

**Best Education Practices (BEPs) for Water Outreach Professionals**  
**Defining BEPs, Refining New Resources and Recommending Future Actions**

*POSTER PRESENTATION*

**Presenter(s): Mary Bianchi, University of California Cooperative Extension**

**Title: Water Quality Education For Irrigated Agriculture On California's Central Coast**

Abstract: Abstract: The Monterey Bay National Marine Sanctuary is the largest marine protected area in the United States, covering more than 5,000 square miles along the Central Coast of California. Runoff water from agricultural lands in coastal watersheds and transported to Sanctuary waters often carries pollutants such as sediments, nutrients, and pesticides. In 1999, the agricultural industry organized to voluntarily reduce water quality threats and avoid increased regulation. The University of California Cooperative Extension (UCCE), in partnership with the USDA Natural Resources Conservation Service (NRCS) developed a Farm Water Quality Planning Short Course to assist farmers to develop individual water quality management plans. The course is based on the success of the Rangeland Water Quality Short Course which has been taught 50 times in 27 counties and has resulted in 400 ranch water quality plans representing 1.2 million acres. The new UCCE peer-reviewed Farm Water Quality Planning Short Course is offered to Watershed Working Groups organized and staffed by the Coalition of Central Coast County Farm Bureaus. During the course, producers receive information on water quality regulations, techniques for self-assessment of nonpoint source pollution problems, management goals for sediments, nutrients, and pesticides, methods for recognizing practices that are already in place that protect water quality, management practices that may be selected for local conditions and crop types, and practice evaluation methods. To date, 278 growers in 14 Watershed Working Groups have received training on the development and implementation of farm water quality management plans.

Target Audience(s): Agricultural commodity groups; farmers

Educational Purpose: Education

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*POSTER PRESENTATION*

**Presenter(s): James P. Dobrowolski, Natural Resource Sciences Department., Washington State University**

**Title: Activity-Based Learning and Daily Field Experiences Help Bring Watershed Restoration To Life**

Abstract: Watershed Restoration is a nationwide shortcourse for agency partners engaged in restoration of disturbed landscapes. Presented in Wenatchee, Washington during 2001 and 2003 and Logan, Utah in 2001, the course is part of the U.S. Forest Service's National Continuing Education program. It combines activity-based and field experiential learning (30% presentation and 70% practice) to provide an understanding of watershed linkages—particularly upstream-downstream and upslope-downslope relationships, essential to the success and longevity of all restoration approaches. Each instructor provides a landscape level view to restoration approaches, issues and relevance by exposing participants to experiences in a broad array of climates and geographic regions. Morning sessions take place in a room transformed to a watershed restoration context by wall peripherals, displays, models and new and innovative materials. Each session establishes clear, meaningful goals and objectives, and promotes the embracing of learning benefits through emphasis on real world examples. Verification of learning is accomplished through hands-on practice, collaborative pretests and posttests, problem solving exercises, and data gathering and synthesis. Pertinent exercises, group discussion and “food-for-thought” challenges are followed by a reinforcing field experience every afternoon. Immediate field application and observation of session exercises provide the ability to expose, in a non-confrontational manner, the environmental, operational, or organizational barriers that prevent restoration success. A relaxed, activity-charged atmosphere supplies a vehicle for evaluating each barrier to success—what can be done to eliminate it, reduce it, or program around it? “Show-you-know” exercises, clear synthesis, and detailed participant evaluations help verify learning success.

Target Audience(s): Agency partners, and Soil and Water Conservation Districts

Educational Purpose: Education (formalized process with a goal)

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*POSTER PRESENTATION*

**Presenter(s): Les Everett, University of Minnesota Water Resources Center**

**Title: Timing And Design Of Education Programs To Enhance Participation: Manure Management Education In Minnesota**

Abstract: An education program can attain its goals only if it reaches the target audience. Participation can be enhanced by timing the program with and designing it around a landmark event that enhances awareness of and perceived need for the education. In this case study the University of Minnesota Extension Service, anticipating release of new state feedlot rules, prepared a two-year education program to inform livestock producers about contents of the rules and to provide manure management education. The goal was to enable producers to implement manure management practices required or encouraged under the rules. Participation in these programs far exceeded that for manure management education in the state prior to rule adoption. Attendance exceeded 4,000 in the first year and 1,100 in the second. This is being followed with an in-depth and personal two-year education program in which small groups of producers develop two-field manure/nutrient management plans for their own farms. To date, through the small-group project, 520 producers have developed nutrient management plans. Participation at programs timed to coincide with rule release benefited from both the heightened awareness brought by major rule adoption, and by the recognized need by many producers to learn about and implement improved manure management practices specified in the rules. Coupling of education programs with a change in regulations, new incentive payment programs, or some other high-profile event, effectively exploits a “teachable moment”

Target Audience(s): Farmers

Educational Purpose: Education and information

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*POSTER PRESENTATION*

**Presenter(s): Taralyn Fisher, Department of Animal and Range Sciences, Montana State University**

**Title: Montana Beef Environmental Management Systems Pilot Project**

Abstract: In an effort to address potential sources of surface water pollution from beef cattle ranches in Montana, a pilot project was conducted to determine the effectiveness of using an environmental self-assessment. Montana is largely a rural state with a land area of 93 million acres and 11,400 beef cattle enterprises ranging in size from a few to 10,000 head. Only 55 of these operations are licensed concentrated animal feeding operations (CAFO), which leaves the remaining as cow/calf rangeland operations or small to mid-size lots. Many of these livestock operations were established near surface water sources, and in present day society there are increasing concerns about the compatibility of livestock agriculture with environmental quality, especially that of water. The Montana Beef Environmental Management Systems (EMS) Project focused on facilities related to beef cattle ranching such as corrals, winter feeding grounds, back-grounding lots, and calving areas to develop a self-assessment Guidebook and Workbook to lead producers through the process of identifying priority environmental issues, assessing potential environmental risk, and developing a plan to mitigate risk. The tool was pilot tested on 23 ranches across Montana, as well as on 3 research farms. Pre- and post-surveys were completed to assess rancher attitudes before and after identifying environmental risks on their own operation, and to evaluate their experience with the self-assessment. Overall accomplishments and outputs of the project will be discussed as well as lessons learned regarding the selected approach for dealing with environmental issues on ranching operations, and survey results will be presented.

