



CSREES National Water Quality Program

Applying knowledge to improve water quality

National Integrated Water Quality Program Impact Report

Regional Coordination Projects

Integrated Research, Education and
Extension Projects

Extension Education Projects

National Facilitation Projects



The
Land-Grant
University
System

*A network that responds to water resource
issues by advancing knowledge through
research, education and extension projects.*

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www.usawaterquality.org/

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About This Report

State and regional water quality programs, through the CSREES National Integrated Water Quality Program, are integrating research with extension and education and are linking university experts to citizens to change the way water resources are used in agricultural and rural communities

This impact report provides key examples of how water quality professionals at universities and colleges, in cooperation with the Cooperative State Research, Education, and Extension Service (CSREES), are working with citizens, communities and partner agencies to address critical water quality problems across the United States. Each region's section reports their program framework and an abbreviated list of project impacts, and highlights an especially successful regional effort.

Citizens across the U.S. are facing a myriad of issues related to the declining quality and quantity of the Nation's water resources. Deterioration of water quality has occurred due to excess sediment, pathogenic bacteria, nitrogen, phosphorus, pesticides and other contaminants. At the same time, periodic drought conditions and a rapidly growing population are placing increasing demands on limited

water resources. Many of the water resource issues in the Nation's watersheds stem from a combination of land use activities that include agriculture and land development. For example, irrigated agriculture is the primary consumer of surface water and groundwater resources in many regions. Furthermore, agricultural activities often are cited as the leading cause of water quality degradation in these regions.

Research, education and extension personnel at universities and colleges, working together through the CSREES National Integrated Water Quality Program, are responding to these water resources and land conservation issues with educational assistance, research and development, and effective outreach programs.

The following pages feature some of the impacts these innovative programs produce in agricultural communities.



CSREES National Water Quality Program
 Applying knowledge to improve water quality

—Research, Education & Extension—
 Division • East/Central • Southeast • Southwest • Midwest

About the Program
Regional Programs
National Themes
 National Facilitation
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CSREES/USDA Announces Water Quality Grants
 Learn more about the FY2004 Funded Projects
 2004 Integrated Water Quality Initiative Grants
 National Research Initiative (NRI) Grants
 Cooperative Efficacy Assistance Project (CEAP) Grants

Upcoming Events
 Dec 10, 2004
 First National Conference on
 Dr. Michael P. O'Neill
 Director, National Water Quality Program
 Miami, FL
 Jan 27, 2005
 2005 National Water Quality Conference
 National Water Quality Program
 Houston, Texas
 Feb 29, 2005
 2005 CSREES National Water Quality Conference
 Visalia, CA
 2005 events are listed in the event calendar.

2005 CSREES National Water Quality Conference
 Register Now!
 2005 CSREES National Water Quality Conference

FY2005 Request for Applications
 CSREES National Research Initiative Competitive Grants

The CSREES Regional Water Quality Programs
 (select a region to learn more)

2005 CSREES National Water Quality Conference

CSREES National Integrated Water Quality Program

The most important feature of the CSREES National Integrated Water Quality Program is a network linking University water quality professionals to citizens seeking answers.

The goal of the Cooperative State Research, Education, and Extension Service (CSREES) National Integrated Water Quality Program is to protect or improve the quality of water resources throughout the United States and dependent areas (see National Network on facing page), particularly in agricultural and rural watersheds. The CSREES National Integrated Water Quality Program brings university scientists, instructors, and extension educators into more effective and efficient partnerships with Federal interagency programs to address priority water quality issues in U.S. agriculture. A key emphasis of the program is integration of extension, research and education resources to solve water quality problems at the local level.

Agricultural Research, Extension, and Education Reform Act of 1998 (AREERA) (7 U.S.C. 7626). CSREES implemented a competitive grants process with four categories: Regional Coordination Projects; National Facilitation Projects; Extension Education Projects; and Integrated Research, Education, Extension Projects. Ten Regional Projects (based on EPA regions) serve as the core of the program, linking water quality professionals across the nation.

The CSREES National Integrated Water Quality Program website (<http://www.usawaterquality.org/>) enhances communication and coordination within the CSREES/University network and with its national and regional partners. The website is designed for scientists, instructors, and extension educators to share and access information about successful water quality improvement programs from across the nation.

For more information about the CSREES National Integrated Water Quality Program, please contact the National Program Leader, Dr. Michael P. O'Neill at moneill@csrees.usda.gov; 202-205-5952 or Lisa F. Duriancik, Program Specialist, at lduriancik@csrees.usda.gov; 202-401-4141.

The program is guided by a unique model for shared leadership that includes representatives from each of the 10 regional projects, representatives from the 1890 and 1994 Land Grant University institutions and the CSREES National Program Leader for Water Quality. This is called the CSREES Committee for Shared Leadership for Water Quality (CSL-WQ).

The CSREES National Integrated Water Quality Program is funded through Section 406 of the



Directory of Water Quality Coordinators

- Committee for Shared Leadership Members
- Regional Interagency Liaison Contacts
- National Facilitation Project Coordinators
- Water Quality Coordinators and Contacts



CSREES National Water Quality Program
 Applying knowledge to improve water quality

Home • National Themes • Drinking Water and Human Health

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Drinking Water and Human Health
 National Theme
 Research
 Education
 Extension

The goal of the CSREES National Water Quality Program is to protect or improve the quality of water resources throughout the United States and its territories through research, education and extension efforts. The CSREES National Water Quality Program has identified Drinking Water and Human Health as a theme on which to focus these efforts.

What is CSREES Doing to Improve Drinking Water and Human Health?

The CSREES network is unique in that it has a system of community based education carrying out public outreach education. It can reach a very large audience with its message of how local citizens can improve drinking water quality due to its local contacts and its collaborations with numerous agencies, organizations, local cooperative and citizen groups. The CSREES network is changing attitudes and influencing the adoption of behavioral patterns to protect drinking water. Throughout the U.S., CSREES is an integral part of Source Water Assessment and Protection Programs. These programs help citizens identify potential or potential threats to drinking water around homes, businesses and farms and take action toward remediation of problem areas or prevention of future contamination. CSREES has established many educational programs that address water monitoring and assessment, water conservation, and pollution prevention. As a result of CSREES activities, U.S. citizens are educated about water quality and are taking action to protect their drinking water and family's health.

By teaching our citizens to identify and better understand health and nuisance problems in drinking water, the treatment alternatives to these problems, and how they can prevent future contamination, we help to assure safe and adequate supplies of drinking water for the future. Through the Land Grant University System partnership with CSREES, the numerous college-level courses and degree programs offered pertaining to agriculture and the environment help to educate citizens on drinking water related topics. CSREES is also collaborating on many innovative research efforts such as the use of bacterial DNA to track pathogenic bacteria and the effectiveness of Best Management Practices and on-site wastewater treatment technologies to prevent pollution.

The National Water Quality Network



...other Southwest States and Pacific Islands sites

- Guam
- American Samoa
- Freely Associated States of
 - Federated States of Micronesia
 - Republic of the Marshall Islands
 - Republic of Palau
- Commonwealth of the Northern Mariana Islands



CSREES

New England

Regional Water Quality Program

Applying knowledge to improve water quality

Our Program seeks to strengthen the capacity of the Land Grant Institutions to deliver an integrated water quality program that educates, empowers, and engages agricultural producers, residents, and communities throughout New England to become effective stewards of their local water resources. Our work builds upon the goals of the USDA-CSREES National Integrated Water Quality Program.

To address the water quality challenges of rural New England, we create locally relevant programs focused on land and community management. At the local level we develop, test and refine programs with case studies that leverage other sources of support. At the regional scale, in cooperation with stakeholders and partner agencies, we identify needs and build upon successful local programs to create and disseminate new materials, tools and curricula for use throughout New England. Our program connects the research, extension and educational expertise of Land Grant Universities with federal, state and local partners to improve water quality management.

Regional Framework

The New England Region Water Quality Program is led by New England's six Land Grant Institutions – the Universities of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.

The heart of the New England Program centers on 6 Focus Areas. These Focus Areas tailor the national themes to the strengths of New England Land Grant Universities' research, education, and Extension programs and capture the enthusiasm and energies of our partners and stakeholders. The Focus Areas are:

- New England Private Well Initiative
- New England NEMO
- Volunteer Water Quality Monitoring
- Sustainable Landscaping
- Nutrient and Pest Management on Organic Farms
- Reducing Phosphorus Impacts with Manure Management

In addition, the New England Region is home to two National Facilitation Projects: The National NEMO Project and the Volunteer Water Quality

Monitoring Project. Both of these National Facilitation Projects are integrated into New England's Focus Areas. Focus Area activities emerge from both locally-based and regional efforts and serve to:

- Identify opportunities to transfer and adapt successful elements of locally-based Extension programs to other states in the region.
- Strengthen the connection and integration of university research, education, and Extension experts to target Focus Areas' activities towards critical areas and techniques required to protect water resources.
- Conduct informational needs assessments and use the Logic Model to develop responsive and innovative programs directed to local stakeholder needs and water quality protection efforts.
- Develop new and maintain existing multi-agency partnerships to enable the New England Water Quality Program to leverage resources.

We focus on:

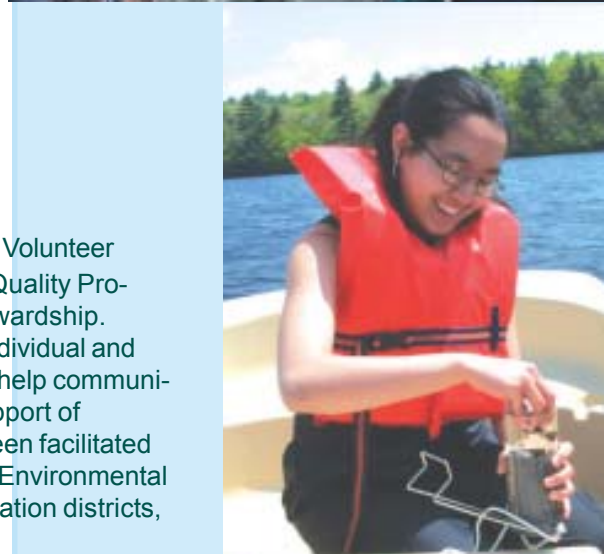
1. Facilitating the incorporation of the best available science in regionally developed water quality education and outreach programs that improve the quality of New England's surface and ground water resources in agricultural and rural watersheds.
 2. Encouraging the adoption of behaviors and activities that result in water quality improvement and protection through thematic programming in: Drinking Water and Human Health; Watershed Management; Pollution Assessment and Prevention; and Nutrient and Pesticide Management.
 3. Working with partners to identify, develop and disseminate research-based tools, curricula and educational programs that promote voluntary approaches to water quality management at the local level.
- Work with partners to identify, develop and disseminate research-based tools, curricula and approaches promoting voluntary approaches to water quality management at the local level.

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Selected Regional Impacts

- **Internet Communications** ~ The Regional Water Quality website highlights the water quality research, education, and extension programs and activities of the New England Land Grant Universities and provides links to our program partners. In addition, the New England Program coordinates the development and hosts the National Water Quality Program webpage.
- **Regional Conferences and Trainings** ~ Regional coordination through both New England Program Steering Committee and Focus Area Activities have provided Extension faculty, staff, and volunteers with training opportunities in areas related to sustainable landscaping, private well water protection, geospatial tools for community watershed management, and agricultural BMPs.
- **Agricultural Research to Action in Extension** ~ The New England In-Service Training Program for Agricultural Service Providers Program provides Certified Crop Advisors with research-based training and recertification credits. Professionals keep up-to-date with new trends in crop production, nutrient management, soil fertility and conservation legislation. Nutrient management plans are being tested and implemented with agricultural producers to determine appropriate manure and fertilizer applications to reduce excess nutrients entering the region's surface waters. In Maine, plans have been completed for 411 dairy farms involving over 90,000 acres of cropland. In Connecticut, plans have been written for over 7,000 acres of farmland. These plans are helping farmers make manure spreading and fertilizer decisions based on the existing nutrient content of the soil and potential impacts to water quality.
- **Volunteer Water Quality Monitoring: Partnerships in Action** ~ Volunteer Water Quality Monitoring Programs within the CSREES New England Water Quality Program often serve as the critical first link to engage the public in watershed stewardship. These programs improve understanding of local water resources, encourage individual and community involvement in water quality protection and restoration efforts, and help communities make informed decisions that improve water quality. In addition to the support of CSREES, New England Volunteer Water Quality Monitoring Programs have been facilitated through collaborations with numerous partners, including Sea Grant, The U.S. Environmental Protection Agency, the U.S. Geologic Survey, various state agencies, conservation districts, local communities, residents and organizations.
- **New England Private Well Initiative: Teaching private well owners how to protect their drinking water** ~ The Initiative is a partnership with the CSREES New England Water Quality Program, the U.S. Environmental Protection Agency New England, state drinking water agencies and the Water Systems Council. The Initiative offers training and education in private well water protection, develops educational materials, and shares programmatic resources and methods with private well water protection programs throughout the Region.
- **New England NEMO: The Use of GIS in Watershed Management** ~ NEMO and NEMO-like programming throughout New England train community leaders and others in the use of geospatial tools to assist in the protection and management of natural resources from inventorying natural resources, modeling existing and future pollution loads, and visualizing landscape changes. These programs apply cutting-edge research techniques and tools to help communities protect water resources and rural watersheds.





