

V(A). Planned Program (Summary)

Program # 13

1. Name of the Planned Program

Water Resources

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
111	Conservation and Efficient Use of Water	20%		20%	
112	Watershed Protection and Management	40%		40%	
133	Pollution Prevention and Mitigation	40%		10%	
403	Waste Disposal, Recycling, and Reuse	0%		10%	
605	Natural Resource and Environmental Economics	0%		20%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	10.1	0.0	36.1	0.0
Actual Paid Professional	18.1	0.0	32.1	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
482465	0	162232	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1571649	0	2394878	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
724671	0	2628980	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

MAES. Minnesota's waters--its lakes, rivers, streams, and groundwater, are an important part of the state's economic strength and a source of pride for Minnesotans. But these water resources are challenged by many pressures that arise out of competing uses for those waters. MAES researchers study all of the state's water resources from several perspectives. Some examples of research progress and results in 2012:

- Researchers have developed and tested an erosion index for riverbeds. Based on that success, they are expanding its use to rivers along the North Shore of Lake Superior.
- An intensive database of feedlot runoff was compiled for an upgrade to the MinnFARM feedlot model that was developed by U of M research reported in a previous year's report.
- Researchers completed a study of the Minnehaha Creek watershed, which has been experiencing a high rate of water loss. The Creek is a popular tourist attraction in the Twin Cities. Researchers found the pumping of water from municipal wells in the area, and the subsurface storm water and municipal sewer piping infrastructure in the watershed may be implicated. The results of this study are of keen interest to local watershed managers and the Minnesota Pollution Control Agency.
- Researchers have been using satellite data imagery as a rapid way to analyze lake-clarity, and this information has now been made available on two U of M websites: water.umn.edu and lakesandland.umn.edu. These websites average more than 6,000 visits each month. The data have been downloaded by agencies, companies, academic researchers and citizens.
- A nitrogen budget assessment to determine nitrogen loading was completed providing information on the opportunities and constraints for farmers considering nitrogen best management practices. The study findings are being used in a Minnesota nitrogen study led by the Minnesota Pollution Control Agency.
- A study on co-digesting the wasted milk from dairy operations with cattle slurry to reduce water pollution was completed. The results showed that the added milk can be digested. This study also has implications for biogas productivity and sustainable energy options for dairy farmers.

Extension efforts focused on research and best practices developed in order to be able to:

- Provide land management / water quality education, stormwater management practice training, and local government stormwater education and support.
- Provide education, practical experience and resources about how to protect and improve the shoreland, environment and lake/stream water quality.

Three Extension programs actively addressed water sustainability issues in 2012. The Stormwater U program works in urban settings, farms and cities to promote ways to manage stormwater runoff. To extend the reach of this program, Extension educators developed and posted videos in October of 2012 to help farmers understand soil compaction. In just four months, these have been viewed over 900 times. The Nonpoint Education for Municipal Officials (NEMO) Program offers information related to stormwater management to local public officials. We have described in this report outcomes of a NEMO program that has made a difference in one multi-community lakes region.

2. Brief description of the target audience

Water Resource Programs are available to communities across the entire state. Target areas for Stormwater Education will include the Twin Cities and other existing or expanding urban areas. We will reach those communities through local government and elected and appointed officials and their staff. Local government engineers and planners, consulting engineers, planners, and architects are also targeted as they help communities make decisions that impact Minnesota's waters. Natural resource and

horticulture professionals will be engaged as partners, learners, and agents of change. Homeowners are another key audience, including shoreland owners, lake association members, and volunteers.

Target audiences for MAES research also includes soil and water scientists, geomorphologists, state and county regulatory agency personnel, farmers, landowners, drainage contractors, crop consultants, engineers, conservation staff, environmental and conservation groups.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	3902	20500	125	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2012

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	4	38	42

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Provide useful information about shoreland, storm water and septic system management into web links, printed products and media. (Target expressed as numbers of products created per year.)

Year	Actual
2012	5

Output #2

Output Measure

- Provide workshops on water quality, stormwater issues and shoreland management, revegetation and use of plants to maintain shoreland structures. (Target expressed as number of events.)

Year	Actual
2012	99

Output #3

Output Measure

- Coordinate shoreline demonstration projects that provide hands-on learning opportunities and add to educational goals.
Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Local decision-makers will know: 1) Where stormwater goes; 2) Major stormwater pollutants and their impact and 3) Components of plans, policies and practices their community could implement to maintain clean water and minimize impacts from stormwater.
2	Shoreland target audiences will: 1) share with others information gained by participating in online or face to face workshops, from the web, or newsletter; and 2) practice one or more of five watershed friendly landscaping behaviors. (Target expressed as a percentage of workshop participants.)
3	Research will provide information on mapping wetlands important to natural resource managers.
4	Research will provide information to help policy makers and agricultural producers make choices that support both water quality and sustainable energy.