Target Audience(s): Agricultural Commodity Groups Farmers

Educational Purpose: Capacity building

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*POSTER PRESENTATION*

**Presenter(s): Thomas Green, AGFLEX**

**Title: Financial Safety Net For Corn Farmers: An Emerging Educational Tool To Increase Adoption Of Nutrient BMPs**

Abstract: Surveys and case studies over the past 30 years have demonstrated that economic risk is a major barrier to farmer adoption of Best Management Practices (BMPs). For example, farmers are often reluctant to lower nitrogen, phosphorus and potassium applications to university recommendations. If the farmer or advisor miscalculates the rate, or unusual weather causes the BMP to fail, yields and profits may decline. Since fertilizer costs are inexpensive relative to the potential loss, farmers "self-insure" by applying higher than recommended rates. The project partners have tested a BMP "net returns" fertilizer rate recommendation guaranty which provides a cash payment to participating corn farmers if the recommendation results in lower yields. The participant (or a sponsor) purchases a specially designed service agreement, applies university-recommended BMP rates, and applies additional fertilizer to a check strip. If a yield loss occurs on the BMP-fertilized acres vs. the check strip, and the value of the yield lost outstrips the fertilizer cost savings, the guaranty provides a payment to compensate for the loss. Between 2001 and 2003, more than 30 corn farmers in five states have participated in research and development, with average fertilizer rate reductions of 24%. Up to 400 additional farmers are being recruited for the 2004 growing season. Watershed managers are quickly recognizing these systems are highly cost effective in terms of setting up field-scale demonstrations and are now purchasing or cost-sharing the agreements for farmers.

Target Audience(s): Agency partners; environmental conservation nongovernmental organizations; SWCDs; ag commodity groups/farmers

Educational Purpose: Education

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*POSTER PRESENTATION*

**Presenter(s): Cynthia Hagley, Minnesota Sea Grant**

**Title: Duluth Streams (duluthstreams.org)--Making Water Quality, Land Use, And Stormwater Data Come Alive For Decision -Makers**

Abstract: The website, DuluthStreams.org provides web-based delivery of automated data using advanced data visualization tools for understanding urban stormwater and water quality issues. Duluth, Minnesota lies adjacent to the pristine waters of Lake Superior. The City has 42 named streams, 14 trout streams, and borders the Duluth-Superior Harbor Area of Concern. Duluth's stormwater infrastructure includes 93 miles of streams and wetlands. Urbanization and rural development are increasing temperature, turbidity/sediment, salinity, organic matter and nutrients in area streams. DuluthStreams established a partnership between the University and local water resource management agencies to enhance public understanding of aquatic ecosystems and their connections to watershed land use by illustrating the nature and consequences of degraded stormwater. Water quality data are fed to the website, [www.duluthstreams.org](http://www.duluthstreams.org) and linked to GIS landuse, current and historical water quality and biological data, and engaging text and photos. Data animations and interpretive text visually engage the public and students via the Internet and local kiosks. Collaboration with the St. Louis River RiverWatch program developed curricula and stream monitoring materials for schools and established uniform protocols for volunteers throughout the region. The Partnership has also adapted NEMO (Nonpoint Education for Municipal Officials) to the Duluth area and initiated a Regional Stormwater Protection Team, a coalition of new Municipal Separate Stormwater Sewer System permittees (MS4s), local universities, and regional agencies, to develop a unified watershed approach for educating the public on nonpoint source pollution issues and protecting the waters of the region.

Target Audience(s): Local decision and policy makers

Educational Purpose: Capacity building

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*POSTER PRESENTATION*

**Presenter(s): Karen Hargrove, WaterWorks! Program**

**Title: WaterWorks! Catfish In The Mainstream: Social Marketing**

Abstract: Water education is ‘real life’ education. If Tennessee’s population continues to grow as it has in the last ten years, we will soon be approaching a crisis situation regarding clean, potable water. Our economy, the health of our citizens, and wildlife habitat are dependent on plentiful and safe sources of clean water.

This year “WaterWorks!” – a new initiative in outreach education for the Center for Environmental Education at Middle Tennessee State University, funded by the TN Department of Agriculture Nonpoint Source Program – was launched, focused on improving water quality in Tennessee.

WaterWorks! models social change through focused marketing to an audience of Tennessee households and homeowners, with specific components designed to promote and reinforce the message of individual responsibility. Highlights:

- a series of video and audio public service announcements promoting clean water quality through responsible action
- a website showcasing public service announcements, youth projects, links to water-related groups and sites in TN
- “Stream Savers,” a recognition program for youth groups completing projects that improve water quality
- a state-wide survey providing baseline information about citizen water quality attitudes and actions
- brochures focusing on homeowner, contractor/builder, and agriculture practices
- an interactive watershed map with watershed links, groups, stormwater information, and county/city contacts
- stakeholder meetings with NPDES Phase II representatives and others involved in water quality efforts in Tennessee

Target Audience(s): Households,  
homeowners

Educational Purpose: Information,  
education, capacity building

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*POSTER PRESENTATION*

**Presenter(s): Mrill Ingram, Environmental Resources Center, University of Wisconsin**

**Title: Tailoring Pollution Prevention for Urban Landscapers in Madison, Wisconsin**

Abstract: Nestled between two glacial lakes, Madison, Wisconsin is blessed with water resources. As in many urban watersheds, however, Madison has growing water pollution issues. One important pollution source is urban landscaping, in particular runoff from over-fertilization and pesticide misuse in lawns and gardens. The goal of this project is to develop social action strategies – for implementation by urban watershed and neighborhood organizations – that will reduce the human health and ecological hazards of pesticide misuse for urban landscape development and maintenance.