Highlighted Regional Effort

Success of the New England Regional In-Service Training for Agricultural Service Providers

Situation:

Agricultural service providers are a key link to the farming community. They provide information and guidance on fertilizer and pesticide application on farms, and guide farmer decision-making on crop selection, rotation options, and harvest decisions. Their information fosters sound agricultural water quality management throughout New England. They also serve as technical service providers through the Natural Resources Conservation Service (NRCS) Agency.

Today, virtually all agricultural service providers are certified through the American Society of Agronomy's Certified Crop Advisors (CCA) program. It is a voluntary program providing a base level of standard through testing and raising that standard through continuing education. The CCA program began in 1993. The New England Regional Water Quality Program is a key sponsor of these trainings in the region, providing an opportunity for crop service providers to keep up to date with the latest regional soil and crop management research, be updated on changes with NRCS programs, and also to learn about crop management business and ethics issues.

Action:

The program consists of a two-day training where we cover issues related to nutrient management, soil and water quality issues, crop management and pest management. Program leaders come from Extension and Research staff across New England. Training held in the summer of 2004 was expanded to include a field training component, due to the success of this aspect, a field training

component will be included in summer 2005 training in Connecticut.

Impact - Outcomes:

- To date, about 100 Certified Crop Advisors have participated in five training programs since 2000.
- Program evaluations were conducted during the February 2004 training with Certified Crop Advisors. Program participants were asked whether or not they influenced on-farm management practices by making both nutrient and pesticide applications more accurate. The evaluations indicate the following impacts on agricultural practices as a result of training programs:
 - Program participants have influenced manure application on at least 60,000 acres of farmland and 55,000 acres in soil fertility management.
 - Program participants have worked with over 654 producers on issues related to soil fertility and 375 with respect to pest management issues to improve accuracy of fertility and pesticide applications.
 - Program participants indicated that they had saved growers money in their production costs based on what they had learned from the program. Responses ranged from savings of \$12,500 to \$500,000.

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USDA Natural Resources Conservation Service

REGION 2



CSREES

New York - New Jersey

Puerto Rico - Virgin Islands

Regional Water Quality Coordination Program

Applying knowledge to improve water quality

Advancing Land Grant University partnerships to restore and protect water quality

Regional Framework

The program is led by a Regional Coordinator, who also serves as liaison to US Environmental Protection Agency, Region 2, and four State Water Quality Coordinators, representing the Land Grant Universities within Region 2: Cornell University, Rutgers University, the University of Puerto Rico and the University of the Virgin Islands. A part-time program associate, housed at Rutgers University, provides staff support for the Regional Water Quality Program (RWQP).

Region 2 is characterized by diversities in climate, geography, population and land use. It includes the Mid-Atlantic States of New York and New Jersey, and the Commonwealth of Puerto Rico and the Territory of the US Virgin Islands in the Caribbean.

Our objective is to encourage coordination among university faculty, extension educators, and federal, state and local agencies to facilitate integration of research, education and extension through multi-faceted regional initiatives.

The regional initiatives were selected through a needs assessment process that included the regional team and numerous program partners. These initiatives address water resource issues that exist throughout our region and that would benefit from broad based university/agency collaboration. These initiatives serve as a rallying point for the RWQP to strengthen our program structure and to effectively engage the expertise of our vast university system.

The RWQP hosts annual and topic-specific meetings to identify emerging water resource issues and to build partnerships among universities and with federal, state, and local agencies in targeted program areas. Trade groups, non-governmental organizations and industry representatives are also invited to participate in these events.

The RWQP web site is an evolving communications tool that broadens our outreach and serves as a place for interested faculty, staff, and partners to learn about current projects and ways to participate.

Regional Initiatives

- Animal Waste Management for Small Farms
- Water Quality Trading
- Onsite Wastewater Treatment System Management
- Watershed Management



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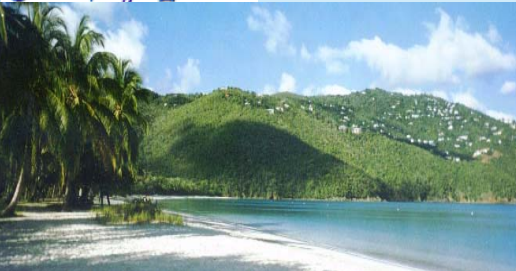
THE STATE UNIVERSITY OF NEW JERSEY
RUTGERS



UPR



UNIVERSITY OF THE *Virgin Islands*



Leveraging Resources

To date, the program has leveraged over 1.3 million dollars in funding, beyond regional funding provided by USDA CSREES.

• **Working with EPA Region 2** ~ While Region 2 is geographically fragmented, the Land Grant Universities in the region share a common need to work with EPA Region 2 to effectively carry out environmental programs. Therefore coordination with EPA Region 2 is an important element of the Regional Program. We have built a strong working relationship with EPA through our EPA Liaison and through routine interaction between faculty and agency management and staff. This has led to a two-way flow of information, wherein EPA provides information about agency water quality priorities and programs and the universities provide information on research findings, client needs and educational approaches. For example, our Water Quality Trading Regional Initiative was established in response to the January 2003 EPA Trading Policy, and our Regional Animal Waste Management Initiative helped inform EPA that the region contained large numbers of animal agriculture operations in need of environmental management assistance.

• **Animal Waste Management for Small Farms** ~ Small animal farms throughout Region 2 face challenges controlling water quality impacts associated with animal wastes, fertilizers, pesticides and other chemicals used on the farm. These farms generally are not covered under the EPA Concentrated Animal Feeding Operation (CAFO) regulations or similar state programs, and do not generally take advantage of the technical and financial assistance provided through the various USDA Farm Bill programs. Each of the Land Grant Universities (LGUs) in the region has programs in place to assist these small farms. For example, Cornell works with small farms to improve feeding regimens as a cost saving method to reduce nutrient pollution. Rutgers is testing cost effective horse manure composting techniques and the University of Puerto Rico (UPR) designs low cost manure storage facilities for limited resource farms. The RWQP contributes to LGU efforts in animal waste management by facilitating discussion and collaboration, and by helping to channel resources to the LGUs to advance their work in this area. An example is the RWQP's partnership with Rutgers University to develop an equine environmental management demonstration site that will incorporate stormwater, pasture and manure best management practices (BMPs), BMP monitoring and extension education. The RWQP is working to secure project funding and to facilitate regional collaboration by engaging Cornell and UPR faculty and by hosting a regional symposium.

• **Onsite Wastewater Treatment System Management** ~ Onsite wastewater treatment systems (OWTS) are in wide use throughout Region 2. In response to reported water quality impairments resulting from failing and inadequate onsite wastewater treatment systems, the RWQP convened a regional symposium in April 2003. This event was held with the Cornell Local Government Program and EPA Region 2 to identify issues and areas for RWQP action. As a result of the symposium, the RWQP created the OWTS Regional Initiative. The initiative includes educational workshops for local officials and OWTS designers and contractors to test approaches and materials for region-wide application. Site visits by our regional team and national experts (including the University of Rhode Island Onsite Training Center) were made to gather soils and regulatory data to support program development. Financial and technical assistance were committed to projects demonstrating OWTS management by local governments in New York and New Jersey for the purpose of testing approaches and materials and to identify research and assistance needs. As a follow up to our 2003 symposium, the RWQP will co-host a forum with USEPA in April 2005 to assess progress made over the past two years and to identify future actions.

Highlighted Regional Effort

Water Quality Trading Initiative

The Water Quality Trading Initiative has resulted in regional discussion and support for pollution trading, development of a major nutrient trading project and exploration of other trading opportunities - demonstrating how partnerships are formed to solve regional water quality issues.

Situation:

Through the Regional Water Quality Program needs assessment process, partners identified control of nonpoint source pollution as a high priority for the region. Water quality trading was identified as one of the mechanisms that could help address the nonpoint source problem. With the support of our partners, the Regional Program has taken the lead in creating a Water Quality Trading Initiative for the region.

Action:

The Water Quality Trading Initiative was established to improve the understanding of this incentive-based approach, and to advance its use where feasible to reduce nonpoint source pollution and to improve the economic efficiency of point source control.

Early in January 2003, coinciding with the release of the US EPA Trading Policy, the Regional Program, in consultation with Land Grant faculty, US EPA and other partners, began to craft the Water Quality Trading Initiative. Discussions were held with numerous partners and a pilot feasibility study was conducted. Geographic areas were identified as likely candidates for water quality trading programs, and various methodologies were considered.

Impact - Outcomes:

Within Region 2, US EPA, New York State and Connecticut (Region 1) are carrying out the Long Island Sound Nitrogen Trading Program, one of the preeminent point to point trading efforts in the nation.

However, beyond Long Island Sound, trading was not being actively considered in other areas of Region 2.

The Water Quality Trading Initiative has facilitated broad-based discussion on the potential of point to point and point to nonpoint trading that could include agricultural and other rural and suburban water pollution sources. Over the past two years, the Regional Initiative has built support for this incentive-based approach by hosting expert presentations and partnership discussions. Trading projects have been fostered through this regional coordination, including the development of a major New Jersey trading project to be funded by US EPA.

Rutgers University, in partnership with Cornell University faculty, the New Jersey Department of Environmental Protection and several other New Jersey organizations, was awarded a \$900,000 US EPA Targeted Watershed Grant. The project will research and establish a trading system geared towards cost-effectively achieving water quality standards for phosphorus in the Upper Passaic River Watershed. This proposal was one of 14 watershed areas in the nation to receive funding.

The Regional Program is also working with Cornell and University of Puerto Rico faculty to identify possible water quality trading projects in New York and Puerto Rico, and is exploring other trading opportunities in New Jersey.



Development throughout much of Region 2 is characterized by the close proximity of numerous land uses. This intensity results in complex water resources issues, but also creates opportunities for trading by taking advantage of differences in control costs among water pollution sources.

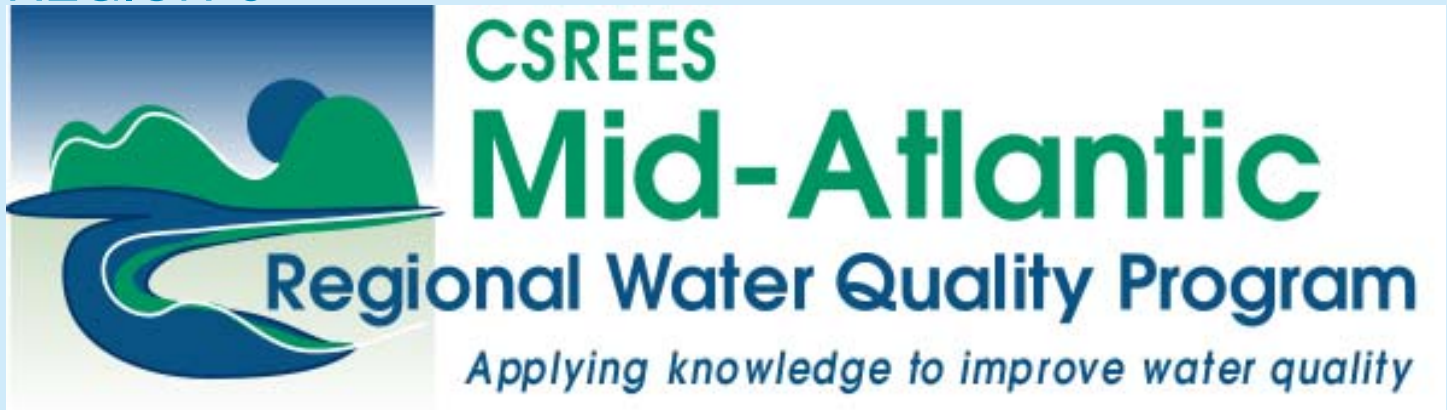


At this press event in August 2004, the Rutgers University Water Resources Program received a \$900,000 US EPA Targeted Watershed Grant to develop a Water Quality Trading Program in the Passaic River watershed in central New Jersey.

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Regional Framework

The Mid-Atlantic Regional Water Quality Program is led by a Steering Committee of representatives from each of the five original Land Grant Universities (1862s) and four Historically Black Land Grant Universities (1890s) within the five-state region.

The goal of the Mid-Atlantic Regional Water Quality Program is to provide science-based expertise and education support needed to ensure that agencies and stakeholders have the most comprehensive and integrated science necessary to reduce nutrient impairments to the waters of the region from nonpoint sources of pollution. Our approach is to be state anchored, regionally organized and part of a national coordination team. Priority science-based educational programs are built upon existing state programs; new regional efforts are developed, and initiatives are undertaken with other universities, key federal and state agencies and regional stakeholders.

The Regional Program is becoming recognized as a prominent source for science-based water quality knowledge in the Mid-Atlantic. The program is developing a repository of comprehensive information and training on emerging technologies, practices and programs for watershed protection and nutrient pollution control. We support balanced decision-making through science-based approaches to water quality management by state and federal agencies in the Mid-Atlantic.

Visit our website at:

<http://www.mawaterquality.org>

Priority Themes and Program Activities:

Animal Waste and Nutrient Management

- Ammonia emissions from agriculture
- Phosphorus Site Index compatibility among states
- Regional nutrient budgets



Residential Environment and Landscape Management

- Responsible lawn care education
- Technical service and education provider collaboration
- Stormwater "rain garden" demonstration
- Septic systems and wells

Watershed Policy, Management and Economics

- Federal CAFO rules
- State Revolving Fund use for agriculture
- Watershed Planning and Total Maximum Daily Loads (TMDLs)
- Nutrient trading

Drinking Water and Underserved Rural Communities

- Drinking water assessment
- Community education and outreach
- Wellhead protection
- Water quality assistance for underserved communities

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Selected Regional Impacts

•**Total Maximum Daily Load (TMDL) Implementation** ~ Clean Water Act requirements for improving water quality in impaired waterbodies have driven the development of TMDL allocations region-wide. In order to ensure effective implementation of these tools, the Mid-Atlantic Regional Program is developing an Implementation Plan Support Tool for use by decision-makers and stakeholders. Incorporated into this Support Tool is a component addressing the means by which public stakeholders can be effectively engaged throughout the process.

