NON-POINT SOURCE POLLUTION MEASUREMENTS AND PROGRAM ASSESSMENT

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INTRODUCTION

Water quality specialists recognize that agriculture continues to be the single largest source of nonpoint source pollution (NPS) problems in the nation. The U.S. Department of Agriculture (USDA) has responded by assigning water quality a high priority in their programs. The U.S. Environmental Protection Agency (EPA) is developing NPS programs under the provisions of section 319 of the Clean Water Act and likewise considers it a high priority. Improving the quality of this nation's waters will take time, particularly because NPS is such a pervasive problem.

AGENCIES' NPS CONTROL PROGRAMS

In late 1990, Congress passed the 1990 Farm Bill which expanded water quality programs under the conservation title. The USDA also began to implement a significant set of technical assistance educational programs and cost-share activities under their Water Quality Initiative (WQI) to control NPS from agriculture. This WQI led to the development of 16 demonstration projects (DP) and 74 Hydrologic Unit Areas (HUA) across the country.

DPs and HUAs have conceptual differences. HUAs must be located only in areas that States have identified, under Section 319 of the Water Quality Act, as having significant impairment of water quality by agricultural nonpoint sources. While nonpoint source problems are potentially important in a DP, they need not have been identified as a high priority problem. HUAs, by definition, are located in a watershed or aquifer-recharge area. The Georgia DP is located in the Gum Creek Watershed in Crisp and Dooly counties. The HUA is in the Little River/Rooty Creek Watershed primarily in Morgan and Putnam counties. Over 20 local, state and Federal agencies are cooperating in these NPS projects.

The section 319 assessment process was conducted by the Georgia Environmental Protection Division, Soil Conservation Service, State Soil and Water Conservation Commission and numerous other agencies. The current DP and HUA projects were targeted as priorities in this assessment. Additional NPS targeted-area projects will be developed as funding allows.

EVALUATING N.P.S. CONTROLS

Of the three general approaches for evaluating the effectiveness of USDA water quality projects--monitoring, modeling, and documenting changes in chemical inputs--water quality monitoring is often preferable.

Most projects rely on intensive monitoring of individual demonstration fields, farms, or best management practices (BMPs). Assessment of project-level effectiveness will require extrapolation of site-specific data to the watershed or waterbody level in order to project changes in water quality impairment.

In order to relate changes in water quality to changes in agricultural management, the extent of adoption, use, and management of land treatments must be known. This is particularly true of practices that are primarily management based such as Integrated Crop Management (ICM) or animal waste management.

In NPS programs, evaluations will assess whether agricultural chemical and nutrient management systems are adopted by landowners. The evaluation will also determine whether water quality models and monitoring data indicate that practices are achieving planned water quality goals. Examples of water quality efforts that will be monitored and evaluated include:

(a) reduction in use and application of pesticides, nutrients, irrigation water and animal waste,
(b) conservation practices that reduce or prevent water quality impairment,
(c) change in chemical and/or biologic conditions of ground and surface water,
(d) change in physical conditions of surface water,
(e) effectiveness in achieving producer adoption of best management practices,
(f) cost-effectiveness and economic value of BMP's.

It is important in NPS watershed programs that baseline data of the area be obtained; otherwise, no meaningful conclusions of water quality improvements can be drawn.

In our projects, we have sampled streams, lakes and ponds, domestic wells and irrigation wells. Regular sampling will continue throughout the life of the project.

A brief description of the Little River/Rooty Creek NPS project purpose and objectives is provided to explain the basic development of an NPS pollution study. The project began in mid-1991 and will conclude in late 1994.

Objectives. The overall purpose of the Little River/Rooty Creek Nonpoint Source Hydrologic Unit (HUA) Project is to increase voluntary farmer adoption of Resource Management Plans which will protect and improve surface and ground water quality while maintaining agricultural productivity and profitability. The project's objectives are:

I. Reduce pollution of surface and ground water through improved livestock, poultry, cropland, pasture and streambank management.
   (a) Improve crop production and livestock management practices affecting water quality on 50% (approximately 80) of the farms in the area over the time frame of the HUA.
   (b) Facilitate landowners implementation of Water Quality Resource Management Plans on 20,000 acres of farmland over the time frame of the HUA.

II. Increase landowners knowledge of effect of agricultural activities on potable water quality.
   (a) Test 50% of the rural water wells in the HUA.
   (b) Improve the knowledge of 50% of the projects landowners of their existing potable water quality.
   (c) Provide training to field staffs on wellhead protection.

III. Reduce potential for contamination of surface and ground water from agricultural activities through improved management of animal waste and nutrients.
   (a) Encourage 40 landowners to apply fertilizer and animal waste on the land using environmentally safe and efficient practices.
   (b) Develop and utilize on-farm waste treatment facilities for 300,000 tons of animal waste.
   (c) Install the Walker Branch project, a total Resource Management System to be used as a demonstration site.

IV. Evaluate effectiveness of project activities.
   (a) Using AGNPS model as a base, evaluate economics of applied practices. Developing a cost per unit for each operation (cost per lb. of N reduction).
   (b) Evaluate the AGNPS model compared to actual monitoring data from EPA's site and develop AGNPS input procedures.
   (c) Determine effectiveness of constructed wetlands as a secondary treatment of wastewater to meet state water quality standards.

BASELINE WATER QUALITY SYSTEM

Before the HUA project began, the major practice used in the area to manage animal waste was lagoons. These lagoons are over 20 years old and have filled with solids as a result of no maintenance. There was no feasible way for the solids to be applied to the land and no resources available to pump out these lagoons, no matter what the cost.

Dairy Waste Management Practices. A complete Water Quality Resource Management Plan is being developed for each operation that signs up and becomes involved in the project. A typical management plan could include waste storage structure (solid separator), holding pond, fixed irrigation system, waste management, diversions, water and sediment control basin, heavy use areas, stock trails, along with pasture and hayland planting and management.

SUMMARY

This report presents the approach being followed to assess the ability of USDA projects to protect or improve water quality from agricultural nonpoint source pollution and to document that protection or improvement. The evaluation components include: (a) Organization and Implementation, (b) Producer Adoption of Water Quality Practices, (c) Physical Impact Assessment, (d) Technical Assistance, and (e) Economic Cost-Effectiveness and (f) Benefits.

The principal objective of these and other NPS projects is to educate the public about the causes and effects of NPS pollution and thus encourage behavioral changes and

TABLE 1. Little River Baseline Data.

	Number	Acres
Dairies with no system.	13	3900
Dairies with only lagoons.	19	5700
Dairies with resourse management system	6	1800
Dairies needing improvement	42	12,600
Total	80	24,000

responsible stewardship of our water resources. Hopefully, monitoring of water quality will show that various BMP's can, in fact, reduce water contamination and/or the potential for pollution. Hopefully, documentation of water quality improvements can be shown by late 1994.

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