

2005 Project Award Summaries  
Maryland Center for Agro-Ecology, Inc.

Seven projects were funded, with \$638,903 from the Center and \$343,752 in matching funds, for a total investment of \$982,655.

1. H. Grant Dehart; *The Feasibility of Workable TDR Programs in the Upper Eastern Shore*; \$66,205 from Center, \$8,855 matching funds; February 2005 to February 2006.

Transfers of Development Rights (TDR) Programs in Maryland are among the most successful in the nation. Sixty percent (60%) of all farmland protected by TDR transfers in the nation are in Maryland (over 55,000 acres), yet only four of the ten TDR programs in the state and only one on the Eastern Shore have protected more than 1,000 acres. The Project Team proposes to analyze the real estate economics, planning, zoning, and other factors such as political and community support in the most productive but threatened agricultural region of the six counties of Maryland's Upper Eastern Shore, and to diagnose whether these counties have the necessary ingredients for a workable or improved TDR program.

The objectives of this study are to:

- 1) Identify the attributes or key ingredients of the most successful TDR programs in Maryland and identify why other TDR programs in Maryland have failed;
- 2) Develop objective criteria for analyzing these Eastern Shore counties to determine the probability that a workable and successful TDR program (including inter-jurisdictional programs) could be designed for counties without programs, or determine measures needed to enhance existing TDR programs; and
- 3) Provide an analysis of each Upper Eastern Shore County with recommendations on whether and how a successful TDR program could be implemented.

2. Jeffrey Michael, Towson University; *Peer Review of Downzoning Studies*; \$15,000 from Center, \$4,211 matching funds; August 2005 to August 2006.

Downzoning restricts the development of agricultural land by increasing the number of acres required for each housing unit. Downzoning has the potential to protect working landscapes from encroaching development, but there are concerns that this approach could cause serious harm to rural landowners through the reduction in property values. Two recent studies (Taylor Rogers et al. 2003; Samuels 2003) examined the effect of downzoning on agricultural land values in the mid-Atlantic region, and came to differing conclusions. This project uses a panel of individuals who are highly qualified to conduct an objective analysis of the two studies and their general approaches to the problem.

The objectives of this study are to:

- 1) Thoroughly review the relevant literature and the degree to which the studies follow accepted analytical methodologies.
- 2) Critically examine statistical and appraisal techniques with a focus on the quality of data and the quality of the sample, as well as the strengths and weaknesses of statistical approaches utilized.

- 3) Make a professional judgment regarding the reliability of the studies' conclusions, and their suitability for guiding public policy choices in Maryland.

If the studies are found to have significant flaws, the panel will provide a detailed description of a research methodology that would overcome the major flaws, and provide a road map for future research that could be relied upon as a basis for public policy.

3. Gary Felton, University of Maryland; *Addressing Competition for Ground Water Supply by Assessing Agricultural Irrigation Efficiency in the Coastal Plains of Maryland and Delaware Incorporating a GIS-based Decision Support System for Irrigation Scheduling on a Watershed Scale*; \$109,445 from Center, \$35,825 matching funds; May 2005 to November 2006.

Just as demand for water supply from development is expected to increase, so is agricultural water use projected to increase, predominantly on the Eastern Shore. Agricultural water use encompasses three categories: irrigation, livestock and aquaculture. Since 1980, the total agricultural fresh water use has averaged 3% to 5% of the State's fresh water use. Focusing on irrigation, expansion of these systems is expected to increase because of a desire to reduce crop production risks. Projections indicate water use demand for agricultural irrigation by 2030 to vary between 60 mgd to 225 mgd under drought conditions. Adequate planning and management of the State's water resources must balance agricultural water use with future competition for the resource caused by growth and land use change.

The objectives of this study are to:

- 1) Develop a predictive model of agricultural irrigation water use based on growth projections made by state government.
- 2) Utilize state predictions of municipal growth and water requirements to identify regions, counties, and more local venues where a conflict between agriculture and other users is probable. Synthesize these data into a statement of sensitive (with respect to withdrawal) regions, counties, and more local venues.
- 3) Create an irrigation-scheduling model (a.k.a. Decision Support System) that will be able to prescribe irrigation schedules for agricultural fields based on soil properties, subsurface hydrology, meteorological data and agricultural practices, crops species, and economic return on irrigation investment.
- 4) Develop an up-to-date accounting of the use of water by irrigated agriculture in Maryland for use by all interested parties, as the most recent irrigation survey is almost 20 years out of date.

4. Robert Wieland, Main Street Economics; *Measuring the Values of Maryland's State-Owned Forests*; \$60,000 from Center, \$10,000 matching funds; June 2005 to June 2006.

This study will develop estimates for the values of a range of goods and services generated by State-owned forestland in Maryland. The study will examine these values with regard to their joint production from a single resource and will develop a model for analyzing economic optimality in their production.

The objectives of this study are to:

1. Estimate timber value from State-owned forestland as a function of standing stocks, growth potential, and timber and harvest management.
2. Estimate recreational value from State-owned forestland by undertaking a travel-cost study to impute demand for recreation on such lands.
3. Estimate a “passive use” value or, the value that Marylanders derive from the knowledge that there are forested acres preserved in the state, by undertaking a contingent valuation survey and analyzing those results.
4. Estimate a value for the environmental services provided by forests in keeping nutrients out of surface waters and sequestering carbon from the atmosphere that might otherwise contribute to global warming.