•**Residential Nutrient Management** ~ Nutrients from suburbanizing areas in the Mid-Atlantic are increasing as population and development move into rural areas. Efficient nutrient use by homeowners and commercial nutrient managers, septic system maintenance and technology upgrades, and coordination among outreach providers across the region have been the focus of several initial activities.

•**Focusing Attention on Agricultural Ammonia** ~ Ammonia emissions can be an important component of total nitrogen losses to Mid Atlantic estuaries. Research confirms that NH3 emissions from agriculture can be significant. The Mid Atlantic Regional Program Ammonia Initiative is aimed at highlighting emerging issues, linking stakeholders to available science, and promoting the role of science in current and future decision making related to the assessment and control of agricultural ammonia emissions.

•**Web-based Resources** ~ The regional program is linking Extension resources from each state and University, as well as other regional resources through its developing website. All Topic Teams are working to develop web-based products with multi-state applicability. The Program is also focusing on the development of resource directories and web-based programming.

•**Addressing Drinking Water Threats in Underserved Communities** ~ Spearheaded by the 1890 Land Grant Universities in the region, efforts are underway to address drinking water quality in underserved communities in Virginia, Maryland and Delaware. The Mid Atlantic Water Quality Program will develop educational materials and conduct community meetings to convey results and discuss issues related to source water protection and potential remediation assistance resources.



Highlighted Regional Effort

Regional Nutrient Budgets

Situation:

Areas of concentrated animal production import large quantities of nutrients in feed, often resulting in excessive nutrients in waste products. This, combined with ongoing inorganic fertilizer use, has caused the build-up of soil nutrients beyond crop assimilation capacity in many areas. Monitoring and modeling in the Chesapeake Bay watershed has demonstrated that these areas contribute the highest nutrient loads to local streams and rivers.

Action:

The Mid-Atlantic Regional Program is developing a nutrient budget to quantify nutrient excesses and deficits by county and sub-watershed. This information will be used to identify opportunities for redistribution of waste nutrients, drive the development and implementation of alternative uses for manure wastes, and assist decision-making related to animal production siting and manure management.

Outcomes:

Following the development of the regional nutrient budget, educational programs targeted to state and federal agencies, industry, Extension and other stakeholders will be conducted. Agricultural and environmental decision-makers will also be introduced to the regional nutrient information so it may assist decision-making on support programs, incentives and other actions to address nutrient imbalances beyond jurisdictional boundaries.

In addition to more traditional outreach and education, a comprehensive, user-friendly, website is under development as well. The website, located at www.mawaterquality.org/budget contains information on changes in agricultural production and nutrient surpluses (and deficits) for each state by county. Users can currently access graphics and documentation describing trends in animal and crop production and nutrient use.

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Mid-Atlantic Regional Water Quality Program

Nutrient Budgets for the Mid-Atlantic States

Regional Project

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Budget account

Budgets:
Pennsylvania
Delaware
Maryland
Virginia
West Virginia
Mid-Atlantic
Delaware

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As part of the Mid-Atlantic Regional Water Quality Project, extension specialists and researchers at several Mid-Atlantic universities are developing **cropland** and **pastureland** budgets for agricultural cropland. Budgets will be posted here as they are developed.

These budgets will improve water quality protection by supporting activities that address the lack of balance between available nutrient supplies and potential nutrient use by crops in a region.

To learn about specific cropland budgets, click on a state below.

Mid-Atlantic States:
Pennsylvania
Delaware
Maryland
Virginia
West Virginia

Mid-Atlantic Regional Water Quality Program

Nutrient Budgets for the Mid-Atlantic States

Regional Project

Pennsylvania State-Level Historical Trends

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Manure phosphorus percentages by species:

The increase in **manure phosphorus** since 1939 is primarily due to a significant increase in annual poultry production in Pennsylvania. Because of this increase, poultry is now the source of a much larger proportion of manure phosphorus than in years past.

Year	Manure P (million lbs/yr)
1939	47
1978	85
1997	83

Note: State-level budget trends can mask within-state differences that are more visible in Pennsylvania's **county budget trends**. For more information, click on a county below.

Mid-Atlantic Regional Water Quality Program

Nutrient Budgets for the Mid-Atlantic States

Regional Project

Virginia State-Level Historical Trends

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Crop phosphorus by type:

Phosphorus removed from **cropland** in harvested crops increased slightly between 1987 and 1997.

Note: State-level budget trends can mask within-state differences that will be more visible in Virginia's county budget trends (coming soon). For more about the limitations of these budgets, please read the **Disclaimer**.

[View another state-level trend.](#)

Mid-Atlantic Regional Water Quality Program

Nutrient Budgets for the Mid-Atlantic States

Regional Project

Virginia State-Level Historical Trends

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Phosphorus removed from **cropland** in harvested crops increased slightly between 1987 and 1997.

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[View another state-level trend.](#)





CSREES Southern Regional Water Quality Program

Applying knowledge to improve water quality

Through extensive coordination and collaboration internally and with external partners and stakeholders, the Southern Region Water Quality Program has significantly enhanced the development and delivery of technology and resources addressing critical water resource concerns in the South and has supported development of the CSREES National Integrated Water Quality Program.

Regional Framework

The Southern Region Water Quality Coordination Project is led by Water Quality Coordinators representing 1862 and 1890 institutions from each of the 13 states in EPA Regions IV and VI. The Project promotes regional collaboration, enhanced delivery of successful programs and multi-state efforts to protect and restore water resources.

Regional strategic planning efforts identified 12 Priority Programs representing the most urgent water resource needs for agriculture and rural communities in the South. These Programs are grouped under three Focus Areas: *Agricultural Pollution Prevention, Rural Environmental Protection, and Watershed Management*, and encompass the 8 national water quality themes established by the CSREES National Integrated Water Quality Program. Regional teams are working to develop and deliver technology and resources to agricultural producers and rural communities across the South to enable them to better understand and respond to these critical water resource issues.

Over the past 4 years, the project has produced a host of new publications, videos, websites and training materials. Regional technology transfer conferences have educated and increased the capacities of water

Priority Programs

Agricultural Pollution Prevention

- Nutrient Management
- Animal Waste Management
- Irrigation Water Management
- Water Quality Education for Agricultural Producers

Rural Environmental Protection

- Drinking Water and Human Health
- On-Site Wastewater Management
- Community Wastewater and Solid Waste Management
- Rural/Urban Interface Landowner Education

Watershed Management

- Watershed Assessment
- Nonpoint Education Network for Rural Community Decision Makers
- Watershed Restoration
- Watershed Education Network



resource management professionals across the South. Multi-state special projects have targeted critical issues in nutrient management, CAFOs, stream restoration, runoff management, on-site waste management, watershed education and Master Farmer program development. In addition, the project has fostered new and stronger partnerships with other federal and state water resource management agencies to achieve common goals.

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CSREES Southern Regional Water Quality Program
Applying Knowledge to Improve Water Quality
Research, Extension & Education Water Quality Programs through the Land Grant University System

Select a state on the map below to view its information

Program Information
Focus Areas & Program Teams
Target Themes
Regional Resources
Regional Links
Contacts
Partners
Youth
Volunteer
Proceedings
Hot Topics

CSREES Southern Region Water Quality Program
Alabama Home
— Research, Education & Extension —
— Drinking Water and Human Health FAQs —

Themes
Publications
FAQs
Web Links
Directory of Experts
Glossary
GIS Data
Theme Teams
Contact Us
Sitemap
National Site

The following database of Frequently Asked Questions (FAQs) are sub-categorized under Drinking Water and Human Health Issues. For more information you can search our Drinking Water and Human Health Publications and/or the Drinking Water and Human Health Links sections.

Listed below are two ways to find FAQs!

1. Select a sub-topic to find FAQs on that subject:

1. General Information
2. Community (Public Access) Systems
3. Private (Individual Household) Systems
4. Domestic Animal Supply Systems
5. Bottled/Packaged Water Supplies
6. Drinking Water Contaminants
7. Drinking Water Disinfection
8. Drinking Water Standards
9. Drinking Water Testing
10. Drinking Water Treatment
11. Special Problems and Solutions

2. Conduct a quick search by using:

Enter a keyword

Racing to Success
SOUTHERN REGION
Water Quality Conference

Lexington, KY
Oct. 23-26, 2005

Selected Regional Impacts

- **Information Databases** ~ The [Regional Water Quality Website](#) brings together the collective water quality research, education and extension resources for Land Grant Universities in 13 states and provides links to the National Integrated Water Quality Program web site and water quality databases hosted by other agencies. The website features a state-of-the-art search engine which examines thousands of science-based, water resource management publications in 65 databases maintained at universities throughout the Southern Region. The [Drinking Water and Human Health FAQ Database](#) developed at Auburn University is a comprehensive database with answers to 2500 drinking water questions. These websites have logged hundreds of thousands of hits.

- **Regional Water Quality Conference** ~ The Southern Region conducts biennial water quality training conferences organized around national water quality themes. Conference sessions focus on sharing successful programs and innovative approaches to solving water quality problems in agriculture, home economics, community development, and 4-H. More than 200 County Extension Professionals are trained during each Conference. Through regional coordination, expertise is shared and duplication of effort in developing educational materials is avoided.



- **Watershed Education Network** ~ The regional Watershed Education Network develops and delivers watershed education curricula to effectively reach a variety of audiences. This year, the Network delivered multi-state Watershed Academies for local planners, extension agents, watershed managers, and state agency representatives; a multi-state 4-H water camp; and multi-state workshops providing training for local citizen watershed action groups, and Extension and Sea Grant professionals.



Water Quality Collaborative Conference:
1862, 1890 & 1994
Land-Grant Institutions
July 12-14, 2004
Gateway Sheraton
Atlanta, GA

- **Water Quality Collaborative Conference for 1862, 1890 and 1994 Land-grant Institutions** ~ The Southern Region coordinated the Water Quality Collaborative Conference, which facilitated sharing of water quality resources and expertise; established multi-institutional water quality work teams; improved collaboration and linkages among the 1890, 1994 and 1862 institutions; increased awareness of water quality work at 1890 and 1994 institutions; and strengthened linkages between USDA-CSREES, minority institutions and other agencies.



- **The project substantially improves public access to research, extension and education resources available through the Land Grant University System** ~ New resources developed through the project include 70 refereed journal articles; 145 fact sheets; 78 proceedings and abstracts; 33 training manuals; 14 videos; 444 popular articles, radio, TV and news releases and 27 new websites. More than 2,581 educational programs have been delivered directly to an estimated 221,407 clientele and over 274,543 publications, training manuals, and videos have been distributed. More than 336 research/demonstration projects have been conducted to evaluate and promote the use of science-based best management practices.

Highlighted Regional Effort

Focus Area: Watershed Management

Program: **Watershed Restoration**

The Watershed Restoration Program is resulting in changes in state and federal stream mitigation policies so that a more effective natural channel design approach is emphasized.

Situation: Natural stream functions in many areas of the South are threatened by changes in watershed hydrology and land use, often resulting in unstable streams with poor habitat and water quality. Compensatory mitigation programs administered by state and federal agencies require state-of-the-art technologies for watershed restoration planning, design, construction and evaluation. Extension is a leader in providing education to natural resource professionals on effective techniques for natural stream channel design, wetland restoration and riparian protection. The Watershed Restoration Program coordinates regional efforts in technology development, training, and information sharing to promote effective restoration in impaired watersheds.

Action: The Watershed Restoration Workgroup formed through the Southern Region Watershed Restoration Program is conducting regional planning, collaboration and information sharing to promote effective restoration activities. The Workgroup is identifying and compiling existing research and education resources and defining and prioritizing significant gaps to be addressed by multi-state, multi-agency teams. The teams are designing collaborative proposals to seek additional funding to support coordinated applied research and development of education resources.

Impact - Outcomes: To date, over 1200 natural resource professionals have participated in 30 workshops in 16 locations in 8 southern region states (NC, AL, SC,

GA, FL, MS, TN, KY). Over 30 demonstration projects are complete, with funding provided by USDA, US EPA, state agencies, and local watershed organizations. The educational program has resulted in changes in state and federal policy regarding stream mitigation to emphasize a more effective natural channel design approach. Mitigation projects are being designed and permitted to result in stable functioning streams based on the increased professional understanding of stream restoration techniques. Over \$3 million, including funding provided by USEPA, state agencies, and local watershed organizations to design and construct demonstration projects has been leveraged by \$100,000 in Section 406 funding from 2000-2004.

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U.S. Environmental Protection Agency
U.S. Army Corps of Engineers
U.S. Dept. of Energy
Natural Resources Conservation Service
North Carolina Dept. of Environment
and Natural Resources
South Carolina Dept. of Health and
Environmental Control
North Carolina Division of Water Quality
Slurry Soil & Water Conservation District
City of Charlotte, North Carolina





Regional Framework

The Great Lakes Regional Water Quality Coordination Program is led by a team of Extension State Water Quality Coordinators, an Extension Regional Liaison, and a Liaison from USEPA Region 5. The Regional Water Quality Leadership Team (RWQLT) supports programs and projects in six priority Themes (see figure below). The Program also provides core support for six flagship projects. The projects coordinate the RWQLT and with at least one of the Regional Theme Teams. Please see the regional impacts and highlighted regional efforts sections on the following pages for more details.