The project aims to identify the barriers and benefits to the use of Integrated Pest Management perceived by paid landscape managers in the Lake Monona watershed in the City of Madison and Dane County, Wisconsin. This poster will discuss the results of our telephone survey research analyzing landscape managers' and groundskeepers' perceptions of IPM practices. We have also evaluated existing IPM materials and messages available to professional landscapers and urban residents. This poster will share the results of research into the development of educational materials, which we will pilot test in collaboration with grassroots organizations, watershed educators and public agency partners in the Lake Monona watershed. We will discuss the development of a social marketing strategy with principles and recommendations useful to urban watershed protectors nation-wide. This includes communications plans to use existing, revised or new landscaping IPM educational materials (such as a one-stop guide for landscape managers and a "green Landscaper" certification program in Wisconsin) and a social strategy for instituting new behavioral norms of urban landscape management.

Target Audience(s): Urban landscapers,  
urban watershed organizations

Educational Purpose: Communication;  
Education

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*POSTER PRESENTATION*

**Presenter(s): Karen Janowitz, Washington State University Extension-Thurston County**

**Title: Water Resource Education For Real Estate Professionals In The South Puget Sound Region, Washington**

Abstract: Increased development of natural lands, caused by a rapidly growing South Puget Sound population, greatly influences the long-term health of the region's water resources. Individual land-use practices, in particular, can critically affect these resources.

Real estate professionals influence these land-use practices, yet tend to have poor knowledge of environmental issues. In 1998, a needs assessment of local environmental educators identified this audience as underserved yet a high priority for water resource education. As a result, Washington State University Thurston County Extension developed and implemented a Water Resource Education Program for Real Estate Professionals.

The program's objective is to educate real estate professionals so they can make environmentally suitable decisions regarding development and land-use practices, as well as educate their clientele about land stewardship, water quality, and aquatic habitat. Courses cover the science, policy and regulations of water resource related issues such as onsite sewage systems, wetlands, shorelines, salmon and streams, and low-impact development. Experts give up-to-date objective presentations in a classroom setting and most courses have a field trip component for hands-on learning. Real estate professional attendees receive continuing education credit toward their biennial professional license recertification.

Attendance in 41 courses over six years totals more than 1112. Course evaluations demonstrate that information provided is relevant and useful for participants' work. Follow-up evaluations show that over 90% of program participants regularly share information they learn with clientele and colleagues. Further research is needed to quantify the impact that this program has on local and regional water resources.

Target Audience(s): Real Estate Salespersons, Brokers, Developers and Appraisers

Educational Purpose: Information

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*POSTER PRESENTATION*

**Presenter(s): Jerry Kauffman, University Of Delaware**

**Title: SMARTYARDS and Other Watershed Outreach Programs Of The Christina Basin Clean Water Partnership In Delaware, Maryland And Pennsylvania**

Abstract: The Christina Basin Clean Water Strategy is a cooperative interstate effort to protect and improve the water quality of streams in the Brandywine, Red Clay, and White Clay Creeks, and Christina River watersheds of Delaware, Maryland, and Pennsylvania. The streams in the 565-square mile Christina Basin drain areas of three states - Delaware, Maryland, and Pennsylvania - and are the sources of drinking water for over 0.5 million people in these states. The Christina Basin Partnership was one of 20 watersheds from throughout the USA (from a pool of 170 applications) that was the recipient of a \$1 million Watershed Initiative Grant from the USEPA.

This paper describes the watershed outreach and education programs of the CBCWP. These include continuing and enhancing the community participation and public education efforts to inform the watershed community and landowners about the need to implement BMP's and how to implement better watershed stewardship in their day-to-day activities and businesses. This program includes cooperative public outreach efforts regarding the ongoing development of the low flow and high flow TMDL load allocations. The watershed outreach programs include:

- Distribution of free native plants to homeowners through the SMARTYARD program.
- Annual bus tour of the watershed on the first Friday after Labor Day.
- Storm drain stenciling in coordination with Boy Scout and Girl Scout troops.
- Distribution of outreach publications and brochures at public events such as University of Delaware football (22,000 seats) and basketball games (5,000 seats).
- SMARTYARD program whereby homeowners are given up to \$250 of free native plants and a landscape design plan as incentive to replace water-and chemical dependent lawns.
- Rain barrel program where homeowners in eligible sub-watersheds are provided free rain barrels.

Target Audience(s): Homeowners

Educational Purpose: Capacity building

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*POSTER PRESENTATION*

**Presenter(s): Amber Langston, University Of Missouri-Columbia**

**Title: Fostering Locally-Led Holistic Watershed Management**

Abstract: The Water Quality Outreach program was created within the University of Missouri Outreach and Extension program to work with agencies, organizations, local governments and individuals to develop information, technical expertise and strategies for protecting water resources throughout Missouri. Early in the development of the water quality program, the importance of developing collaborative networks was realized for success in protecting Missouri's water resources. To achieve this, MU extension programs took a Community Development approach in working with communities. The approach was to create capacity (leadership) within the community by the transference of knowledge and technical expertise to people in the community. As this program has now worked with twenty different watershed-planning groups, it has been found that citizens will choose to become involved if they understand the situation and how it might affect them, and, if they have the knowledge and resources to work through the situation.