Outcome #1

1. Outcome Measures

Local decision-makers will know: 1) Where stormwater goes; 2) Major stormwater pollutants and their impact and 3) Components of plans, policies and practices their community could implement to maintain clean water and minimize impacts from stormwater.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	81

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

An example of an initiative that accomplished important learning gains is the Vadnais Lakes Area Watershed. This watershed faces challenges related to water quality in local lakes and streams. The region encompasses about 16,000 acres, 11 lakes, six cities and both urban and suburban landscapes. Changes in land use and management have deteriorated water quality that, in turn, has had a negative impact on aesthetics, recreational use and ecological value. Local communities have the best potential for preventing further harm to this resource.

What has been done

To achieve better water quality standards, a watershed-based total management daily load (TDML) was completed for five lakes. The TDML identified large target reductions for pollutants. Local politics, planning and practices have the greatest potential for adverse impacts due to land use and management. Outreach programming was aimed at local, county and state groups including lake associations and community organizations such as water ski clubs and environmental groups.

Results

Programming resulted in: 1) broad participation by more than 50 stakeholders from many jurisdictions; 2) contributions from many agencies and professional staff; 3) an overall increase in understanding and buy-in to the TMDL; and, 4) input being used to assure implementation among stakeholders. Evaluation showed that 85 percent indicated they'd learned a great deal, especially achieving better understanding of TDMLs and phosphorous reductions; 33 percent indicated their city or organization could do a lot to implement new practices. The TDML has been submitted to the Federal Environmental Protection Agency for Approval, which is expected to be approved in the spring of 2013.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation

Outcome #2

1. Outcome Measures

Shoreland target audiences will: 1) share with others information gained by participating in online or face to face workshops, from the web, or newsletter; and 2) practice one or more of five watershed friendly landscaping behaviors. (Target expressed as a percentage of workshop participants.)

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Research will provide information on mapping wetlands important to natural resource managers.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Mapping wetlands is important for assessing effects on wetlands due to development, agriculture and climate change.

What has been done

Researchers have developed multiple methods to map wetlands using both imagery and other geospatial data.

Results

The results are being incorporated into the ongoing creation of a National Wetlands Inventory for Minnesota--a state funded project managed by the Minnesota Department of Natural Resources.

The improved mapping techniques resulting from the research are being used by the wetland mapping teams, allowing workers to reduce the time required to map a given area by 90 percent. The accuracy of the data products from these new methods is also significantly better than that of the existing National Wetlands Inventory.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management

Outcome #4

1. Outcome Measures

Research will provide information to help policy makers and agricultural producers make choices that support both water quality and sustainable energy.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Environmental and energy policies are inextricably tied. The promise of energy production from cellulosic feedstocks is tempered by the potential impacts of feedstock production on water quality--an important policy issue for Minnesota agriculture.

What has been done

A mathematical programming model of the agriculture sector in the Le Sueur Watershed in Southern Minnesota, reported previously, was extended for an energy/environmental policy analysis related to biofuel feedstock production. The biofuel feedstock considered was switchgrass, added to corn grain and soybean production. The modeling was linked to hydrological simulation models and showed that water quality improves as feedstock supply increases.

Results

The framework used in this study can be adapted to evaluate how public investments in water quality infrastructure, for example structures to stabilize stream banks or buffer strips, may complement best production practices for feedstocks. The approach is well-sited to predicting the adjustments in production practices and their environmental impacts, and help state and local

officials develop more effective public policies.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Competing Programmatic Challenges

Brief Explanation

Program teams focused efforts on watershed initiatives that could generate comprehensive change in watershed regions. This limited statewide impact.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Surveys were distributed at the end of workshops to assess outcomes and to learn about participants. Pre-post questions determined the magnitude of learning gains, and participants were also asked to indicate the likelihood they would change their behavior. Questions also focused on participant preferences, such as location and time of day, so that the program team could more effectively reach target audiences in the future. Finally, demographic information is gathered as a means to better understand who attended the workshops and events.

For example, those who participated in Nonpoint Source Pollution Education for Municipal Officials (NEMO) were sent a follow-up after the program ended, and 75 percent indicated they better understood phosphorous reactions. A new tool called The Watershed Game got great reviews, with 95 percent of respondents saying they better understood Total Daily Maximum Loads and related plans and policies. A third left the program believing their city or organization could do a lot to implement new policies and practices. As a result, NEMO has received continued support from stakeholders and has submitted plans to the Environmental Protection Agency. These are expected to be approved this spring.

Key Items of Evaluation

A concentration of efforts across a large watershed is helping citizens and local government understand what they can do to improve water quality in a region encompassing 16,000 acres. Program evaluation has led to broad participation, a common understanding of the problem and solutions, and a formal community plan to address quality of water that is submitted for review and approval from the Environmental Protection Agency.