The study’s principal contribution will be to provide a more comprehensive estimate of the value of forest outputs that are not traded in explicit markets but whose values can be imputed through professionally accepted methods. An ancillary benefit of the study will be to allow these valued outputs to be assessed as multiple products, each deriving from forestland, but each also having its own production characteristics. While we do not expect to be able to fully define production functions for each output, establishing estimates of their respective values is a first step toward developing a production possibility frontier for Maryland’s State-owned forestland.

5. Kenneth Staver, University of Maryland; *Developing an Assessment of Potential Reductions in Nitrate Leaching from Cover Crops*; \$145,460 from Center, \$130,050 matching funds; January 2005 to January 2008.

Public concern about nutrient losses from agriculture into the Chesapeake Bay has increased, as it has become clear that earlier predictions of nutrient reductions were overly optimistic. A contributing factor for the underachievement of nutrient reduction goals is the lack of comprehensive quantitative information on the long-term effectiveness of nutrient reduction practices, such as winter cover cropping. To help solve this problem, this project will develop a systematic assessment of the potential effectiveness of winter cover crops for reducing nitrate leaching into shallow groundwater throughout Maryland. Winter cover crop studies in Maryland during the past 15 years have clearly shown that grass cover crops can substantially reduce nitrate leaching, generally by 50% or more. However, these individual studies have not been summarized into a comprehensive description of the effectiveness of cover crops to reduce nitrate leaching throughout the range of climates, soil types, and cropping systems in Maryland, and under the widely variable range of annual weather conditions that are critical in determining nitrate leaching rates in any given year.

The objectives of this study are to:

1. Add a cover crop module to a well-established root-zone simulation model.
2. Verify the augmented model against independent experimental data.
3. Use the validated model to estimate the impact of cover cropping on nitrate leaching across the range of soils, climatic settings, and cropping systems in Maryland.

This project contains strong collaborations with the Natural Resource Conservation Service (NRCS) and the Maryland Department of Agriculture (MDA). The results of this project will contribute directly to the NRCS effort to develop conservation practices for Maryland, and nationally, that reduce nitrate leaching. The project will also contribute to MDA programs for developing cost-effective strategies for using cover crops across Maryland in order to meet nutrient reduction goals.

6. Jennifer Dindinger, Maryland Center for Agro-Ecology, Inc.; *Downzoning in Maryland: Analysis of Value Retention for Farmland Select Counties*; \$62,550 from Center, \$5,000 matching funds; August 2005 to August 2006.

This report builds on the previous downzoning study sponsored by the Maryland Center for Agro-Ecology, Inc. (Taylor-Rogers et al 2003) and will examine whether downzoning actions had a significant effect on the value of unimproved agricultural/rural land in certain counties of Maryland through two approaches. The first approach uses the original methodology from the Taylor-Rogers study, examining four new county pairings. The value of unimproved agricultural/rural land before and after a downzoning action occurred in the study county will be compared to the value of unimproved agricultural/rural land in the control county that had no downzoning action over the same time period. The second approach reexamines both the Queen Anne's County – Kent County pairing from the original study and a new Charles – Cecil pairing, but incorporates new variables into the regression analysis to determine whether or not they have a statistically significant effect on land value.

The objectives of this study are to:

1. To use the existing methodology from the Taylor-Rogers 2003 study to assess the change in value, if any, resulting from downzoning actions in Montgomery County, Carroll County, Cecil County, and Queen Anne's County, as compared to Prince George's County, Harford County, Charles County, and Kent County, respectively.
2. To ascertain which variables, if any, are important control variables. The potential set includes, but is not limited to: the size of the parcel, distance to growth areas, distance to sewer service areas, distance to major transportation corridors (interstates and primary roads), distance to nearest major metropolitan center (Baltimore; Washington, DC; Wilmington, DE), soil suitability, and distance to nearest commercial center. The important control variables are those that have a statistically significant effect on agricultural/rural land value after downzoning.
3. To incorporate these additional variables through an expanded analysis using the Queen Anne's – Kent pairing and Charles – Cecil pairing and determine if any of the properties involved in a downzoning action had a loss of value that the averaging technique used in the Taylor-Rogers et al. downzoning report did not reflect.

7. William Lamp, University of Maryland; *Retention of Former Wetlands on a Caroline County Farm: Nutrient Reduction and Biotic Habitat Development*; \$184,093 from Center, \$149,811 matching funds; Summer 2005 to Summer 2008.

We hypothesize that large-scale restoration of farmed wetlands on Maryland's Eastern Shore, using ecologically appropriate methods, can: 1) significantly reduce nutrient inputs into ground and surface waters of local watersheds; 2) reestablish functional native wetland plant and animal communities; and 3) provide new ecosystem services that mitigate or reduce cumulative impacts of ongoing agricultural activities at the watershed scale. A cooperative project initiated in 2003 involving The Nature Conservancy, US Fish & Wildlife Service (USFWS), Maryland Department of the Environment (MDE), and USDA's Natural Resource Conservation Service (NRCS) provides a unique opportunity to assess the environmental and ecological benefits of restoring 210 acres of agricultural land in northern Caroline County to seasonal forested and open-canopy wetlands and forested uplands.

Specifically, our objectives for this 3-year project are:

1. To measure the changes in total nitrogen, carbon, and nitrate in the soil profile that occur during the early stages of restoration and the resulting change in nitrate discharge to surface waters, and
2. To document improved ecological structure and function (physical, chemical, and biological) of restored seasonal wetlands compared to similar natural wetlands.