Bay Farms: A Regional Nutrient Use Efficiency Initiative

OVERVIEW AND GOALS

In watersheds and regions with an excess of agricultural nutrients, such as key subwatersheds of the Lower Susquehanna River Basin, the dominant strategy of relying on existing tools and technologies and taking a farm-by-farm approach is unlikely to get the job done on its own. Three particularly difficult barriers are:

1) the lack of good information about crop nutrient needs, which leads farmers, quite rationally, to apply a buffer of nutrients beyond what is needed to account for the unknown,
2) the need for voluntary, incentive based programs to promote innovative and performance-based approaches to improving nutrient use efficiency on farms, and
3) the significant numbers of Plain Sect farmers in the region, who will not participate in publicly funded programs and therefore have not received assistance to implement conservation measures to reduce nutrient loss and protect water quality.

An additional challenge is the regional excess of nutrients in the form of manure and litter, which in raw form are very expensive to export outside the watershed. Addressing these challenges requires a coordinated, multi-partner, regional effort that leverages:

1) innovative tools for improving on-farm nutrient use efficiency and
2) leading sources of agricultural conservation assistance — government as well as non-governmental resources — to further implementation of these advanced tools.

In 2004, the Center for Conservation Incentives at Environmental Defense (CCI), with support and participation from numerous partners, launched a pilot project to improve on-farm nutrient use efficiency in Lancaster County, which highlights some of the most critical challenges and opportunities for dealing with excess nutrients in the Chesapeake Bay. Lancaster County is one of the nation's most productive agricultural counties and is the Chesapeake Bay Watershed's most animal-intensive county. Because significantly more agricultural nutrients enter in fertilizer and feed than leave in food and fiber (there are more manure nutrients in Lancaster County than can be utilized by all the farmland in the county[1]), Lancaster County faces a pressing nutrient imbalance — one that is not uncommon to a large number of counties in the Chesapeake Bay Watershed.

[1] According Ag Census and PSU, the county is home to more than 406,000 animal units producing almost 5 million tons of manure – more than 55 million lbs N and almost 14 million lbs P. This exceeds the county's potential crop uptake of 35

In 2004 and 2005, project partners worked with 30 farmers per year to provide them with new, advanced nutrient tools and incentives to improve their nutrient use efficiency, thereby reducing loss of nutrients to streams and eventually the bay as well as reduce their fertilizer costs. In 2006, the project expanded to about 55 farmers managing about 12,000 acres, including 16 Plain Sect farmers.

In addition to working with farmers to implement innovative nutrient management tools, the project is advancing an innovative use of USDA's Environmental Quality Incentives Program (EQIP), USDA's largest cost-share and incentive program for farmers. CCI and project partners are working with USDA in Pennsylvania to implement a Special EQIP Project in Lancaster County, an approach that enables the program to fund new practices and target a specific goal in a specific geographic area. This approach has proven very successful, providing an arena in which USDA can try something new, with the goal of taking lessons learned from the Special EQIP project to implement the new tool — in this case advanced nutrient management tools — across the state.

The core of the expanding project will focus on bringing relatively new, highly effective nutrient use efficiency tools to farmers in the target watersheds and working to ensure long-term use of these tools by the farmers to achieve anticipated nutrient reductions. These tools include:

- **PSNT: The Pre-Sidedress Nitrate Test (PSNT), based on nitrate concentration in the top 12 inches of soil when corn is 6 to 12 inches tall, is a very effective test that tells the farmer how much more, if any, nitrogen the crop needs.** This test works well for a corn crop that has had an application of manure, a nitrogen-contributing cover crop, or has had a previous application of nitrogen.
- **Chlorophyll meter**: **The chlorophyll meter test — which is simple, straightforward, and fast — correlates the nitrogen status of the plant to that of the soil.** The procedure is ideal for fields that receive annual manure applications. Like the PSNT, the chlorophyll meter tells the farmer if the corn needs more nitrogen, and if so, how much.
- **CSNT: The Cornstalk Nitrate Test (CSNT)** involves measuring nitrate concentrations in the lower portions of cornstalks at the end of the growing season. It is a powerful management tool that enables corn producers to distinguish between optimal and excess applications of N — in essence, a report card on nitrogen use efficiency by the farmer that season. Combining the CSNT with either the PSNT or chlorophyll meter gives a complete picture of nitrogen needs and efficiency.
- **Variable Rate Nutrients (VRN): VRN is a GPS-based mapping and variable rate nutrient application system** that provides information on the different nutrient needs of a crop on a small, sub-field scale and maps out for the farmer how to vary N and P applications to be more efficient.