To date, twenty watershed-planning groups have been involved with this program because of being forced through regulatory action or because of concern for their water resources. Each of the twenty watershed planning committees is at different intervals in the planning process. Lessons learned so far are as follows:

- People do care about their community
- People will become involved if they understand the problem/situation
- People need to do the work with assistance from agencies, organization and government (local ownership/buy-in)
- National/State Community/Economic and Environmental/Natural Resources problems are local problems "first"

Target Audience(s): Local decision/policy makers, agency partners and SWCD personnel

Educational Purpose: Communication and capacity building

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*POSTER PRESENTATION*

**Presenter(s): Judy Maben, Water Education Foundation**

**Title: Water Leaders Class – Preparing For the Future**

Abstract: The Water Leaders Class is a one-year program of the Water Education Foundation that identifies young community leaders from diverse backgrounds. These young professionals include members of minority and ethnic communities, and representatives of many professions such as engineering, law, environmental planning, and public interest advocacy.

The program is designed to educate the Water Leaders Class about water issues, as well as enhance individual leadership skills and prepare participants to take an active, cooperative approach to decision-making and problem solving.

Serving as mentors to class members each year are leading urban, agricultural and environmental stakeholders and state policy-makers. Mentors in past years have included state senators, state water board members, water district executive directors, leading attorneys and NGO executive directors. Class members are matched with mentors from perspectives differing from their own points of view.

Class members participate in state-wide water policy briefings, technical water issues tours, “shadow” their mentors, and develop a group paper/power point on a water issue of current importance like water transfers, groundwater, water and growth, or water marketing.

The benefits of the program include better understanding of water issues, ongoing relationships with class members which are helpful to participants’ professional lives, and a continuing commitment to remaining in water-related professions. The Foundation is in the eighth year of the Water Leaders Program and many graduates have attained high professional status, including congressional staff members and a California State legislator.

Target Audience(s): Local Decision and Policy Makers, Agency Partners

Educational Purpose: Capacity Building

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*POSTER PRESENTATION*

**Presenter(s): Tabitha Madzura, Missouri Watershed Information Network**

**Title: Web-Based Watershed Workshops: Using Internet Resources To Protect Water Quality In Missouri**

**Abstract:** The Missouri Watershed Information Network (MoWIN) assists individuals, governmental and private agencies, schools and other groups in locating and accessing natural resources information. MoWIN is a partnership of 30 state and federal agencies, non-governmental organizations, local government, natural resource interest groups, business, industry and individuals interested in the health of Missouri watersheds. MoWIN has a website (<http://outreach.missouri.edu/mowin/>), and ongoing projects to gather, compile and distribute watershed information. The goal is to increase citizens' awareness and knowledge about watershed conditions, best management practices, save time in locating and accessing information needed when making watershed restoration decisions. In 2002, MoWIN staff developed a web-based curriculum and held sixteen workshops across Missouri. Approximately 300 individuals participated and over 20 natural resource specialists presented various water and watershed-related topics.

Topics included best management practices related to land disturbance, revitalization, and others. Expected outcomes were successful watershed planning, use of Internet resources to retrieve watershed-related information, increased awareness of source water protection, stormwater and other environmental/natural resource information and ultimately, removal of waters from the 303 (d) List. Evaluations indicated that workshops were informative and useful, the website met participants' expectations for related topics, was easily accessible and participants were likely to use MoWIN information for natural resources-related activities. Venues were accessible, comfortable and conducive to learning and workshops were well organized. Participants indicated that using MoWIN website was likely to save them time due to the site's One-Stop-Shop-for-Watershed-Information design. MoWIN is a good example of a conservation partnership that provides natural resources information to Missourians.

**Note:** This project won a National Silver Award – 2nd Place (2003) from the Association of Natural Resources Extension Professionals (ANREP) for usefulness to a target audience, innovativeness, and potential educational impact. The project has been presented at the Annual Soil and Water Conservation Society Conference in Spokane, Washington (2003) and the Annual National Environmental Management Conference in Richmond, Virginia (2003).

**Target Audience(s):** State and federal agency water quality personnel, natural resources interest groups, farmers, citizen-based watershed groups

**Educational Purpose:** Two way communication

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*POSTER PRESENTATION*

**Presenter(s): Monica Lopez Magee, Council For Environmental Education**

**Title: Team WET Schools: Building School-Community Partnerships to Promote Water Education and Stewardship Among Underserved Urban Youth**

Abstract: By using James S. Hogg Middle School as a model case study, staff from the Council for Environmental Education (CEE) will illustrate how Team WET Schools, a water-focused urban environmental education program, operates. The Team WET School model illustrates major strengths of the program- the ability to reach diverse students and teachers with water education and service learning opportunities, and the ability to involve a variety of non-traditional partners in environmental education. The session will focus on how local organizations and businesses have worked and can work with the CEE national office in individual school buildings to empower urban students and teachers to become responsible water stewards. Since the spring of 2002 CEE has worked closely with the City of Houston and Harris County Storm Water Management Joint Task Force (JTF) to support the water education and stewardship efforts at Hogg Middle School, a primarily Hispanic school located near downtown Houston. CEE and the JTF teamed up to offer workshops to help educators integrate activities from the WET in the City K-12 Curriculum and Activity Guide into school curricula. Twenty-three Hogg teachers, representing 39% of the faculty from across the disciplines, participated in the workshops and are actively using WET in the City activities in their classrooms.

