Using Nutrient Balances to Benefit Farmers and the Environment

Principal Investigator
Mark Muller
Institute for Agriculture and Trade Policy
2105 - 1st Ave. S.
Minneapolis, MN 55404
612-870-3420

Farmer Cooperators
In Cottonwood County:
Mike Adrian, Mountain Lake
Jonathan Adrian, Mountain Lake
Alvin Dick, Mountain Lake
Steven Dick, Mountain Lake
Lauren Harder, Mountain Lake
Phil Harder, Mountain Lake
Ronald Klassen, Mountain Lake
Robert Pankratz, Mountain Lake

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ESAP Contact
Wayne Monsen, 651-282-2261

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Project Summary
The Minnesota River, and Mountain Lake in particular, has suffered from excessive nutrient inputs. Mountain Lake has had two fish kills in recent years due to excessive phosphorus. What was once one of the best fishing locations in southern Minnesota has been lost. Community members are working to restore the lake to prior vitality. Farmers in the Mountain Lake watershed are in a difficult position as they face these environmental concerns in a time of excessively low crop prices.

From 1996 to 1998, several farmers in the watershed assisted with the development of the Nutrient Management Yardstick, a bookkeeping tool designed to help farmers understand and better utilize the flow of primary nutrients on their farms. The Yardstick can help farmers, along with soil tests and advice from crop consultants, find ways to reduce nutrient inputs.

This project will continue the education process of utilizing the Yardstick and to disseminate the results to other areas of the state.

Project Description
The Nutrient Management Yardstick is a series of worksheets that provides information on nutrient flows on a farm. It provides a method of calculating the amount of nutrients in animals and crops that enter and leave the farm. Processes that take place within the farm, such as the farm’s crops being fed to the farm’s animals, do not have to be accounted for. The worksheets give the farmer another piece of information when making decisions on nutrient management.

Dave Bucklin from the Cottonwood County SWCD and Mark Muller of IATP are working with eight farmers in the Mountain Lake watershed filling out the Yardstick worksheets to see how the three primary nutrients flow on their farms. All eight farms have corn and soybeans as their major crops. Three farms raise hogs, two farms raise turkeys, one is a dairy, and two farms have no livestock. The average farm size is about 350 acres. These farmers have been brought together to discuss the Yardstick and nutrient management.

Project Results
In the winter and spring of 1999, Dave and Mark spent a couple of hours with each farmer participant filling out the Yardstick worksheets and discussing nutrient management. These meetings provided an excellent opportunity for Dave to update the farmers on programs available through the SWCD, such as the recently implemented Conservation Reserve Enhancement Program in the Minnesota River Basin. These meetings also provided farmers the opportunity to ask questions concerning nutrient

![Figure 1. Average of nitrogen fluxes, 1997 & 1998 data, 6 livestock farms, Mountain Lake, Minnesota](image-url)
The Yardstick worksheets gave the farmer participants a good picture of where the nutrients move on their farms. Averages were determined of the nutrient flows for nitrogen, phosphorus, and potassium on the six livestock farms for 1997 and 1998. Nitrogen enters the farm from feed purchased, fertilizer and manure, nitrogen fixing plants, and through rainfall (Figure 1). Nitrogen leaves the farms through animal products, crops, animals, and manure. Twenty-six percent of the nitrogen is either stored on the farm or lost to the environment.

Phosphorus and potassium both enter the farms through feed inputs and fertilizer and manure and then leaves the farm in five ways through animal products, crops, animals, manure, and lost to the environment (Figures 2 and 3). Thirteen percent of the phosphorus and 36% of the potassium is either stored on the farm or lost to the environment.

In the winter and spring of 2000, Dave and Mark will again work with the farmers to complete the worksheets. The farmers will use soil samples in conjunction with the Yardstick to help plan for the nutrient needs in the 2000 crop year. They plan to apply the amount of fertilizer that will supply the crop nutrient needs and achieve the goal of very low amounts of nutrients being lost to the environment. The Yardstick worksheets also help in determining the most cost-effective amount of nutrient application.

There is some concern by farmers that overzealous environmentalists could use the worksheets inappropriately. Since the Yardstick quantifies nutrient excesses, someone could wonder why a farmer is not utilizing all available nutrients. Everyone needs to realize that not all nutrients are available for crop use and that some loss is inevitable.

**Management Tips**

1. Participating in the Yardstick program is informative and valuable.
2. The Yardstick programs over the course of a few years will help you see the trends of nutrient flows on your farm.
3. The Yardstick worksheets help you recognize both financial and environmental concerns.

**Cooperators**
Dave Bucklin, Cottonwood County Soil and Water Conservation District
Mountain Lake Clean Water Partnership

**Project Location**
Contact Mark Muller for directions to the farms involved in this project.

**Other Resources**
Centre for Agriculture and the Environment. Website: http://www.clm.nl.english/publicationlist/publicationlist.html

The Conservation Technology Information Center, 1220 Potter Dr., Room 120, West Lafayette, IN 47906-1383, 765-494-9555. Website: http://kyw.ctic.purdue.edu/FRM/ManureMgmt/Paper68.html