CCI received a grant from the National Fish and Wildlife Foundation (NFWF) to expand the existing project to more farmers in Lancaster County and into Chester County, PA and Cecil County, MD.

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million lbs N and 35 million lbs P. At the same time, more than $9.6 million was spent in 2000 in the county on 11 million pounds of commercial N and 8 million pounds of commercial P for crops.

Other grants received by project partners include a USDA Conservation Partnership Initiative grant (2005) and support from the Pennsylvania State Conservation Commission (2005). Beyond the Special EQIP project, NRCS in Pennsylvania has also supported the project through contribution agreements.

Specifically, over the next three years the project will accomplish the following

On-farm nutrient use efficiency:

- **Outreach and education**: To increase understanding of key nutrient use efficiency tools (such as PSNT, CSNT, chlorophyll meter, and VRN), we will reach more than 2,000 farmers in the target watersheds, including efforts tailored specifically for the Plain Sect community.
- **On-farm implementation**: We will implement PSNT, chlorophyll meter and CSNT testing on at least 300 farms over the 3 years, including at least 50 Plain Sect farms. Specifics include:
    - In year one, participating farmers receive free of charge PSNT/CSNT or chlorophyll meter/CSNT sample collection, analysis, results and nitrogen application recommendations.
    - In year two, farmers enroll in EQIP for an incentive payment (tiered, based on nutrient use efficiency) for following PSNT or chlorophyll meter-based recommendations.
    - Plain Sect farmers may receive PSNT/CSNT or chlorophyll meter/CSNT collection, analysis, results and recommendations free of charge outside EQIP for two more years if they follow the PSNT or chlorophyll meter-based recommendations in years two and three.
    - We will work with 20 farmers to implement test plots comparing PSNT and chlorophyll meter-based applications to traditional application rates.
- **On farm implementation**: We will implement VRN, a GPS-based mapping and variable rate nutrient application system developed by Mosaic Crop Nutrition, on about 2,000 acres.
- **Nutrient efficiency improvements** will be monitored via the test results and detailed farmer recordkeeping. Data will be coded to protect farmer confidentiality.

Integration into EQIP:

- Expand and improve the on-going EQIP special project in Lancaster County, PA: expand project into Chester County, PA, and further develop a tiered/performance-based nutrient management standard to facilitate transfer to other counties. A performance-based standard differs from the current approach in that it guides and rewards producers for achieving a higher level of performance in managing their nutrients, thereby reducing nutrient losses further.
- Introduce and/or help promote further adoption of PSNT, CSNT, chlorophyll meter, and VRN in Cecil County, MD, including a possible special EQIP project, and transfer to other MD counties via the state's tiered nutrient management standard.

Composting Project:

- Advance a regional composting working with Terra Gro, an existing, successful composting operation located in Peach Bottom, PA, to take in excess manure/litter from farms in the region. This already successful operation is taking in manure and spent horse bedding/manure and producing a high quality compost product being used for turf as far away as Charles County,

MD outside Washington, DC. Terra Gro, a private company, will invest significant funds of its own into expansion.

- Specifically, combine funds with Terra Gro to construct a new hoop structure at the Terra Gro operation, which will increase Terra Gro's capacity and output of compost by 50%. Installation of this additional hoop structure composting facility on the operation will optimize the recycling and reuse of nutrients in terms of volume of manure screened and composted and finished product produced.

Partners and local advisors are what make this project successful. These include: the Center for Conservation Incentives at Environmental Defense; Lancaster County Conservation District; Pennsylvania State University Cooperative Extension; USDA Natural Resources Conservation Service in PA, MD, and CT; Brubaker Consulting; University of Connecticut; Lancaster Farmland Trust; TeamAg Inc.; Chester County Conservation District, Little Brittan Ag Supply, AET Consulting, University of Maryland Cooperative Extension, and others. The farmers themselves — all kinds and all sizes — are the core of the project. The Center for Conservation Incentives (CCI) is a lead coordinator of the project and contributes technical and policy expertise and financial support. NRCS provides both technical and financial support for the project.

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