The Program and its Leadership Team are guided by the following goals:

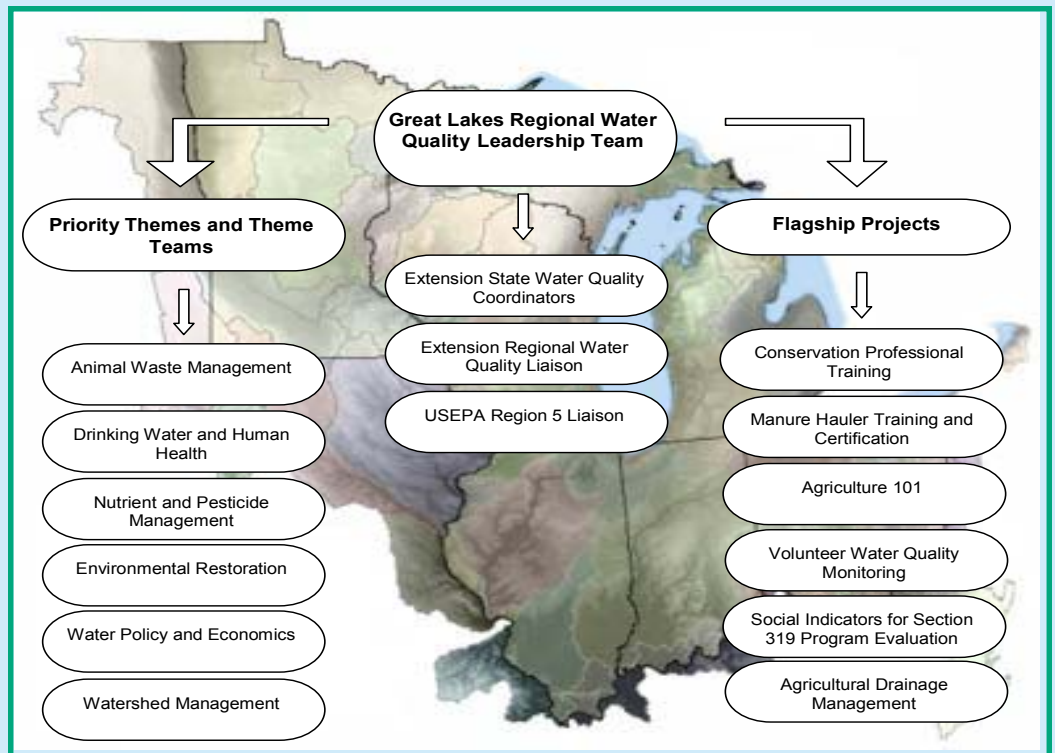
- Provide regional coordination of research, education, and extension/outreach efforts addressing water quality problems within the Extension’s North Central Region and US EPA Region 5.
- Collaborate with a diversity of agencies and organizations to share responsibilities and resources in the interest of solving water quality problems that are complex in nature and regional in scope.
- Build continuing education and professional development programs based on current available information to educate agricultural and non-agricultural audiences about water quality problems and their solutions.

➤ Offer an entry point for state and federal agencies, commodity organizations, and other non-government organizations to access the resources within the Land Grant universities and collectively address water quality problems of mutual interest.

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Regional Impacts

Coordination Impacts

The Great Lakes Regional Coordination Project has increased communication and coordination in regional Extension water quality programming through the Regional Water Quality Leadership Team and associated Theme Teams and projects. It has also increased coordination among Land and Sea Grant institutions and tribal colleges. The Team has become an outreach arm to federal agencies such as USEPA and NRCS, and other organizations by initiating efforts to identify and work toward common priorities. A USEPA representative joined the Regional Leadership Team in 2004. Finally, the Project has been effective in leveraging federal and non-federal funds for water quality programs. The Great Lakes Regional project has leveraged over \$6 million (a 3:1 ratio), benefiting water quality research and outreach efforts and participating agencies and organizations, as well as building the visibility and reputation of CSREES as a productive and contributing partner.



Program Impacts

In addition to building long term relationships among agencies, universities, commodity groups, non-profit organizations and others, the Great Lakes Regional Coordination Project has fostered specific projects in each of its priority Themes. The following summaries describe a water quality issue in each Theme, the action taken by Great Lakes partners to address the issue, and the impact the action had on the affected community. Please contact the Regional Water Quality Liaison, or any other member of the Regional Water Quality Leadership Team for more information about water quality programs within the Great Lakes Region.

Training for Commercial Manure Applicators ~

Voluntary training and certification program developed by Extension in cooperation with commercial manure haulers. Outlines environmental regulations, odor mitigation strategies, nutrient management plan implementation, preventing manure spills into waterways and minimizing environmental damage when spills do occur. Ten to 40% reductions in liability insurance premiums agreed to by several insurance providers for applicators that complete the program.



“Ag. 101” Training for EPA Staff in Region 5 ~ Training program for EPA staff members from Region 5 (Divisions of Water, Air, and Pesticides). The first training was held at the Pinney-Purdue research farm, with Purdue Pesticide Program staff and the Extension Regional Liaison as primary organizers. The purpose of the training is to familiarize regulatory staff with the day-to-day operations of a working farm. This training will be offered to EPA staff biannually during the next four years.

Conservation Professional Development & Training ~

This program provides both a base level of training for conservation staff (soil and water conservation districts, partner agencies, Extension, and private sector) and targeted training in specialized areas (such as pest management, comprehensive nutrient management planning, forestry, etc). This project is coordinated by the RWQLT and is a funded by a Section 406 Extension Education grant and USDA-NRCS.

Volunteer Water Quality Monitoring ~

This multi-state project trains citizen volunteers in the understanding and collection of water samples for bacteria. The project includes an assessment of the quality, reliability and usability of bacteria (specifically *E. coli*) test kits. Volunteer monitoring groups and agricultural producers will be tapped to evaluate the usability of these test kits. A multi-state steering group is being assembled to evaluate results, build in-state support, and create training materials in order to build the capacity of volunteer monitoring networks region-wide.

Development and Communication of Evaluation

Criteria for USEPA 319 Projects ~ Extension staff from the Great Lakes Region have helped EPA staff develop meaningful criteria evaluating the effectiveness of EPA funded projects addressing non-point source pollution. Activities have included technical review of draft criteria and workshops for EPA staff, state 319 coordinators, and 319 applicants. Evaluation criteria are currently being used for all 319 projects in Region 5 and will be utilized in development of national evaluation efforts.

Highlighted Regional Effort

Training For Commercial Manure Applicators

Situation: The for-hire manure application industry in Wisconsin applies 1/3 of the dairy manure in the state (4 billion of the 12 billion gallons produced annually) and are therefore a key audience for assuring the successful implementation of nutrient management plans. This number is expected to double in the next ten years as livestock operations become larger and more concentrated and manure application rates drop. After experiencing legislatively-mandated regulations in IA, MN and MO, manure applicators approached Extension to ask for help in developing a meaningful and useful training and certification program. Three other upper Midwest states (IL, IN, OH) have expressed an interest in becoming a part of the program.

Action: A voluntary training and certification program was developed by Wisconsin, Illinois, and Michigan Extension in cooperation with commercial manure haulers. The program educates applicators and their employees on environmental regulations, odor mitigation strategies, nutrient management plan implementation, preventing manure spills into water ways and minimizing environmental damage when spills do occur. To provide an economic incentive for participation, 10 to 50% reductions in liability insurance premiums have been agreed to by insurance providers for applicators that complete the program. This project is being piloted in WI, MI, IL; the evaluation will be used to make changes before it is introduced in all 6 states. Training started in 2003 with 3 manure spill response demonstrations. Using actual manure, manure spill contain-

ment and cleanup were demonstrated to more than 400 applicators and farmers from 7 states. More than 60 applicators have participated in classroom training on state specific environmental regulations, odor mitigation or equipment calibration.

Impact - Outcomes: The program has opened doors between the manure applicators and the regulatory agencies. After the first Michigan classroom training session, a commercial manure hauler told project coordinators, "We had our local DEQ [Department of Environmental Quality] staff at the meeting and that was an advantage. [We had an opportunity] to get acquainted should there be problems, now we know who we have to deal with." The insurance economic incentive has benefited the industry as well. Participants who had completed the most advanced training experienced an 80% decrease in insurance claims across the board (except Workman's Compensation, which is down more than 50%). Participating applicators have cut their liability insurance premiums an average of \$3,800 in the first year and minimized premium increases by reducing insurance claims.

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Wisconsin Department of Ag, Trade & Consumer Protection
Illinois Environmental Protection Agency
University of Illinois Extension
Michigan Department of Environmental Quality
Michigan State University Extension
Michigan Environmental Assessment Program
Vincent Urban Walker and Associates Insurance, Green Bay

REGION 7



The Heartland Integrated Regional Water Quality Coordination Initiative has responded to stakeholder concerns by implementing multi-state programs on the water quality priority issues of animal manure management, nutrient and pesticide management, and community involvement in watershed management. The U.S. EPA Region 7 is a partner in Heartland leadership and issue teams. The Initiative facilitates issue-based discussion and collaboration among agencies and land grant universities through working groups, roundtables and workshops. Regional networks are created which increase the capacity of CSREES-funded programs to define the needs of targeted audiences and coordinate state-level research, education and extension resources.

Heartland Priority Issues and Objectives



Regional Framework

The Heartland Initiative is a partnership between research and extension at Iowa State University, Kansas State University, the University of Missouri and the University of Nebraska; EPA R7; and IDEA, a communications and information technology service.

The Heartland Action Plan:

Build efficient multi-state, issue-based working groups (issue teams).

Make resources of the land grant universities (LGUs) and the CSREES National Water Quality Program more accessible to federal, state and local water quality improvement efforts.

Facilitate regional dialogue between LGUs, partner agencies and other targeted stakeholders.

Engage 1890 and 1994 universities in capacity building for water quality outreach and education.

Animal Manure Management

1. Assist state regulatory agencies and federal partners in EPA R7 to integrate land grant research, including alternative technologies, into state rules for CAFO regulation and CNMP guidelines.
2. Expand the understanding of livestock industry advisors concerning federal and state CAFO regulations and other environmental manure management requirements.

Nutrient and Pesticide Management

1. Assist technical and regulatory agencies to access land grant university resources for implementation and evaluation of N, P and pesticide Best Management Practices (BMPs) for water quality.
2. Coordinate and deliver research-based information for regulators and service providers on the cost-effectiveness of regionally appropriate BMPs.

Community Involvement in Watershed Management

1. Increase regional communication and coordination among community development researchers and practitioners to foster locally-driven watershed management.
2. Conduct research on the effect of citizen participation in watershed management, and link to education and extension through development of a practitioners guide.
3. Build productive relationships with agencies which assist communities in responding to regulatory mandates.

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Selected Regional Accomplishments

Web-Based Information Resources

A Heartland Web site was created by the IDEA (Information Development ~ Expanding Awareness) communications technology service. The regional site includes a database of CSREES projects and reports, links to other regional and national water quality programs, and an interactive reporting system.



In 2004 IDEA developed a *Content Management System* for use by the issue teams. The system provides templates which allow the teams to create Web sites with a consistent organization of information while revising the content at will. The Heartland home page serves as the gateway to these sites.

Issue sites contain resources selected in response to stakeholder feedback. For example, the Community Involvement in Watershed Management site includes case studies contributed by a regional network of practitioners with watershed experience, reviews of current research literature and links to state resources.



Issue Teams



Heartland activities are implemented by issue-based, multi-state teams led by the co-project directors. These teams are the foundation of the Initiative's regional coordination accomplishments. Team members include representatives of university research and extension, EPA R7, state agriculture and environmental agencies, NRCS, and nonprofit organizations. They participate actively and voluntarily in goal setting, workshop design, participant recruitment, workshop presentations and newsletter contributions.

Issue teams identify regional audiences and needs. For Nutrient and Pesticide Management these are research-based information for regulators and service providers on the cost effectiveness of nutrient and pesticide BMPs, and on management issues for realistic TMDL and nutrient criteria implementation. Subject matter targets are P management as top priority, followed by N and pesticides.



The issue teams connect with the academic leadership of the 1890 and 1994 universities. Faculty of Haskell Indian Nations University have participated in the CSREES National Conference and issue discussions.

Highlighted Regional Effort

Priority Issue: Animal Manure Management

Situation: Environmental stewardship within production agriculture can contribute to significant improvements in water quality. Intensive livestock production in the Heartland states makes manure management a high priority for controlling excess nutrients in soil and water.

The Heartland Initiative targets a regional need created by recent changes in federal regulation of large livestock and poultry facilities (concentrated animal feeding operations, CAFOs) and nutrient management requirements of USDA conservation programs. In response to federal mandates, states are defining rules and regulations for acceptable manure management plans and practices.

Program Accomplishments

The AMM issue team holds regional workshops on CAFOs and comprehensive nutrient management plans. Scientists have collected research-based resources for implementation of CAFO regulations. Regulatory agencies responsible for developing the regulations have engaged in breakout groups, with LGU, NRCS and EPA participating, to discuss how each state is tackling particular issues and technical questions. Attendees have submitted over 100 written comments requesting further annual workshops and increased emphasis on case studies and tools for meeting permitting needs.



