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Watershed Stewardship Education Program--A Multidisciplinary Extension Education Program for Oregon's Watershed Councils

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Watershed Stewardship Education Program--A Multidisciplinary Extension Education Program for Oregon's Watershed Councils

Abstract

The Watershed Stewardship Education Program (WSEP) is an innovative, multi-disciplinary program in the Oregon State University Extension Service. Through educational materials and programs, WSEP helps watershed councils, landowners, and others work effectively together to understand multiple components of their watersheds and apply this knowledge to assessments, project development, and water quality and habitat monitoring. This article documents the need for and the development of this innovative educational program and discusses implications for Extension, including the necessity of multi-disciplinary programming and working with non-traditional audiences.

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Introduction

Watersheds nationwide have been, and are still, experiencing significant alteration. Anthropogenic land and water uses have dramatically affected the quality and quantity of surface and ground waters, as well as fish and wildlife habitat. The nature of these impacts is diffuse and cumulative throughout the watershed.

Watersheds have become a point of emphasis regarding land management. In several states "watershed councils" (community-based, semi- to formally-appointed associations or groups of people with diverse interests and values) have emerged to help address the need for managing natural resources and improving watershed conditions across property boundaries and at the watershed scale.

Members of watershed councils acknowledge that they need education and technical assistance to be successful in implementing enhancement programs that improve current and pending watershed problems. They need to know these programs are researched-based and that they have been designed--in terms of breadth and depth--to be optimal in delivery of knowledge, skills, and

abilities.

Practical educational programs with clear written materials, research-based information, and hands-on trainings, demonstrations, and tours are necessary for landowners, managers, contractors, and volunteers to understand and integrate concepts. Extension is viewed in many communities as the organization most effective in providing credible, research-based educational materials and programs that meets community needs through building their capacity to make practical decisions (Wright & Shindler, 1999).

Land and water management practices of individuals and groups, in both urban and rural areas, need to be changed if watershed functions are to be enhanced for declining fish and wildlife populations and drinking water quality. Programs that effectively educate and build the capacity of communities to address local water resource issues are critical to building an awareness of the situation and taking actions to improve it. Extension has a major role to play in developing and delivering these educational programs.

The Watershed Stewardship Education Program (WSEP) is the response to this educational need. WSEP was created in 1996 by the Oregon State University (OSU) Extension Service, to be conducted in partnership with the Oregon Watershed Enhancement Board (OWEB) and the Oregon Forest Resources Institute (OFRI). Through trainings and educational materials, WSEP helps watershed councils, landowners, and others understand multiple components of their watersheds and, through working together, apply this knowledge to assessments, project development, and water quality and habitat monitoring.

Context

The Cooperative Extension System has a history of developing and delivering successful in-depth natural resource curricula for landowners and others. Master programs, such as the Oregon Master Woodland Manager (MWM) program (a 10-module program designed to help woodland owners manage their lands better and to serve as volunteers working with other landowners), have been successful in helping to educate the public on basic (forest) management information. The MWM program has been around for nearly 15 years and has trained over 300 volunteers.

Extension has also partnered on innovative, collaborative efforts that link local economic development with ecosystem restoration. OSU Extension was a core member of the Ecosystem Workforce Project (EWP), the educational component of President Clinton's Northwest Economic Adjustment Initiative (a.k.a. Jobs in The Woods program, a program that linked dislocated timber workers with forest restoration efforts through training and family-wage jobs). The EWP curriculum was largely developed by OSU Extension and served as the formal educational component for those who wanted to become trained and employed as ecosystem workers.

The Oregon Plan for Salmon and Watersheds (OPSW) was developed by state governmental agencies under the leadership of Governor John Kitzhaber as a strategy to protect and enhance salmon habitat and watershed (condition) function. It has been adopted by the National Marine Fisheries Service to serve as the recovery plan for Coho and other salmon species listed as threatened or endangered under the federal endangered species act (ESA). The OPSW addresses agricultural management by requiring the Oregon Department of Agriculture to work with landowners in developing basin-wide management plans to improve water quality. The OPSW also endorses local voluntary watershed management by supporting watershed councils statewide with monetary support, restoration manuals, and other technical necessities.