Target Audience(s): Local Decision and Policy Makers; Agency Partners; Households; Neighborhood Organizations; Service Clubs; Environmental/Conservation NGOs; Soil and Water Conservation Districts; Specific Ethnic Groups

Educational Purpose: Education (formalized process with a goal)

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*POSTER PRESENTATION*

**Presenter(s): Mike Mecke, Texas CIIO Extension And Texas Water Resources Institute**

**Title: "Water For West Texas" A New Extension Program**

Abstract: WEST TEXAS! What a wild, scenic and yes, often desolate area it is. and what a rugged, self-sustaining and pioneering-type of person settled West Texas! From the earliest paleo-Indians, Apaches, Comanche, Jumanos or Pueblos - to the Spanish and Mexican settlers, later, the first Anglo ranchers – all learned to know, respect and preserve the rare and precious waters or perish. West Texans never had to be taught that their water resources, whether flowing in the Pecos or Rio Grande Rivers or from a spring or lying below ground in an aquifer, were precious – this is instinctive to people living and working in dry, arid climates and in deserts. Truly here, “Water IS Life!” or, “Agua ES Vida!”

Historically, considerable irrigation water was produced by both the Pecos and Rio Grande Rivers. Increased upstream demands for irrigation and domestic uses, plus saltcedar invasion and a ten year drought, has resulted in less water and poorer quality water for river irrigators. The balance of the irrigation is from ground water or from still healthy flowing springs. Other historically large springs in the region once produced pure, cool irrigation waters and provided recreation for many, but now are dried up due to overuse of the aquifers. This new program has been developed to assist the residents of the region through a variety of methods including: educational exhibits and presentations, demonstrations, workshops and seminars, applied research programs, publications, media articles and through collaborative efforts with a diverse group of agencies, governmental units and non-profits.

Target Audience(s): Diverse, include all listed plus irrigation dists and groundwater cons dists in West zone.

Educational Purpose:

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*POSTER PRESENTATION*

**Presenter(s): Caitrin Noel, University of Vermont Watershed Alliance**

**Title: The University Of Vermont Watershed Alliance: Using Youth Education And Service To Engage Communities In Local Water Quality**

Abstract: Audience size and limited human and financial resources limit Extension ability to educate individual homeowners, landowners, local officials and others. Leverage and multiplication of effort is needed.

The Watershed Alliance (WSA), a youth water quality/watershed education, monitoring and service program, prepares youth to inform and engage communities in water quality issues. Water education often focuses on classroom education and student monitoring. WSA adds student community service and information components to enhance community understanding of water quality issues, improve access to information, and spur community action for watershed protection.

Students increase awareness and stimulate action by presenting local water quality data to select boards and town government. Student monitoring detected water quality problems in several towns. Reporting these led to a "boil water" advisory, the emergency repair of a local WWTP, revision of WWTP operations and increased community awareness of water quality. Students work with local community groups in public awareness, education and data collection. Students developed media efforts to increase local awareness and engage the public to address pressing local water quality problems.

The service component and database effort promotes local ownership and community responsibility. The database provides easily accessible and useful information in an understandable form. Because water quality data is locally collected, stored and used by students, there is ownership and trust of the data. Schools become community information resources on water quality. Communities are more responsive and engaged in water quality protection and improvement when local youth monitor, report, and educate about local waters.

Target Audience(s): Households, homeowners, local decision and policy makers

Educational Purpose: Education, Capacity Building

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*POSTER PRESENTATION*

**Presenter(s): SS Parmar, Integrated Watershed Development Project**

**Title: Watershed Development In Una District Of Himachal Pradesh In India**

Abstract: In the rain-fed, irregular hilly terrain of District Una in Himachal Pradesh, World Bank funded, Integrated Watershed Development Project (IWDP) is in operation. In the present paper an attempt was made to investigate the effectiveness of various methods used for water harvesting and its conservation in the study area. Data was collected from members of the village development committees (VDCs) through interviews and participatory observations. Analysed data indicated that under the IWDP Project through VDCs developmental works particularly related to minor irrigation, water management, watershed development and soil conservation have been carried out.

A large numbers of check dams and specially designed ponds have been constructed for harvesting rain water. The striking observations were made that in the study area where water was scarce, besides conserving water in the ponds, now the stake holders have adopted fish farming which has improved their economy. In the project area to slow down the rain water run off, check soil erosion and for regenerating the depleted forest cover, a large number of trees have been planted.

The paper highlights formation of the village development committees through Participatory Rural Appraisal methodology, their functioning and water harvesting at the micro-watershed level. As IWDP is in operation till 2005, for continuing watershed development in areas where topography is irregular, water is scarce various development agencies in the hilly regions should start planning to link up the existing VDCs with other institutions. The significant achievements and drawbacks of the approaches used under the IWDP have been discussed in the present paper.

Target Audience(s): Agricultural Commodity Groups Farmers, Environmental/Conservation Non-Government Organizations, Soil and Water Conservation District

Educational Purpose: Education and capacity building

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**Best Education Practices (BEPs) for Water Outreach Professionals**  
**Defining BEPs, Refining New Resources and Recommending Future Actions**

*POSTER PRESENTATION*

**Presenter(s): Amy Rager, University of Minnesota Extension Service**

**Title: Best Practices For Environmental Field Days**

Abstract: Over 75 % of Minnesota counties report environmental field-day programs, involving thousands of 4th – 6th grade youth. The investment of time of time and money by state and federal governments, agencies, and non-profit organizations to support these programs for k – 12 schools is significant. To be more effective, these programs require expensive planning and partnerships as outlined in the best practices for environmental field days researched by the environmental science education working group at the University of Minnesota. We have identified a list of best practices, from both literature and practical experiences, for the organizers and presenters at these events resulting in guidelines for improving the impact these programs can have on young people.