A monthly on-line newsletter on the AMM Web site responds to questions raised at the workshops. Research presentations and discussion notes are also posted. Selected peer-reviewed research reports provide background for a regulatory/legislative audience. The issue site is linked to the Heartland Home Page.



Heartland AMM Fall Workshop
Joe Lally, Iowa State University

Over the course of the last 12 months we have described various tools available to producers, service providers, and agency support staff surrounding the Nutrient Planning Requirements of both regulatory agencies and NRCS. Conservation planners have incorporated the various results of these tools into decision support documents that have assisted the producer in management decisions, and these documents also filled the regulatory requirements of record keeping.

The Web site also contains recent information on vegetative treatment systems for managing open lot runoff, and CAFO fact sheets developed by the national Livestock and Poultry Environmental Stewardship curriculum which have been adapted for regional needs.

The program is facilitating a CNMP working group with NRCS on record keeping and planning resources.

The program contributed research and technical portions to an EPA training for CAFO permit writers and inspectors. This pilot session for the national training was held in Region 7.



Impacts and Outcomes:

The Heartland AMM program has increased communication and collaboration between the technical resources community and state regulatory agencies. The workshops and newsletter provide a regional perspective and opportunity to learn from each other about rules currently under development. The best evidence of this impact has been the issue team's commitment and workshop attendees' continued interest in regional meetings that broaden multi-state discussion of both technical information and implementation case studies.

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CSREES

Northern Plains & Mountains

Regional Water Quality Program

Applying knowledge to improve water quality

*The goal of **The Northern Plains and Mountains Region Water Quality Program** is to protect and improve the quality of water resources by facilitating development, delivery and implementation of new and existing practices throughout the Region.*

Regional Framework

The Northern Plains and Mountains Region Water Quality Project integrates research, education and extension programs within the six Region VIII states (CO, MT, UT, SD, ND and WY). Strengthening partnerships with federal, state and local environmental and water resource management agencies is an important goal to achieve effective regional coordination and leveraging of funding.

During the first four years, the project has fostered regional teamwork and new collaborations. Partnerships are in place at the campus level to engage additional faculty without traditional agriculture or extension appointments as resources for the regional programs.

Current Program Priorities

- Provide stakeholder driven tools and training to improve the current management of watershed and rangelands to benefit water quality.
- Educate youth and teachers on watershed functions and the relationship between land use and water quality through the development of curricula, youth programming and teacher training.
- Implement participatory research via producer learning groups to field test Best Management Practices for improving water quality and agricultural profitability.
- Provide research and outreach support for implementation of AFO/CAFO nutrient management programs to protect water quality in the Region.
- Train water resource managers and crop producers in remote sensing and geospatial tools for improving management decisions.
- Educate small acreage and underserved landowners about water quality and opportunities for irrigation water conservation.

Successful regional collaborations include a regional website to provide marketing, communication, and public information, and to serve as an archive of materials developed by the project. A series of informational factsheets covering topics of concern in the Region has been produced and mailed to 700 key opinion leaders, elected officials, and stakeholder groups within the Region. Coalbed methane (CBM) educational and research programs were funded in partnership with the Environmental Protection Agency and the Department of Energy and presented regionally in response to local needs due to the water quality issues associated with developing this resource. An educational session on water management and salinity was developed and provided to practicing agronomists from throughout the U.S. by the regional partners at the 2003 annual meeting of the American Society of Agronomy. Regional participation in the Missouri River Basin Consortium (MRBC) continues to develop with our state coordinators well represented in the planning committee. Region VIII states are also involved in implementing AFO/CAFO programs through training on nutrient management plan development, in partnership with NRCS. Additionally, states provide K-12 education support on watershed functions, links between land use and water quality, teacher training and support, website development and macro invertebrate monitoring.

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Selected Regional Impacts

Integrating Research and Teaching ~ The regional program has successfully incorporated hands-on elements of monitoring and mapping into our watershed education programs. These programs help students understand how streams and lakes function within watersheds and how activities and changes in the watershed affect the health of water bodies. Watershed oriented research on coalbed methane discharge water impact has trained graduate students in range science, agronomy, water resources and ecology.

We conduct teacher trainings throughout the year, organize watershed festivals, provide activities at community events, and work directly in hundreds of classrooms each year. Hands-on training is provided for high school students and teachers with lake and stream sampling for water quality, prairie vegetation, ecology, stream organism and experience in constructing sampling equipment. We offer on-line watershed education courses and resources, including a water quality resource guide for 4-H educators. Since 2001, these programs have reached over 14,000 youth. In the past three years, over 1,200 teachers have learned about water quality and watershed functions.



Partnering ~ In 2003, funding was also obtained from the USDA-NRCS to assist with EQIP related technical support in the area of irrigation water management. A project team was quickly assembled to outline the most current irrigation water management practices to conserve water supplies. The outcome was two peer-reviewed technical bulletins. The first entitled "High Plains Irrigation Practices Guide" and the second entitled "Stretching Urban Water Supplies: Strategies for Landscape Water Conservation". As a follow up to this work, a training partnership was initiated with NRCS to provide drip irrigation training to NRCS and Extension personnel. More in-depth irrigation water management training is planned for summer of 2005.



Addressing Timely Water Resource Issues ~ Limited water supplies due to drought in the region have brought irrigation management and water conservation to the forefront of regional activities as cities and ag producers struggle to meet demand. In response, we consolidated research papers, fact sheets, and white papers into a drought resource guide for producer. Coordinated drought education and information meetings were conducted to provide the latest information about farming practices, livestock and range management, crop insurance, water use, and income tax considerations of certain management decisions. Extension faculty talked with the managers of green-houses, municipal water boards, owners of sod farms and small acreages, home builders, owner associations and others about xeriscaping, irrigation systems, proper settings of sprinklers, water conservation methods. We worked with producer groups, irrigation companies and water user associations to determine best management practices in irrigating crops and selecting specific crops during times of little or no water availability. Internet communications, spreadsheets and decision-making tools were developed to help irrigated crop producers, crop insurance adjusters and cow-calf owners to analyze options and financial impacts of various approaches to coping with limited water supplies.

Highlighted Regional Effort

Best Management Tools for Selenium Prevention

Situation ~ Selenium (Se) is an important micronutrient found in many vitamin supplements for humans. However, at concentrations above safe levels, selenium is toxic to fish and wildlife. Elevated selenium in streams and rivers has been recognized as an environmental problem in the Colorado River Basin, of particular concern to endangered fish species. Irrigation practices are suspected to provide the main mechanism for the mobilization of soluble Se to subsurface and surface waters. The transport of Se is assumed to occur via traditional surface water delivery systems from Se rich sub-basins to irrigated and undeveloped areas.



Impacts ~ A water balance study on a local golf course was conducted and found significant contributions to Se loading. Based on the study findings, the golf course has decided to dry out most of the water features on the golf course and adopt conservation measures to better monitor and operate the irrigation system.

Two graduate students were trained on this project and faculty in Civil Engineering and Ag Economics used model findings in undergraduate education.

A coalition built among school districts, U.S. Bureau of Reclamation, local Soil Conservation Boards and the National Energy Foundation helped to fund and provide water education to 450 local elementary school children in 2004. Eleven field sites were identified and instrumented to document and demonstrate the benefits of BMP tools. During 2004, about 340 participants toured these sites in informal settings.



Actions ~ An integrated 406 project was funded in the region to address these concerns. In the research portion of the project, modeling approaches have been developed to predict basin-scale water quality, water quantity, and economic impacts of proposed selenium remediation strategies. A basin-scale modeling approach is critical since changes in water use in one part of the basin may have impacts on both quality and quantity at multiple points downstream. The project has also developed monitoring and statistical approaches that can help evaluate the impacts of management efforts to reduce selenium loads and improve stream standards compliance.

The BMPs of greatest interest are canal lining, irrigation management, and other alternatives that can reduce deep percolation through the selenium-rich shale deposits that were laid down in the Cretaceous Seaway, back when T. Rex roamed the West.

A partnership between Cooperative Extension and a local selenium task force received an EPA 319 grant to develop BMP tools, while Regional 406 funding was used to carry out technical assistance, outreach and education functions. Extensive local input was used to develop BMPs and water management guidelines for outdoor landscapes, indoor water conservation, golf course water conservation, pond construction, and alternative design for individual septic systems. These BMP tools are being used to educate stakeholders about practices that could prevent Se mobilization.



CSREES Southwest States & Pacific Islands Regional Water Quality Program

Applying knowledge to improve water quality

The CSREES Southwest States and Pacific Islands Regional Water Quality Program works to improve water quality management through educational knowledge and extension programming that emerges from a research base. The program builds on the strengths of the Extension Water Quality Programs at the Land Grant Universities throughout the Southwest and Pacific Islands.

Regional Framework

The Southwest States and Pacific Islands Water Quality Coordination Project represents a diverse group of 1862 Land Grant Institutions from the four states, and six Pacific Islands within EPA Region 9. The Project promotes regional collaboration, technology-sharing, and research and education programs that promulgate the protection and conservation of water resources. In recognition of our region's diversity, we support regional coordination on both regional and subregional bases.

In our first two years we have added four Land Grant institutions to our original partnership; Palau Community College, the College of Micronesia, College of Marshall Islands, and Northern Marianas College. A regional website has been developed that provides public access to water quality information, resources and local water quality professionals. Through strategic planning and our regional needs assessment survey, A Survey of Public Attitudes, we defined four regional focus areas; Rural Environmental Protection, Water Conservation, Watershed Management, and Animal Waste Management. Collaboration in research and education is occurring at all organizational levels across our region. Regional capacity development programs, technology transfer, and the

Regional Themes

Rural Environmental Protection

- Drinking and Human Health
- Onsite Wastewater Management
- Small Community Wastewater Treatment
- Isolated Community Education (Pacific Subregion)

Water Conservation

- Agricultural Water Conservation
- Homeowner Conservation

Watershed Management

- Agricultural Nutrient Management

Animal Waste Management (Pacific Islands Subregion)

- Best Management Practices and Appropriate Technologies
- Small Producer Education

confidence derived from a team effort, have helped us to touch communities that have been without the benefit of professional assistance.

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In our region, we encounter fundamental quality of life issues such as availability of clean drinking water and appropriate sanitation practices. In these underserved areas, the Region 9 water quality Program subscribes to the USDA-CSREES principle "Access to safe drinking water, or information to acquire safe drinking water, is a basic right of every citizen."



Selected Regional Impacts



- **A Network of Water Quality Professionals** ~ We have established unprecedented communication among water quality professionals in a region that spans 8 time zones and crosses the International Dateline. Productive communication within our regional network of 10 Land Grant institutions and their partners provides for cost-effective sharing of technology and resources. Public access to our regional network of water quality programs, professionals, and resources is facilitated through our regional website <http://ag.arizona.edu/region9wq/>



- **Coordinated Response to Education Needs Hawaii, the Marshall Islands, and Palau** – Extension personnel are providing water quality education to individuals and communities who rely upon rainwater cisterns to collect their drinking water.

Hawaii, Northern Marianas, Guam, and American Samoa – Extension personnel are introducing Animal Waste Management Best Management Practices and appropriate technologies to swine farmers throughout the Pacific Basin.

Nevada and Arizona - Extension personnel provide professional development opportunities that address rural wastewater treatment and drinking water treatment.

California –The Center for Water Resources and Extension cooperators are conducting nitrogen management seminars in the nation's largest vegetable production areas.



- **Regional Needs Assessment A Survey of Public Attitudes**

Through a collaborative effort with Region 10, statistical analysis of public opinion was employed in the identification of regional focus areas. **A Survey of Public Attitudes** effectively communicates public perceptions and concerns to our region's program planners and decision-makers.

- **Developing Capacity in Community College Land Grants**

Our first regional workshop devoted specifically to professional development was conducted in July of 2004 in Hawaii. Our Hawaii workshop focused on statistical interpretation and analysis of the Regional Survey. Professional development figures significantly in each regional meeting. Extension personnel have received training in organizational communication, partnership building strategies, strategic planning, logic models, and reporting. Capacity development has proven to be instrumental in providing professional assistance to the underserved areas of our region.



Highlighted Regional Effort

An Alternative Waste Management System to Swine Operations for Water Pollution Control Programs in the American Pacific

Principal Investigator: A. Sabaldica, Ph.D. Northern Marianas College

Situation: Piggeries in the Pacific Islands are a significant contributor of nitrates and fecal contaminants in surface water, groundwater, and even coastal waters. Unmanaged piggery effluent threatens watershed and coastal ecosystems throughout Micronesia and American Samoa.

The swine effluent problem in the Pacific has two points of contention. One issue is education; local farmers aren't familiar with principles of contaminant transport or the potential health hazards posed by the effluent. The other issue is an economic one. An alternative system for waste management, if it is to be utilized, must be affordable.

Action: Land Grant Extension Researchers from the University of Hawaii and Northern Marianas College, in conjunction with USDA-CSREES cooperators and EPA, have been addressing both of these issues in a recent series of education workshops in the Northern Marianas. These workshops foster stewardship of water resources and introduce two affordable solutions for responsible waste management; a dry-litter system and a portable pen system.

Impact - Outcomes: Three workshops have provided education to roughly 100 participants so far, with some participants choosing immediate adoption of these alternative management techniques. Future workshops will advocate the economic advantage of utilizing the nutrient-rich "wastes" in on-farm crop programs.

