its potential as a planning tool to help urbanizing communities identify where to invest farmland preservation funds. This brief summarizes what the project is about, what we have accomplished so far, and where we are headed.

## THE FARMLAND LEGACY MAPPING FRAMEWORK



Photo courtesy of USDA OPC.

Farmland supplies us with many non-market public goods and services, and society is often willing to compensate private landowners by purchasing development rights or giving tax relief to prevent farmland conversion to urban and residential use. Farmland public goods can be categorized into three broad social objectives: to maintain a viable local agricultural economy, to retain the rural amenities provided by farmland, and to influence the rate and location of urban growth. The social forces striving to preserve farmland for these broad objectives are often represented by different stakeholders who may be working at cross-purposes. The intersection of their objectives forms an obvious opportunity for coordinated action for farmland preservation. One of the

obstacles to planning for farmland preservation has been the technical challenge of visualizing and interpreting the large amount of map information about the planning area. We are developing an innovative map-based planning tool to help farmland preservation programs prioritize conservation investments to achieve their desired mix of these three objectives. Our GIS-based framework analyzes maps of relevant factors (such as soil productivity, flood plains, wildlife habitat, and zoning) and produces the kind of information decision makers and citizens need to evaluate preservation options. The tool can be used to assist in answering the following types of questions about farmland preservation:

- Would preserving this farm be a wise decision?
- Given a specified budget, which subset of available farms would achieve the most towards your conservation objectives?
- Which subset of all farms would meet your conservation objectives most cost-effectively and how much might it cost?

Some strengths of our framework are:

- The framework can account for a wide range of socially-defined objectives.
- Objectives may be tailored to local concern allowing communities the ability to define the relative importance of criteria for ranking farmland.
- The GIS tool automates the calculations required to produce farm scores and rankings, allowing the users to explore preservation options and plan alternatives.
- The same process used to rank farms can be used to track overall progress towards achieving regional farmland conservation goals.
- The conservation value of a farm is based on its cost-effectiveness in meeting your stated objectives.

#### **PUBLICATIONS TO DATE**

Davis, F. W., C. J. Costello and D. M. Stoms. 2006. Efficient conservation in a utility-maximization framework. *Ecology and Society* 11: 33. [online] URL: <http://www.ecologyandsociety.org/vol11/iss1/art33/>.

Machado, E. A., D. M. Stoms, F. W. Davis, and J. Kreitler. 2006. Prioritizing farmland preservation cost-effectively for multiple objectives. *Journal of Soil and Water Conservation* 61: 250-258.

#### **CURRENT AND FUTURE ACTIVITIES**

We are evaluating the demand for farmland preservation and associated spatial planning tools. We have compiled county-level data on farmland preservation programs, population and growth rates, income, agricultural statistics, and similar factors to describe the characteristics of regions that have already implemented programs and to identify where these characteristics are appearing now. We expect that the most likely areas for future farmland preservation programs will be outside the current urban fringe, where communities still have land use options and affordable land prices.

We have been examining the locations of 300+ agricultural conservation easements in the San Francisco Bay region as they have been acquired over the past two decades. We are testing whether easements appear to have been strategically located to influence patterns of urban growth. This analysis is helping us to design quantitative criteria for prioritizing farmland as well as to measure the success of farmland preservation in achieving social objectives.

We are developing GIS models to convert map information into scores representing local conservation value. Initially we are focusing on criteria for rural amenities and urban growth management because these objectives have received less attention than farmland productivity. The regulation of water quality is becoming an important environmental interest for many groups because of regulations and potential markets for shares of Total Maximum Daily Loads. Additionally, given the current concern over flood damage, we are researching the potential of farmland to minimize flood liability. We are currently evaluating the GIS tools with the Central Valley Farmland Trust in California. We welcome comments, questions, and suggestions about the approach and potential case study sites.

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