

V(A). Planned Program (Summary)

Program # 11

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	10%		20%	
112	Watershed Protection and Management	40%		40%	
133	Pollution Prevention and Mitigation	40%		10%	
403	Waste Disposal, Recycling, and Reuse	10%		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: 2013	Extension		Research	
	1862	1890	1862	1890
Plan	10.0	0.0	27.2	0.0
Actual Paid Professional	18.1	0.0	33.1	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
518378	0	231541	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1855916	0	1574463	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
593359	0	2390608	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

MAES. Minnesota's waters--its lakes, river, streams and groundwater, are an important part of the state's economic strength and even its identity. But these waters are under constant demands by competing interests, and face new threats from invasive species, climate change, and land and population change. MAES research helps support Minnesota's water resources from several perspectives. Highlights of research results and outcomes in 2013 include:

- A study of local stakeholders perspectives on water use examined constraints to community engagement in water resource protection and restoration. The study resulted in strategies to better engage the community in these issues, which were shared with natural resource agencies and community stakeholders across the state.
- Attempts to control invasive Eurasian watermilfoil has led to suppression of native water plants. Researchers studied methods of reestablishing native aquatic plant communities after invasive species control and found that they could transplant native plants into lakes with success. Poor water clarity, however, did inhibit native plant recovery and expansion in some lakes.
- To meet EPA standards for lower arsenic concentrations in well water, work is needed to find better methods to detect and analyze the biogeochemical cycling of arsenic through soil and groundwater. Researchers developed a method to quantify arsenic in water using hydride generation atomic absorption spectrometry. They also completed a large incubation experiment using freshly collected glacial sediments. The result is a better understanding of the chemical and microbial factors contributing to arsenic release to groundwater.
- Land management changes such as tile drainage, cultivation, and cropping practices have been blamed for recent increases in river flows and increased bank erosion. Researchers analyzed river flow data in the Upper Midwest to decipher climate and land management effects on river. They compared recent data to earlier data before tile drainage systems were installed in fields. They found any upward shift in erosion due to land management changes, such as tile drainage systems, was relatively small compared to the upward shift from recent wet climate.
- In studies of the interactions between surface waters and groundwater, especially in urban areas, researchers looked at whether captured storm water could be re-directed to augment water flow in urban creeks and rivers. Results indicated that it might be a better strategy to re-evaluate the groundwater pumping management in the area. The study showed that as water is flowing into deep aquifers, most of the surface aquifer recharge ends up in the deep aquifer rather than discharged into the area creeks. The information is useful to urban water managers.
- A study of the quality of sub-surface water under active compost sites was undertaken to develop a set of standards for evaluating compost media for use in dairy barn composting bedding systems. Researchers conducted one of the most comprehensive studies of leachates from a single compost site, including not only pH, nitrogen, phosphorus and potassium, but fecal coliform, total phenolics, pesticides, herbicides and others. The results will provide direction on what needs additional study on these compost facilities to maintain ground water quality.
- We have reported in previous years about a spreadsheet decision tool that MAES water quality researchers and economists developed to compare the effectiveness and cost of potential best management practices to reduce the nitrogen load entering surface waters from cropland. This year we can report the continued impact of this decision tool. It is serving as a key part of the Minnesota Pollution Control Agency's statewide nitrogen reduction plan, and was instrumental in the agency's decision to set a 20 percent reduction milestone for 2015.

Extension. In 2013, the Water Resource team at Extension continued to build partnerships with local

elected and appointed officials so that local policy and action would support water quality. Specific evaluated activities trained others to use the Watershed Game in their communities, developed online resources for shoreland property owners, and convened community leaders who can work together to protect the St. Croix Watershed. The team also worked across state lines to consider research and program management needs throughout Extension and other professional sectors.