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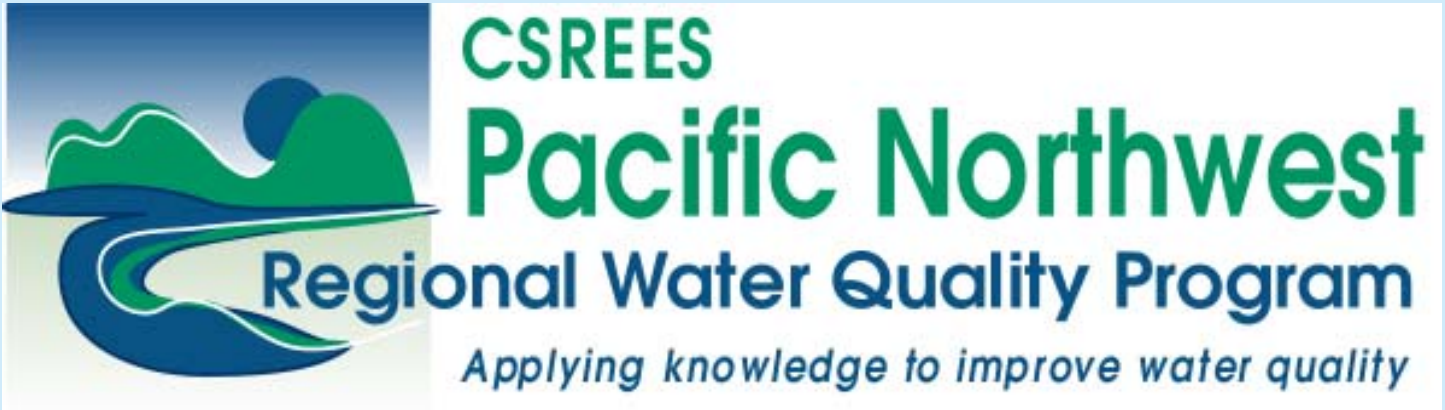
The Challenge: Unmanaged effluent streams typical of the region. Unmanaged streams of this volume will inevitably find their way to surface waters and groundwater.



The Solution: Portable Pen and Dry-Litter Systems; affordable environmental stewardship



This farmer immediately adopted the dry litter system after attending a workshop in the Northern Mariana Islands. He commented that he was very happy with the system, witnessing immediate reductions in water use and visible effluent. He and his wife prepared the system over the course of 5 days during their free time.



We are an Alaska-Idaho-Oregon-Washington partnership of five land-grant universities, four water research institutes, U.S. Environmental Protection Agency Region 10, and USDA Natural Resources Conservation Service.

We are committed to working together—and with other federal, state, local, and private partners—to provide research and education on water quality to Pacific Northwest communities. Our partnership is supported in part by the USDA Cooperative State Research, Education, and Extension Service (CSREES).

OUR GOALS

We help Pacific Northwest residents make informed decisions about protecting and restoring their water resources. By providing leadership for water resources research, education, and outreach, we help people, industries, and governments prevent and solve current and emerging problems in water quality and quantity.

OUR APPROACH

We make a difference through communication and coordination. We promote regional collaboration by strengthening individual state programs and acknowledging existing efforts and successes. We assess program gaps, identify potential issues for cross-agency and private-sector collaboration, and develop a clearinghouse of expertise, programs, and information resources. We also establish and build partnerships and enhance their impacts by placing an Extension liaison at EPA Region 10 headquarters in Seattle.

OUR NATIONAL WATER QUALITY PROGRAMMING AREAS

We deliver programs related to eight national water-quality theme areas:

- animal waste management
- drinking water and human health
- environmental restoration
- nutrient and pesticide management
- pollution assessment and prevention
- watershed management
- water conservation and agricultural water management
- water policy and economics

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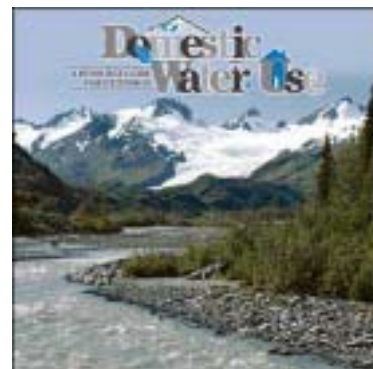
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Selected Regional Impacts

■ Domestic Water Use Handbook

When PNW educators and Extension personnel address public concerns, field questions from media, or develop teaching materials on drinking water, they reach for our handbook, *Domestic Water Use: A Resource Guide for Extension*.

This annually revised publication, also available via CD and Web, includes 14 chapters and more than 70 current publications written by drinking water experts at land-grant universities, state and local health departments, and state and federal agencies.



■ Regional Web Site

We offer the general public a fact-filled web site, www.pnwwaterweb.com, and emphasize our priority programming areas: drinking water and human health, water quantity and policy, and watershed management. Users of this site can download our regional directories, curricula, and other publications and click on worthwhile links to more resources and projects.

■ Watershed Theme-Based Satellite Conferences

In May 2002, conferees at 38 Extension satellite sites across the region learned how diverse members of local watershed groups can work together more productively. “Living on the Edge: Grassroots Watershed Planning in the Pacific Northwest” introduced participants to today’s most effective collaborative processes and showed them how the region’s most successful teams are meeting their goals.

In November 2003, the second of these theme-based satellite conferences expanded to 53 sites, confirming our hunch that this approach will build our educational capacity while conserving our dollars. More than 500 participants got an intensive—and very welcome—education in pinpointing gaps in funding watershed restoration projects, identifying funding sources, and structuring winning proposals.

What’s next: “Improving Community Involvement in Watershed Restoration.”



■ Water Monitoring Workshops

We conduct an annual monitoring workshop with the purpose of fostering critical thinking and effective decision-making on complex water quality issues and to serve as a springboard to action in local communities. Adaptable to various target audiences, the two-day water quality monitoring workshop is offered to teachers and volunteer leaders in the Pacific Northwest.

Highlighted Regional Effort

Finding regional answers to regional questions

At land-grant universities in Alaska, Idaho, Oregon, and Washington, the public can find experts and expertise on the region's most pressing water issues. Six regional directories, published by the Pacific Northwest Regional Water Quality Program, now help users find these experts and expertise *without* scouring every nook of Alaska and every cranny of Washington.

Developed for our local, state, regional, and federal partners, these concise, easy-to-use print and electronic directories list the most relevant publications available for each of six "national theme" areas:

- **Animal waste management**
www.pnwwaterweb.com/National/animal_waste.htm
- **Drinking water and human health**
www.pnwwaterweb.com/National/drink_water.htm
- **Environmental restoration**
www.pnwwaterweb.com/National/env_res.htm
- **Nutrient and pesticide management**
www.pnwwaterweb.com/National/nut_pest.htm
- **Water conservation and agricultural water management**
www.pnwwaterweb.com/National/water_cons_man.htm
- **Water policy and economics**
www.pnwwaterweb.com/National/water_econ.htm

They also include contact information for key research and Extension experts in each of the four states and summary statements and desired outcomes for each of the six themes.

Our regional directories let a reader in Oregon know that Idaho has a publication on reducing soil losses with filter strips, and they let a reader in Idaho know that Oregon has one on using constructed wetlands to improve water quality. They tell a resident of Alaska that Washington has an expert in agriculture chemical toxicology, and they tell a resident of Washington that Alaska has one in rural drinking water systems.

To keep our regional directories fresh and current, we plan to revise them twice a year.

CSREES Pacific Northwest Regional Water Quality Program
Applying knowledge to improve water quality
Animal Waste Management

Overview
The potential for transport of nutrients and pathogens from livestock and dairy production operations to the environment is a significant issue in the Pacific Northwest. In order to stay economically competitive, many livestock and dairy production operations have increased the number of animals utilizing the same land base. In addition, the number of non-commercial farms has been rapidly increasing throughout much of the region. Adoption of animal waste best management practices can reduce the transport of nutrients and pathogens from farms and contribute to improved water quality. Improved management and utilization of animal wastes can occur through proper collection, storage, treatment, and land application. Such strategies can benefit farmers by reducing disposal problems and reliance on commercial fertilizers, as well as improving water retention and fertility of soils. The Pacific Northwest Regional Water Quality Program provides a broad range of research-based educational materials devoted to animal waste management and sanitation. Cooperative Extension regularly conducts outreach programs with livestock producers on a wide range of best management practices.

Desired Outcomes

- Groundwater and surface water is better protected from contamination by animal wastes
- Livestock production economics are improved by implementation of whole farm nutrient management strategies
- Producers have a greater knowledge of nutrient cycles and environmental concerns
- Livestock producers are considered good stewards of the environment

WASHINGTON STATE UNIVERSITY | UNIVERSITY of Idaho | UAF | OREGON STATE UNIVERSITY | USA

CSREES Pacific Northwest Regional Water Quality Program
Applying knowledge to improve water quality
Drinking Water and Human Health

Overview
Pollutants such as pesticides, nitrates and pathogens entering groundwater and surface waters are health hazards to the community. Groundwater is the primary source of drinking water for most of the private and many of the public water supplies in the Pacific Northwest, except for Alaska. In Alaska, while larger public water systems utilize ground water, surface water is the primary source outside larger cities. Groundwater is generally more reliable both in quantity and quality than surface water. As a result it is generally less expensive and more reliable to develop a groundwater source. Public water supplies are regularly tested under the Safe Drinking Water Act; however, private wells are generally not tested on a regular basis since testing is not required. Failing onsite sewage systems, excessive fertilizer or animal manure applications are a particular threat to human health, especially in areas where surface waters or shallow well supplies are used for drinking, recreation and shellfish harvesting. The region's four Land Grant Universities have a broad range of

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CSREES Pacific Northwest Regional Water Quality Program
Applying knowledge to improve water quality
Nutrient and Pesticide Management

Overview
Pesticide and fertilizer use is almost everywhere across the Pacific Northwest's developed and agricultural landscapes. In order to provide larger harvests of affordable foods, farmers often supply crops with proper nutrients (fertilizers) and protect them from pests (weeds, insects, fungi, etc.) by applying pesticides. In maintaining their landscapes, homeowners tend to use proportionately more fertilizers and pesticides than do farmers and frequently have less training in proper application methods. Human and animal health problems can occur through excessive exposure to landscape and farm chemicals. Environmental pollution can occur when these chemicals enter waterways and groundwater systems. Nutrients and pesticides can enter surface and ground waters through misapplication, movement of treated soils, irrigation return flows, runoff from urban and agricultural land, stormwater runoff and leaching through soils. Groundwater contamination from pesticides and nutrients is a difficult long-term issue due to the impracticality of cleaning groundwater aquifers. Responsible agricultural producers and homeowners employ methods to assure proper application of chemicals to minimize potential exposure to people, animals and the environment. The land grant universities of the Pacific Northwest region engage in a broad range of research activities, outreach and training programs to assist agriculturalists, pesticide applicators and homeowners in properly managing nutrients and pesticides, for optimal production and environmental stewardship. The universities provide research-based educational materials on soils, plant choices, irrigation management techniques, fertilizer and pesticide use and a range of other related topics.

Outcomes

- Home gardeners and producers are more aware of dangers from improper management of pesticides and nutrients
- Returns irrigation flows to rivers are clearer
- Groundwater is protected from contamination
- Landowners and agricultural producers better manage chemicals used to enhance landscapes and to grow crops

WASHINGTON STATE UNIVERSITY | UNIVERSITY of Idaho | UAF | OREGON STATE UNIVERSITY | USA

Project Impacts for:

Integrated Research, Education and Extension Projects *Extension Education Projects* *National Facilitation Projects*

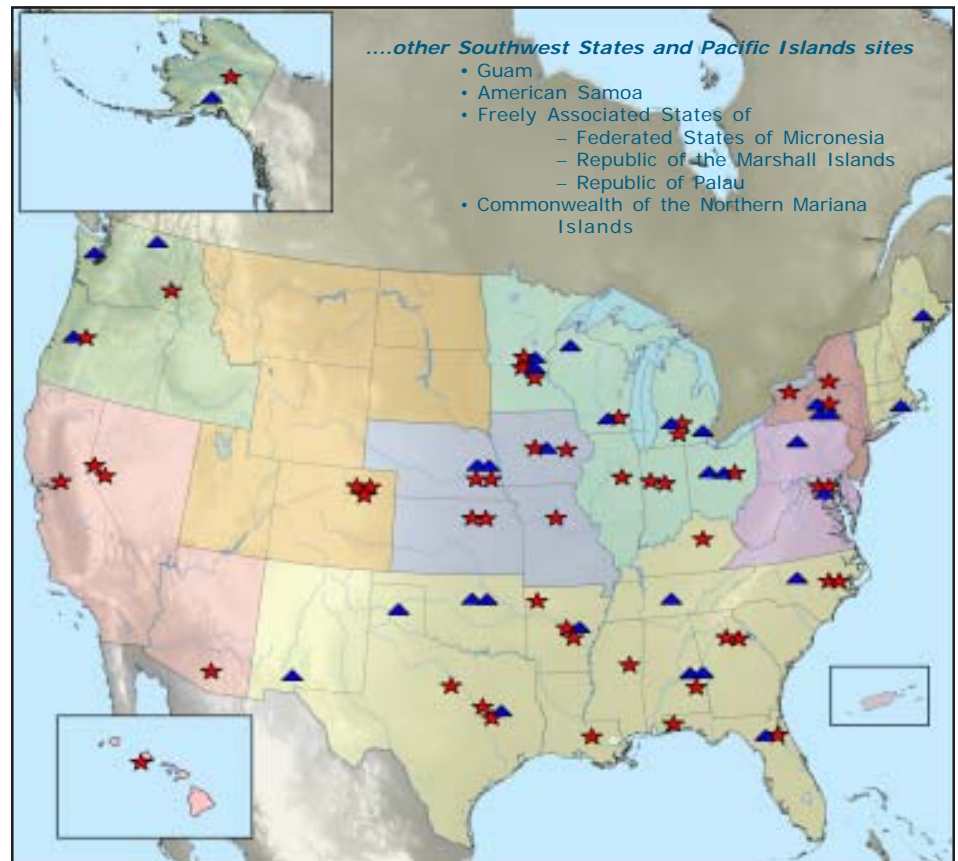
In addition to Regional Coordination Projects, three other types of projects are supported by AREERA Section 406 competitive grants:

Integrated Research, Education and Extension Projects integrate water quality research, education, and extension to solve water quality problems at the watershed level. These projects target a specific watershed and utilize an integrated approach to address an existing problem or concern. Projects awarded 2000-2003 are indicated on the map by red stars.