The intent of the Best Practices for Environmental Field Days program is to provide organizers, presenters, participants, and volunteers of environmental field day events with practical research-based information to increase the success of their events, improve student learning and retention, and make meaningful strides in the development of an environmentally literate citizenry.

This presentation will highlight the best practices program for planning and delivering effective environmental field day programs.

This is a spotlight program for the University of Minnesota Extension Service.

Target Audience(s): The target audience for the BMP program is Agency Partners and Environmental/Conservation Non Government Organization. Those natural resource professionals who organize and present at environmental field days (e.g. school-based Water Festivals) for k – 12 school children

Educational Purpose: Information

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**Best Education Practices (BEPs) for Water Outreach Professionals**  
**Defining BEPs, Refining New Resources and Recommending Future Actions**

*POSTER PRESENTATION*

**Presenter(s): Marcy Seavey, Iowa Academy Of Science**

**Title: Teacher Perceptions Of Iowa Workshop Model Aspects For Fostering Use Of Project WET**

Abstract: State partners of national environmental education (EE) programs contribute to professional development in EE through their program delivery. This study describes teacher perceptions of individual elements of EE workshops provided by one such program, Iowa Project WET. The study found that educators associate three types of workshop activities with successful classroom integration of Project WET activities: (a) Experiencing activities first-hand, (b) interacting with other educators, and (c) learning about the Project WET Activity and Curriculum Guide. Almost 90% of survey respondents integrate some of the activities they experience during the workshop into their classrooms. Some of these teachers also integrate additional activities not presented in the workshop. Multiple measures of activity use indicate the respondents select and use activities to meet curriculum goals. Survey data and phone interviews show that respondents utilize each activity they implement to meet multiple goals related to the curriculum, student interactions, and assessment of student knowledge. Respondents reported that insufficient planning and class time limited use of activities. Suggestions are made for improving the workshop model.

Target Audience(s): Environmental/conservation nongovernment organizations

Educational Purpose: Education

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**Best Education Practices (BEPs) for Water Outreach Professionals**  
**Defining BEPs, Refining New Resources and Recommending Future Actions**

*POSTER PRESENTATION*

**Presenter(s): Lori Severtson, Gaylord Nelson Institute of Environmental Studies and School of Nursing, University of Wisconsin**

**Title: How does risk information shape protective behavior and support for policy to mitigate risk in the environment?**

**Abstract:** The purpose of this study is to understand how experiential and external sources of risk information influence behavior to reduce arsenic exposure and opinions about policy to reduce arsenic in the environment. External information sources were the self-reported arsenic level and total information use. Experiential information was perceived overall water quality and arsenic-related health effects. We applied the common sense model (CSM) that illustrates how people process information to construct representations that guide responses to health threats. Of 649 surveys mailed to private well owners with arsenic levels that exceeded the current arsenic drinking water standard, 545 (84%) were suitable for analysis. Structural equation modeling quantified relationships based on the CSM and fit the data with behavioral outcomes (RMSEA=.045) or policy outcomes (RMSEA=.045) and explained 57% and 55% of the variance in behavior and policy opinions respectively. External information sources had their greatest effect on behavior through certainty about knowledge and control methods and on policy opinion through understanding causes of arsenic. Experiential information (predominantly water quality) had its greatest effect on behavior through the emotional representation, health and property value consequence dimensions and the exposure identity/cause dimension. Experiential and external sources of information influenced behavior while external information was the dominant influence on policy. Information should 1) promote understanding lab results and provide guidance for 2) interpreting and responding to perceived overall water quality and 3) selecting effective arsenic control methods in order to promote protective behavior. Public information should educate the public about arsenic causes to promote groundwater policy support. People need to understand how to identify, causes and consequences of, and how to control both risk exposure and risk in the environment to foster comprehensive environmental health prevention.

**Target Audience(s):** Agency partners, NGOs

**Educational Purpose:** Information, communications and education

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**Best Education Practices (BEPs) for Water Outreach Professionals**  
**Defining BEPs, Refining New Resources and Recommending Future Actions**

*POSTER PRESENTATION*

**Presenter(s): Lori Severtson, Gaylord Nelson Institute of Environmental Studies and School of Nursing, University of Wisconsin**

**Title: Evidence Supporting Yearly Community Well Testing**

Abstract: An evaluation of an arsenic well test program (WTP) offered in 19 of 37 towns in Wisconsin's arsenic advisory area showed that participants in the one town that offered the WTP each year over 3 years 1) tested for arsenic more often 2) used more arsenic-related information, 3) rated information sources as more useful, 4) had a greater recognition of being at risk for having arsenic-contaminated well water, 5) selected a lower arsenic level for identifying their water as unsafe, 6) were less likely to agree that the newly revised drinking water standard was too strict, and 7) had more confidence in how their town officials were handling the arsenic problem than participants in towns offering the program only one time. An ongoing program offered at the local level with cooperation from local officials may foster trust at the local level that in turn enhances the acceptance of prevention information. This evaluation research, a mailed survey with a response rate of 85.4% (N = 1233), also shows that collaborations between university students and agencies can produce results useful to both agency staff and researchers.