2. Brief description of the target audience

Water Resource Programs are available to communities across the entire state, especially through key conduits who can create local policy and action that protects water quality. This includes 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 are 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

2013	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	5091	9159	1688	0

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

Patent Applications Submitted

Year: 2013

Actual: 1

Patents listed

8,367,389--Methods, Compositions and Devices Utilizing Structurally Stable Cyanuric Acid Hydrolase

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2013	Extension	Research	Total
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Actual	9	11	20
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V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of products developed to provide useful information about shoreland, storm water and septic system management in web links, printed products and media.

Year	Actual
2013	18

Output #2

Output Measure

- Number of educational events conducted about water quality, stormwater issues and shoreland management, revegetation and use of plants to maintain shoreland structures.

Year	Actual
2013	91

Output #3

Output Measure

- Number of shoreline demonstration projects that provide hands-on learning opportunities.

Year	Actual
2013	5

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 practice one or more of five watershed friendly landscaping behaviors. (Outcome expressed as a percentage of workshop participants.)
3	Community leaders will change local ordinances and strategies to protect waterways in their community. (Target expressed as the number of previous workshop attendees who had taken specific actions in their community.)

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.

Not Reporting on this Outcome Measure

Outcome #2

1. Outcome Measures

Shoreland target audiences will practice one or more of five watershed friendly landscaping behaviors. (Outcome expressed as a percentage of workshop participants.)

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	66

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

When individuals understand the connection between land use and water quality, they are likely to adopt land uses that keep water safe and clean.

What has been done

One effective way to disseminate information about connections between land use and water quality is the Watershed Game. The Watershed Game is an interactive tool that increases best management practices among shoreland owners and elected officials. For 2013, the Watershed Game was included in a number of workshops for elected officials, increasing their knowledge and providing them the opportunity to use the game with constituents in their communities.

Results

In 2013, the Watershed Game increased its use to more than 100 trained facilitators who use it in more than ten states. Among training participants, 71 percent indicated they were very ready to lead the activity following the training, and more than 50 percent indicated they had used the game within six months of being trained. The positive effects of the program intervention will now

be disseminated to more communities and states.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation

Outcome #3

1. Outcome Measures

Community leaders will change local ordinances and strategies to protect waterways in their community. (Target expressed as the number of previous workshop attendees who had taken specific actions in their community.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2013	10

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Actions on the part of a single community or jurisdiction within a waterway do little to protect an entire watershed from harm. A multi-jurisdictional approach is needed to increase awareness and action across a region.

What has been done

Extension convened community leaders in jurisdictions along the St. Croix Watershed. Representatives came from 19 communities and counties, ten watershed organizations, four state agencies and other partners. The event was "a workshop on the river" to help leaders understand the need for phosphorous reduction, learn strategies to achieve the goal, identify priority actions and discuss challenges. Ultimately, the goal was to reduce phosphorous in the river, aiming for reduction Total Daily Maximum Load by 27 percent.

Results

The event successfully created shared knowledge and consensus about the need for action. All participants said they would review and revise current ordinances, would increase local

education, and would share what they'd learned with other local leaders, staff and communities. Forty-seven percent (47) of participants had attended previous sessions and had taken specific actions as a result. Five had reviewed and strengthened ordinances, policies and zoning, and an additional five had increased resident education.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Competing Programmatic Challenges

Brief Explanation

A small team is working to enhance water quality throughout Minnesota, the land of 10,000 lakes. To magnify their impact, the team seeks to leverage relationships with local partners who can, in turn, train and guide their community constituents. Targeted efforts to leaders who can impact an entire watershed makes positive results more possible.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Evaluation of water resource programs examine the degree to which participants learned, and what particular actions they intend to take that will change policy, educate the public, or create structures that protect the water. In 2013, these evaluations found that programming had prepared local decision-makers to educate constituents on the issues of watershed management, and that past participants in programs targeted toward total maximum daily load reductions had strengthened ordinances, policies and zoning, and had educated shoreland owners to strengthen compliance.

Key Items of Evaluation

In 2013, these evaluations found that programming had prepared local decision-makers to educate constituents on the issues of watershed management, and that past participants in programs targeted toward total maximum daily load reductions had strengthened ordinances, policies and zoning, and had educated shoreland owners to strengthen compliance.