Extension Education Projects provide leadership and effective partnership for water quality education to help people, industry, and governments prevent and solve current and emerging water quality problems. Extension Education Projects focus on outreach to affect changes in knowledge and management which enhance and protect the Nation's water resources. Projects awarded 2000-2004 are indicated on the map by blue triangles.

National Facilitation Projects develop and initiate nationally coordinated programs that contribute to an increase in public understanding and involvement in com-

Integrated Research, Education and Extension Projects (red stars) and Extension Education Projects (blue triangles) awarded 2000-2004.



munity decision-making and that facilitate the development of public policy on water resources issues (e.g., decisions about land use, land management practices, waste water management alternatives, and the protection and restoration of riparian zones). The result is more citizen involvement, wider dispersal of information, and more

rational analysis of environmental decisions in communities and across the nation.

The following impact reports are key examples of each of these important project types. Contact persons identified for each program can provide additional information regarding their work.

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Integrated Research, Education and Extension Projects

A Watershed Nutrient Management Decision and Education Support System for the Eucha Basin



This project engages community members, educators, policy makers and scientists from two states to develop a watershed-based ecosystem management framework. The methods and tools for implementing NMDESS are applicable nationwide.

Situation: A team of scientists in Arkansas and Oklahoma are developing a watershed nutrient management decision support system (DSS) to improve land use and water resource management decision-making. The project efforts are

focused on the Eucha Basin, with results applicable to similar watersheds across the US. The Eucha basin was selected because nutrient management issues in this basin are representative of the political, economic and ecological challenges facing resource managers across the US. The Eucha Basin includes Spavinaw Creek in northwestern Arkansas and drains into Lake Eucha in northeastern Oklahoma, a water supply reservoir for the city of Tulsa, Oklahoma. Water quality in the reservoir has been declining for several years in part due to increased algal growth resulting from increased phosphorus loads from point and nonpoint sources, including the land application of poultry litter. However, there is no clear threshold for managing water quality for algal growth, so there is no clear management endpoint for phosphorus loading to the reservoir.

Action: The goal of this project is to develop a nutrient management decision and education support system (NMDESS) for developing comprehensive watershed nutrient management strategies for both agricultural and urban landscapes. The process of Analysis and Deliberation was used to develop this DSS (see figure). This process involves intensive discourse, both in public education sessions and private interviews, between the scientific community, watershed managers and other stakeholders within the basin. NMDESS provides a risk-based approach to identifying substantial nutrient sources within watersheds based on site-specific terrestrial, atmospheric, and hydrologic components of nitrogen and phosphorus nutrient cycles. NMDESS integrates risk-based decision-making theory with geographic information system (GIS)-based watershed modeling (Soil and Water Assessment Tool, or SWAT) and reservoir modeling (CEQUAL-W2) to create a decision support system that links land use practices with reservoir water quality.

Impacts -

Outcomes: This project engages community members, educators, policy makers and scientists from two states to develop NMDESS, a watershed-based



ecosystem management framework. The NMDESS framework is unique in its integration of chemical and biological measurements, *in situ* algal growth bioassessments, complex watershed and reservoir models and stakeholder-developed scenario analyses. Land owners, policy makers and other stakeholders

will be able to analyze impacts of a wide range of land management scenarios on water quality in the Eucha Basin using this on-line tool. The methods and tools for implementing NMDESS are applicable nationwide.



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Arsenic in Churchill County, Nevada Domestic Water Supplies

Many private well owners are exposed to concentrations of arsenic that exceed 10 ppb, the standard that will be in effect for public water supplies in 2006.

Situation: The standard specified for public water supplies for arsenic by the federal Safe Drinking Water Act in the United States will be enforced at a maximum contaminant level of 10 ppb in 2006. In many rural areas domestic drinking water needs are met by private water supplies. These are not subject to the regulations and management requirements of the Safe Drinking Water Act.

Approximately 25,000 people reside in Churchill County, Nevada. Of these, an estimated 11,500 are served by 16 public water supplies. The remainder, in an estimated 5500 households, rely on private domestic water supplies. Churchill County recently attracted national attention because of concern about an apparent cluster of acute lymphocytic leukemia in the summer of 2000. Although unrelated to arsenic in groundwater, investigations of the cluster led to recommendations by an expert panel convened by the U.S. Centers for Disease Control that county residents consider the quality of personal water supplies, with special attention to arsenic.

County residents who rely on private water wells are unclear about the best way to manage home supplies to avoid exposure to arsenic. Reports of unscrupulous water testing and treatment vendors have added to the uncertainty about how to best cope with high concentrations of arsenic in private wells.

Impact - Outcomes: The survey indicated that a large proportion of the population consumes water from private wells, a minority of private well owners treat home supplies, and many well owners are exposed to concentrations of arsenic that exceed 10 ppb, the standard in effect for public water supplies in 2006.

A water supply specialist, supported by county, state and funds from this project, has provided advice on water quality and water treatment to Churchill County residents since February 1, 2001. A majority of the questions that he responds to are related to arsenic in water supplies. He has provided information to approximately 500 people to date and has designed and produced peer-reviewed fact sheets and special publications for use in the county and the state.

The GOLD volunteers (shown in photo) have been a key resource in efforts to investigate water quality, including providing support for a sampling survey conducted by the U.S. Environmental Protection Agency in 2003. These volunteers work with the water supply specialist to educate county residents about drinking water quality.

The Nevada Environmental Public Health Tracking Program involves partnerships with the Nevada Division of Environmental Protection and several other state agencies to establish a public health tracking network. The program is extremely interested in the methods used for the sampling survey as a foundation for tracking environmental contaminants and has established a partnership with the University of Nevada to expand the efforts begun with the support of the U.S. Department of Agriculture.

Actions: Funds provided by USDA-CSREES have supported four types of efforts.

- First, researchers conducted a sampling survey to characterize the degree of exposure through private wells.
- Second, the project focused on providing advice to residents about home water treatment and water quality questions.
- Third, the water specialist manages a group of senior volunteers, Nevada GOLD (Guarding Our Local Drinking water, shown in photo).
- Fourth, the successes of this program have supported a strong working relationship with the Nevada Environmental Public Health Tracking Program.



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Extension Education Projects

Accelerating Riparian Buffer Adoption to Enhance Water Quality and Farm Income

Situation: Conservation buffers adjacent to water bodies are an excellent means of protecting water quality, particularly if used in concert with other soil conservation practices. Although farmers and landowners generally recognize these benefits, they are often reluctant to install buffers since land must be taken out of production which decreases income, and maintenance is required which increases expenses. This project was designed to address these and other concerns.

Actions:

- Tours, workshops, training sessions, meetings, electronic presentations, publications, news releases, and other techniques are being used to create an awareness of buffers and their benefits.
- A 23-acre buffer was established as a major demonstration tool. Some unique features include:
 - Planting trees and shrubs such as decorative woody florals, small fruits, and hazelnuts that have potential as an income source - a concept referred to as "productive conservation".
 - Direct seeding of trees and shrubs to improve stands and reduce costs.
 - Pure stands of several different grasses, legumes, and other forbs to compare growth and other characteristics.
 - Non-conventional buffer designs to improve performance and reduce maintenance required.

- Several weed management techniques to improve grass establishment and early growth.
- Stands of typical warm season grass mixes.
- Four local farmers were hired part-time for a peer-to-peer outreach component called "FarmLink". After training, these farmers contacted other farmers and landowners one-to-one to promote the adoption of buffers and other conservation practices and explain cost-share and other programs that are available to assist with practice installation or adoption.

Impacts - Outcomes:

- Tour participant quotes:
 - "Before going on this tour, I had no idea what a buffer zone was or that you could grow hazelnut or pecan trees in this part of the Midwest."
 - "I sincerely believe the things I saw will influence the decisions I make as long as I stay in the landscaping field and own an acreage."
 - "I learned so much the other night. This is a really unusual project."
 - "I didn't know that these programs were available to assist with conservation practice installation."
- Seventy individuals were contacted in the peer-to-peer outreach program. Of these, 16 have executed contracts with NRCS for 32 separate conservation practices, including:
 - Eight grassed waterways totaling 15.2 acres that control the runoff from over 300 acres.

- Seven stream-side filter strips encompassing 34.2 acres that filter the runoff from nearly 2000 upslope acres and physically protect approximately 3.2 miles of streambank.
- Grass planting on 26.3 acres of cropland in 6 different parcels that will reduce erosion by about 130 tons per year and provide excellent wildlife habitat.
- No-till planting on 986 acres (7 contracts) that is estimated to reduce soil erosion by 3,000 tons annually.
- These contracts will result in direct payments of over \$150,000 in the watershed.



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Practical Water Quality Education for Agricultural Professionals

Situation: In the Pacific Northwest there is an opportunity to increase producer adoption of nutrient and pest management practices that protect water quality. Certified Crop Advisors, Technical Service Providers and licensed pest management professionals want access to practical educational programming that is locally adapted. Education that links the management of pesticides with nutrients provides an integrated perspective to enhance water resource protection.

Actions: The Integrated Soil Nutrient and Pest (iSNAP) Water Quality Education Project is a collaborative effort to deliver innovative education in the Pacific Northwest.

A regional NRCS advisory group provides feedback to increase the alignment of iSNAP programs with NRCS practices.

In March 2004, iSNAP collaboratively produced a two-day workshop, *Understanding Phosphorus Effects on Water Quality and Phosphorus Management Alternatives*.

In November 2004, the first iSNAP two-day workshop, *Integrated Pest and Nutrient Management Options: Practices and Tools to Protect Water Quality*, was held in Oregon. In February 2005, this program will be offered in Washington and Idaho.

Planned activities for 2005 include: educational programs on buffers and drift management, a new publication on irrigation water quality and online education modules.



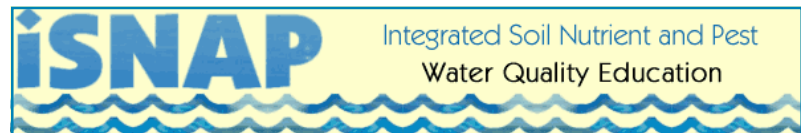
Impacts - Outcomes:

This regional project offers a hands-on learning environment to evaluate the linkage between nutrient management, pest management and water resources.

Our approach focuses on a small group case study approach. The goal is to have participants gain experience collaboratively developing site-specific solutions to meet both producer needs and resource protection goals.

Skills that agricultural professionals will gain as a result of participating in the iSNAP Project include:

- Assessing and communicating potential water resource benefits to producers
- Determining viable management alternatives that meet producer needs
- Improving management practices through on-farm research and monitoring



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University of Idaho
U.S. Environmental Protection Agency
Natural Resources Conservation Service
Western Region IPM Center Pacific Northwest Working Group
Oregon State Pesticide Safety Education Program
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National Facilitation Projects



NEMO

The National NEMO (Nonpoint Education for Municipal Officials) Network is a confederation of programs around the country that educate local land use decision makers about the relationship of land use to water quality and water resource protection.



Situation: Land use is decided not only by individual property owners, but by community officials sitting on local land use boards and commissions. These officials need information, tools and education to help them do a better job of protecting their water resources as they grow their communities.

The 34 programs of the NEMO Network educate local land use decision makers about the link between land use and water resource protection. The Network is coordinated by the University of Connecticut Cooperative Extension, which leverages CSREES funding with EPA and NOAA support to create the National NEMO Network “Hub.” The Hub helps to develop new NEMO programs, and works closely with Network members to strengthen existing programs through the exchange of ideas, educational methods, publications and resources.

Actions:

- Conducted over 100 “scoping workshops” to assist multi-organizational collaborations in other states adapt NEMO to their natural resource and land use challenges.
- Provide new programs with a startup kit that includes sample presentations, publications and tips.
- Held an *Open Space Boot Camp* training session to help NEMO programs demystify open space planning for community leaders.

- Provided training for NEMO programs on the *Impervious Surface Analysis Tool (ISAT)*, a GIS software “plug-in” module developed by UConn in partnership with NOAA.
- Created the National NEMO Network website (<http://nemo.uconn.edu/national>), which allows programs to share educational materials, report successes and impacts, connect with a variety of resources and learn about network initiatives.
- Issue a semiannual newsletter that profiles member programs, announces upcoming events and conferences, reports on national policy developments, and provides a status update on the network.
- Provide the National NEMO Network listserv, an interactive forum for NEMO coordinators to share experiences, seek advice and discuss educational approaches.
- Every 18 months to two years, organize the NEMO University (or NEMO U) National Network conference, an opportunity for Network members to develop new educational strategies, collaborate, and share methodologies and research.
- Hold an annual meeting of the National NEMO Network Interagency Work Group, a diverse group of federal and national stakeholder organizations.
- Issue a biennial Network Progress Report, encapsulating both Network-wide progress and individual NEMO project impacts.