Target Audience(s): Agency partners, NGOs

Educational Purpose: Information, communications and education

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**Best Education Practices (BEPs) for Water Outreach Professionals**  
**Defining BEPs, Refining New Resources and Recommending Future Actions**

*POSTER PRESENTATION*

**Presenter(s): Lori Severtson, Gaylord Nelson Institute of Environmental Studies and School of Nursing, University of Wisconsin**

**Title: A Utilization-focused and Theory-based Evaluation of an Arsenic Well Testing Program**

Abstract: The purpose of this study is to understand how people responded to an arsenic well testing program (WTP) offered to Wisconsin residents in an arsenic advisory area. This evaluation research incorporated utilization-focused and theory-based elements to collect data useful to program stakeholders and contribute to our theoretical understanding of relationships between risk information and protective behavior. The common sense model (CSM) has shown that people process health threat information to formulate representations that guide behavioral and emotional responses to threats. The CSM was applied to measure sources of risk information, risk representations, the emotional representation and, outcomes of water safety judgments and protective behavior. A survey was developed, piloted and mailed to participants that tested their wells through the program had an arsenic level: a)  $> 5 \mu\text{g/L}$  (N=1154); and random samples of households with wells from b)  $1-4 \mu\text{g/L}$  (N=100) and c) who didn't test their well through the program (N=259). 1233 (85.4%) of delivered surveys were returned. Descriptive results will be shared for study constructs across study subgroups (program well test, private well test, no test). Selected findings include: mailed information was used most often, information from personal agency contacts was rated most useful, 2/3 of participants who didn't test through the WTP tested privately, participants with higher arsenic levels selected a higher arsenic safety threshold, and about 1/2 of participants with arsenic levels over the current drinking water standard were not effectively reducing their exposure. Study findings suggest risk message revisions and delivery strategies.

Target Audience(s): Agency partners, NGOs

Educational Purpose: Information, communications and education

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**Best Education Practices (BEPs) for Water Outreach Professionals**  
**Defining BEPs, Refining New Resources and Recommending Future Actions**

*POSTER PRESENTATION*

**Presenter(s): George Smith, Agricultural Extension Service, University of Tennessee**

**Title: Enlisting Landowners in Water Conservation**

Abstract: The poster highlights two highly successful publications developed by the University of Tennessee Agricultural Extension Service. The first is a handbook entitled "Conservation Practices for the Farms and Forests of Tennessee." It describes 51 best management practices (BMPs) with full-color pictures of each practice; description of the practice; water quality benefits; landowner benefits; considerations; complementing practices; maintenance; and costs.

In no way is this handbook a technical manual. Rather, it is an attractive, easy-to-understand book designed to introduce readers to BMPs; why they should be considered; and direction when they choose to implement practices. This is an excellent example of how to reach those who are not sure about BMPs or why they should consider implementing them.

The second publication is a BMP calendar developed for the Pond Creek watershed in East Tennessee. It was developed as part of a pilot project, designed to introduce landowners in the watershed to BMPs and to inspire them to make any necessary changes. Each month features a BMP that addresses major sources of ag-related contaminants in the watershed with a picture of the practice, a description of what it is, what it can do for them, and water quality impacts. By combining a calendar with BMPs, landowners are exposed to the concepts each time they glance at the calendar in a positive, non-threatening way.

Featuring the handbook and calendar should be beneficial to water quality professionals as they consider the host of multimedia options available when developing materials themselves.

Target Audience(s): Landowners

Educational Purpose: Information and capacity building

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**Best Education Practices (BEPs) for Water Outreach Professionals**  
**Defining BEPs, Refining New Resources and Recommending Future Actions**

*POSTER PRESENTATION*

**Presenter(s): Ron Struss, University of Minnesota Extension Service**

**Title: *Minnesota Water-Let's Keep It Clean; a Twin Cities Stormwater Education Collaboration***

Abstract: Over 150 Minnesota cities are required to implement Stormwater Pollution Prevention Plans. Each plan requires a strong educational component, with target audiences and educational goals identified for each six Minimum Control Measures.

Metro WaterShed Partners, a collaboration of water resource educators in the Twin Cities, saw an opportunity to assist cities in delivering quality stormwater education and established "Minnesota Water – Let's Keep it Clean", a program that does three things: 1) Collaborate with putting clean water messages in mass media, something out of financial reach for individual cities, 2) Make ready-to-adapt stormwater educational materials available to cities and neighborhood organizations, and 3) Achieve a consistency of message across the Twin Cities Metro. A regional communication/marketing firm, Periscope, has been contracted for placing messages in the media and website design.

By June 2004, the program will have completed a spring and fall mass media campaign, and established a resource laden educational website at [www.cleanwatermn.org](http://www.cleanwatermn.org). Current \$110,000 funding is from state and regional governmental grants. Continuation funding is sought from subscriptions from cities, corporate sponsorship and grants.

During a case study presentation, the following will be addressed:

- Formation of collaboration, development of messages, delivery strategy.
- Fall and Spring mass media campaigns, messages and impacts (website data).
- Creation and content of website based educational resource for cities, et. al.
- Program continuation funding, success of subscription funding.

Target Audience(s): Agency Partners (city staff)  
 Households  
 Neighborhood Organizations

Educational Purpose: Information; Capacity Building

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**Best Education Practices (BEPs) for Water Outreach Professionals**  
**Defining BEPs, Refining New Resources and Recommending Future Actions**

*POSTER PRESENTATION*

**Presenter(s): Scarlet Tang and Todd Murray, Whatcom County Cooperative Extension**

**Title: Lake-Friendly Gardening: Case Study In Homeowner Education In Whatcom County Washington**

**Abstract:** Stormwater pollution is a growing concern for Lake Whatcom, a multi-use lake that is the drinking water source for over 85,000 Whatcom County, Washington residents. A 1999 state report documented multiple urban pollutants, including pesticides used by homeowners, in stormwater drains and tributaries within the watershed (Serdar and Davis 1999). In addition, the lake is listed on the Clean Water Act 303(d) list for low dissolved oxygen due to excessive phosphorus, a component of most fertilizers.