Impact - Outcomes:

- Creation of 34 funded NEMO programs in 32 states and territories.
- Enhanced communication between member projects, resulting in multi-state educational efforts (such as Lakes NEMO, a product of Maine and Minnesota).
- Innovative, new educational products and techniques from Network members, such as the Northland NEMO’s “*Guide to Using Natural Resource Information in Local Decision Making*” and Ohio NEMO’s *CampuShed* program to improve water quality practices on the Ohio State University campus.
- Expanded educational tools for Network programs, including open space planning education (about 7 programs) and the ISAT watershed analysis tool (about 6 programs).
- Increased funding made available for NEMO Network programs, such as NOAA’s \$200,000 *Coastal NEMO Enhancement Program* in 2002.
- Increased awareness of Extension’s role in assisting community decision makers, through NEMO sessions at non-USDA national conferences (e.g., the American Society of Photogrammetry and Remote Sensing Conference in 2004), agency and organization briefings (e.g., the U.S. Conference of Mayors in 2004), and publications (e.g., the *Planning Commissioner’s Journal* in 2003).

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Volunteer Monitoring

The National Facilitation of CSREES Volunteer Monitoring Efforts Project coordinates and disseminates information about the Extension Volunteer Monitoring Network.

Situation: Volunteer water quality monitoring programs often serve as the critical first link that engages the public in watershed stewardship. Volunteer monitoring programs improve the understanding of local water resources, encourage individual and community involvement in water quality protection and restoration efforts, and help communities make informed decisions that improve water quality.

The National Facilitation of CSREES Volunteer Monitoring Efforts Project coordinates and disseminates relevant information within and about the Extension Volunteer Monitoring Network. This network is currently composed of 38 Extension-associated monitoring programs in 29 states and territories. It represents a powerful constituency of more than 8,500 trained citizen scientists actively engaged in grassroots stewardship efforts.

Actions:

This National Facilitation Project was undertaken to construct a comprehensive support system for Extension volunteer water quality monitoring efforts nationally. We have:

- Located 38 Extension-based and Extension-associated volunteer monitoring programs.
- Queried these programs and summarized the findings on their strengths, weaknesses, successes, and challenges.
- Established a mechanism of communication among with these programs via a listserv, CSREESVolMon@lists.uwex.edu.
- Created, launched, expanded, and frequently updated our website

www.usawaterquality.org/volunteer. The website contains all the outputs of this project.

- Researched, developed, and produced modules for the “Guide to Growing CSREES Volunteer Monitoring Programs”, both in print and on the website, including many active links. This guide approaches one-stop shopping for program coordinators who are truly interested in growing their programs.
- At the invitation of regional coordinators, we developed curricula and conducted volunteer monitoring training workshops to meet the particular needs of three regions.
- Developed and used a Wisconsin online database for volunteer monitoring data.

Impact - Outcomes:

- Assumed leadership role as a national service provider for volunteer water quality monitoring,
- Enhanced communication among existing Extension volunteer monitoring programs nationwide,
- Reduced the effort needed to start new volunteer monitoring programs or to expand existing programs,
- Lent support and credibility to previously isolated programs,
- Facilitated local data sharing and internet learning,
- Expanded volunteer opportunities due to enhanced local and state capacity for Extension volunteer monitoring programs,



- Strengthened strategic partnerships within the Extension Volunteer Monitoring Network and between CSREES and other agencies, and
- Enhanced recognition of CSREES volunteer monitoring efforts as a viable component of the water monitoring community.

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National Facilitation Projects



Best Educational Practices

The Water Outreach Education Project is a collaboration of water partners to promote Best Education Practices (BEPs) for water education and to improve access to water education resources and strategies.

Situation: Community involvement has been identified as the key to successfully implementing state and federal agency plans for clean and safe water across the nation. The Water Outreach Education Project connects natural resource professionals with information and BEPs needed to help citizens improve their understanding of water issues and develop water stewardship skills. This is a complicated project designed, in part, to build links among initiatives, resources, and networks established under the auspices of USDA funded water education and research.

Actions: This project was designed to create resources. It brings together suggestions from an advisory group, information about learning theory, research about target audiences, and key informant and symposium participant recommendations. Objectives included:

- Developing a web site organized around education planning and the eight management themes of the NWQP.
- Translating education research and theory into quick, practical strategies.
- Providing electronic access to a wide variety of water outreach education materials and professional development opportunities.
- Identifying audience-specific best education practices and topic-specific water outreach resources.
- Planning a national symposium to review project products and to guide future action.

Impacts - Outcomes: *Water Outreach web site* – We launched the new Extension Water Outreach Education web site, www.wateroutreach.uwex.edu, in

December 2004. The site provides a variety of resources including practical, research-based education strategies; audience-specific BEPs; and topic-specific water outreach resources developed throughout the project period.

Education research and theory – We made education theory user-friendly by pulling out critical information and providing short descriptions in simple language. We created a decision-tree which leads users through a series of questions about education needs. It then guides users to related practices, tools, and information that will help them meet the need identified.

Electronic access – We created an on-line searchable database for educational materials and case studies for each of the eight water management themes. Database categories evolved to match needs identified through key informant interviews. As the web site goes public in 2005, we expect to see a variety of resources entered by Extension and agency educators from around the country.

Audience-specific BEPs – A study to review research for seventeen specific audiences identified 526 references published in the last decade. Study audiences, such as households, neighborhood organizations, and recreational water users, were identified through key informant interviews. Ninety-five references provided at least a minimal level of case evaluation and critical reflection to help suggest BEPs for selected audiences. Findings for each audience, as well as the entire research bibliography, are published on the web site.

A national symposium – National Extension water quality coordinators, outreach professionals, and key stake-holders participated in a June 2004 Symposium to review the pilot web site; share audience-specific BEPs and topic-specific water outreach resources; make recommendations for promoting sound education practices among water management professionals; and suggest avenues for future action. Symposium findings are published in the *Proceedings* available on-line and in print.

We challenged Symposium participants to help us identify barriers to developing research about target audiences and to tell us what advice they would give funders about how to improve the quality of water education and outreach. Among their recommendations for the future . . .

- Develop regional work groups to build BEP understanding and skills
- Promote interconnections among web site users

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US EPA Office of Environmental Education
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Water Education Foundation
Ohio Dept. of Natural Resources
Ohio State University Extension
University of California Extension
University of Nebraska Extension
University of Wisconsin Extension

On the web at: <http://www.wateroutreach.uwex.edu>

Pollution Assessment and Prevention

The Project facilitates integrated extension, research and education programs that enhance the quality, reach, and outcomes of voluntary water pollution assessment and prevention programs.



CSREES
Pollution Assessment & Prevention
National Facilitation Project
Applying knowledge to improve water quality

Focus: The Water Quality Pollution Assessment and Prevention Theme Team is a network of Extension and other educators who promote self-assessments, voluntary actions and monitoring by private land-use managers and residents to protect and restore water quality. The project goal is to facilitate integrated extension, research and education programs that enhance the quality, reach, and outcomes of voluntary water pollution assessment and prevention programs, particularly on farms and in homes.

Situation: This project builds on the foundation laid by the Farm*A*Syst/Home*A*Syst programs in the 1990s. Farm*A*Syst and Home*A*Syst both serve as model pollution prevention action initiatives. A strong national network of Farm*A*Syst/Home*A*Syst educators was developed in the 1990s, and many states expanded on the *A*Syst pedagogy to develop sister programs such as Lake*A*Syst, Coast*A*Syst, Forest*A*Syst, etc. Today this unique approach to voluntary pollution assessment and prevention is sustained through the Farm and Home Environmental Management Program at the University of Wisconsin.

Actions: The National Facilitation for Pollution Assessment and Prevention project (P2A2) supports educators interested in the potential of the Farm and Home Environmental Management concept with networking opportunities and a mechanism for sharing educational materials. Initiatives focus on supporting Farm*A*Syst/ Home*A*Syst programs nationwide; disseminating results from Environmental Management Systems research; and expanding the arena of mutual support and collaboration on educational materials.

Outcomes:

Refined theme goals – Conducted interviews, facilitated discussions and sought advice from about 40 pollution prevention assessment and action educators nationwide to determine priority activities.

Networking – A priority for this project. The theme team sponsored ten conference posters and three sessions at USDA national Water Quality Research and Extension conferences, with special emphasis on publicizing work of educators from the 1890 (historically Black) and 1994 (Tribal) land grant colleges and universities. The Team email listserv is a forum for sharing success stories, seeking answers to topical questions, and brainstorming ideas. P2A2 staff distributes notices of grant opportunities, conferences, and new and innovative materials; provide direct assistance and/or letters of support to proposal writers; distribute pollution prevention publications; and respond to inquiries.

New website – The new P2A2 website is a starting point for water quality personnel to learn about resources. The site connects the users to a database cataloging hundreds of state-based materials. An extensive interactive directory provides listings of people working within the A*Syst network, organized by state, EPA region and program. <http://www.uwex.edu/farmandhome/wqpaap/>

On-line newsletter – Twelve quarterly on-line newsletters featured success stories and lessons learned from pollution prevention educational programming conducted by Extension educators or researchers. Over

250 people subscribed themselves to receive email notification of new postings of the newsletter. Success stories from people in the P2A2 network described in the newsletter are featured on the website.

Bibliography of agroecological and farming systems research projects with clear implications for water quality

While research has been done on the impacts of BMPs on water quality, less attention has been paid to the implications of effective alternative cropping or livestock management strategies on water quality indicators. A central question of this type of research is what is the effect of a whole system of practices, rather than just one practice like cropping systems or rotations, on water quality. Findings are available on the website.

Evaluation – Developed a protocol for pollution prevention programming evaluation, subsequently used to inform the design of the National Water Quality Program reporting tool which has superseded it.

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 University of Arizona
 University of Arkansas
 University of Rhode Island
 Virginia State University
 U.S. EPA



Contact the CSREES National Integrated Water Quality Program

Committee for Shared Leadership Members

The Committee for Shared Leadership for Water Quality is an internal working group created to foster development of the National Water Quality Program. Members include the 10 Regional Coordinators from Regional Projects funded through the Section 406 Integrated Water Quality Grants Program, an 1890 and a 1994 Representative, and the CSREES National Program Leader for Water Quality.

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Moving Forward



We look forward to further creating and disseminating knowledge to citizens, watershed groups, states and agencies with the goal of improving the Nation's water resources.

The CSREES National Integrated Water Quality Program (NIWQP) has made outstanding progress over the last four years in enhancing the development and delivery of water quality research, extension and education resources. AREERA Section 406 has enabled NIWQP to continue to expand its efforts to identify and disseminate the latest knowledge for protection and improvement of our Nation's water resources. Furthermore, Section 406 has enabled the NIWQP to expand information and resource sharing among states aimed at addressing critical regional water quality goals and to strengthen relationships in their regions, and between states and CSREES.

The CSREES National Water Quality Website at <http://www.usawaterquality.org/> offers direct access to University research, education and extension programs on water resources. Links are provided to regional CSREES Water Quality Programs including descriptions of programs addressing national water quality topical themes, accomplishments, and success stories. The website also provides links and information for National Facilitation, Extension Education, and Integrated Research, Education, and Extension projects funded by the CSREES National Integrated Water Quality Program.



This regional, multi-state approach is increasing the NIWQP's capacity to better understand and address water quality concerns and advance knowledge. Information and resource sharing through this approach enhances the capacity of states, the capacity of 1890 and 1994

institutions, and of partner agencies including NRCS and EPA.

We look forward to continuing to create and deliver knowledge on water resource issues to citizens, watershed groups, states and agencies. We envision a program that enables states to rapidly and efficiently share technology, and to work more closely with other water resource partners and citizens to prevent and solve significant water quality and water resource management problems.

For more information about the CSREES National Integrated Water Quality Program, please contact the National Program Leader, Dr. Michael P. O'Neill at moneill@csrees.usda.gov; 202-205-5952 or Lisa F. Duriancik, Program Specialist, at lduriancik@csrees.usda.gov; 202-401-4141.

CSREES National Water Quality Conference

The CSREES National Integrated Water Quality Program's annual conference held in Clearwater, Florida in January, 2004 enabled water quality professionals engaged in research, extension, and education to share knowledge and resources, identify emerging issues, and to strengthen the network of the CSREES National Integrated Water Quality Program.

Over 60 technical presentations and 120 posters addressing key water quality issues were presented to more than 250 participants attending the conference.

Participants at the National Water Quality Conferences include State extension water quality coordinators; university scientists, instructors, and extension educators who focus their efforts on water quality; USDA-CSREES staff members who work directly or indirectly with state water quality specialists; EPA staff involved with water quality issues; and others who work with or for public or private institutions involved with water quality and water resource management.

Proceedings for the Conference are posted at <http://www.usawaterquality.org/2004conference/default.html>. Proceedings for the 2003 Conference held in Tucson, Arizona are posted at <http://www.usawaterquality.org/2003conference/default.html>.

The next Conference is scheduled for February 7-9, 2005 in San Diego, California and will emphasize **Research, Extension and Education for Clean Water**. Mark your calendars!

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