Changing residents' yard and garden practices was key to minimizing urbanization's effects on the lake. In response, Washington State University Extension and Whatcom County Water Resources produced a booklet series, the Lake-Friendly Gardening Kit (<http://lakewhatcom.wsu.edu/gardenkit>). The team rewrote research-based Extension materials in a more engaging style and design. The kit is geared towards local issues, with booklets titled The Ten Most Un-Wanted Pests, Top Secret Agents, and Passive-Aggressive Plants, among others.

Three months after receiving the kit, recipients were mailed a written survey. About 50% responded, with these results:

- 38% of respondents read the entire kit; 48% read half to most of it.
- 100% agreed the kit was useful.
- 98% thought the materials were easy to understand.
- 86% felt they learned how to make their practices more lake-friendly.
- 52% managed pests differently.
- 48% purchased pest-resistant plants.
- 52% changed their lawn care practices.
- 48% shared what they learned with someone else.
- 89% recognized the connection between their land use actions and water quality



Target Audience(s): Education

Educational Purpose: Information, capacity building

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**Best Education Practices (BEPs) for Water Outreach Professionals**  
**Defining BEPs, Refining New Resources and Recommending Future Actions**

*POSTER PRESENTATION*

**Presenter(s): Eileen Tramontana, St Johns River Water Management District**

**Title: Leaving A Legacy**

**Abstract:** The Legacy program is a cooperative educational venture between the St. Johns River Water Management District and area schools. The program enlists educators and their students to help the District staff make public lands more accessible while serving as living laboratories and classrooms.

Through its Legacy program, the District gives students an opportunity to assist in managing public lands and to participate in service-learning projects within the District's jurisdiction.

In turn, the District benefits because students remove exotic invasive plants, design and build trails and other amenities, post signs, pick up trash, provide tours, develop interpretive and educational materials, inventory natural resources, and test water.

Participation in the Legacy program has assisted in improving students' grades, raised their awareness of water resource issues, and helped them develop leadership skills that benefit them, their schools and their communities.

The Legacy program began in 1993 and has continued through today. Currently, 13 schools in 10 counties participate in Legacy programs. Although there are many similarities between Legacy programs, each program has unique individualized teaching strategies and programs structured to fit the needs of students, schools and the natural resource site.

The District provides assistance in the following areas:

- Development of Legacy program activities
- Performance expectations
- Funding strategies
- Grant development
- Lesson Plans
- Teacher training and support
- Community partner identification and inclusion
- Identification of public land site and negotiation for use

**Target Audience(s):** Governmental agencies, landowners, service and environmental groups

**Educational Purpose:** Education

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**Best Education Practices (BEPs) for Water Outreach Professionals**  
**Defining BEPs, Refining New Resources and Recommending Future Actions**

*POSTER PRESENTATION*

**Presenter(s):** André Walker, Utah State University Water Quality Extension

**Title:** Stream Side Science-Developing Outreach Materials With The Audience In Mind

Abstract: In 1999, USU Water Quality Extension developed an in-depth manual to help teachers and other educators teach watershed concepts by designing and implementing their own water quality monitoring programs. The manual was well received by teachers who were already interested in water quality and had the resources to do the activities, but did not spark the interest of other teachers or the Utah State Office of Education.

The two main reasons cited for this were 1) a lack of knowledge about water quality and watersheds, and 2) a need by Utah teachers to restrict their time and resources to materials that are directly linked to the Utah State Core Curriculum for each grade level.

Over the last year, USU Water Quality Extension worked with teachers and Utah Office of Education staff to develop a curriculum which utilizes the hands-on activities in the Utah Stream Team Manual, but is also aligned to the Utah State Core for 9th Grade Earth Systems Science. These activities now have the full support of the state education office and the Utah Governor's Watershed Initiative, including evaluation of the materials, printing and distributing the materials statewide, and assistance in teacher training.

This poster will discuss the process of partnering with state agencies and educators to develop educational materials and trainings that not only meet the needs of educators through alignment to core standards of the state, but also provide hands-on, high quality water education for high school and middle school students.

Target Audience(s): Teachers

Educational Purpose: Education

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**Best Education Practices (BEPs) for Water Outreach Professionals**  
**Defining BEPs, Refining New Resources and Recommending Future Actions**

*POSTER PRESENTATION*

**Presenter(s): Clint Waltz, University Of Georgia Crop And Soil Science**

**Title: A Blended Learning Program For Golf Course Water Conservation**

Abstract: In collaboration with the Golf Course Superintendents Association of America (GCSAA), a new concept in training golf course superintendents was developed. This program is unique for GCSAA, in that, it was designed as a “blended learning” experience which assists the practitioner in development of a water conservation plan site-specific to their golf course. University of Georgia turfgrass faculty was responsible for development of sound scientific based educational resources and the responsibilities of GCSAA were to market the program to its clientele. The first phase of the “blended learning” program was the development and launch of an on-line course, to provide introductory level information on Water and how it is impacted by Atmospheric factors, uptake and use by the Turfgrass plant, impact of Edaphic or soil factors, and the Relationship of the soil / plant / atmosphere continuum, the title of the course was W.A.T.E.R. The second phase of this program was a workshop conducted by UGA faculty, with hands-on development of a water conservation plan. The superintendents will have instruction and access to templates they can modify and implement to accommodate the nuances of their site. The program will conclude with a 60-day access to instructors through a GCSAA maintained list-serve for final refinement of individual plans. The deliverables of this program were development of written plans to be followed for water conservation on individual golf courses. Within the first two weeks of launching the on-line phase, registrants included superintendents from 20 states and 7 counties.

Target Audience(s): Recreational water users and recreation business

Educational Purpose: Information, communication, education, capacity building

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