The creation of the OPSW merged public concern and community-based action, as it attempts to restore and enhance habitat for salmon through voluntary actions leading to positive measurable results, rather than through new federal regulations. Watershed councils are the heart of this initiative, as they are charged with identifying, prioritizing, planning, and implementing projects through voluntary local efforts that would improve conditions enough to increase the numbers of fish in the system (Conway, 2000). Yet, despite the provision of incentives (financial support, etc.) and the encouragement of collaborative project design and implementation, watershed councils have struggled and often fail due to lack of support for working together (Huntington & Sommarstrom, 2000).

Most natural resource users (landowners, fishermen, citizens, etc.) recognize the need to participate in the scientific decision making process to control decisions affecting their livelihoods (Smith & Jepson, 1993). However, research and experience indicate that participation is most effective when it is interactive, involves communication that is two-way, and promotes shared decision-making (Walker & Daniels, 2000).

User groups, such as watershed councils, make decisions and act when they feel that they have a strong enough base of local and technical knowledge. Ultimately, successful watershed-focused projects come about only when there is an informed and effective group making the decisions. Smith and Gilden (2002) identified seven asset categories that move watershed councils from figuring out what needs to be done (assessment) to actually doing something (action):

- Leadership,
- Vision,
- Trust,

- Social networks,
- Capital,
- Power, and
- Local and technical knowledge.

Their work mirrors our experience. Distrust, fear of difference, dysfunctional leadership, and non-inclusive watershed groups stagger and often fail altogether in doing the on-the-ground work to solve the issues that brought them together.

Currently there are over 90 local watershed councils in Oregon. These citizen-based groups strive to understand complex watershed processes and land use management practices that affect stream habitat, temperature, sediment, coliform bacteria levels, and other water resource concerns. They want to make informed and lasting ecological and social decisions, as well as to evaluate the results of their efforts. They have experienced the unfortunate scenario of decisions made on non-factual or missing information and how that can lead to scarce dollars being wasted on unnecessary data collection, data analysis, labor, repair of mistakes, and duplication of effort.

Over the past decade, scattered throughout the region, programs have been implemented to provide education to improve watershed stewardship. However, they lacked standardization, multiple disciplines, and elements of collaboration or connection with other education providers. In some areas of the state, watershed councils and others approached their local OSU Extension Agents for help. The agents did what they could, but with no statewide watershed education program in existence, their delivery was limited.

Creating a Flagship Program

The combination of a history of successful curriculum development and an increasing demand for watershed education at the local level led OSU Extension to create a three-person, multidisciplinary team responsible for pulling together the resources necessary to create and pilot-test a watershed stewardship education program in 1996. The project team recognized that watershed stewardship education is a multidisciplinary effort and invited members of the Forestry, Agriculture, and Sea Grant Extension Program Areas who were interested in watershed education to join our team.

This team--working together with watershed council coordinators and members, as well as other local landowners and concerned citizens--conducted several planning meetings to decide upon the optimal topics to be included in the WSEP and to design the educational materials and program delivery that best met the needs of a varied audience. After these meetings, OSU Extension embarked on the development and pilot testing of the formal WSEP program. The WSEP was pilot tested in three regions along the Oregon coast. More than 1,000 copies of the curriculum were purchased and used, and 20 workshops were delivered and yielded evaluations averaging very good or excellent. It appeared we were on target in addressing this educational need.

The stakeholder-driven pilot program taught us that the WSEP should have four main components: a learning guide (curriculum), a series of eight basic trainings, a Master Watershed Steward volunteer program, and advanced training. We will discuss each of these components in detail; discuss the funding, coordination, and future of WSEP; and conclude with a discussion of implications for Extension.

Practical, Easy-to-Use Educational Materials

Watershed Stewardship: A Learning Guide is the foundation of the WSEP program. It was created collaboratively and received local, regional, and national review. It serves as the basis of the WSEP trainings and as a reference manual in other educational programs. The *Learning Guide* is packaged in a loose-leaf format in a 3-ring binder so that individuals can add new chapters and other supplementary materials from WSEP trainings and other sources. The *Learning Guide* (publication number EM 8714) is distributed by OSU Extension and Experiment Station Communications (EESC). Information on ordering the *Learning Guide* is available on the EESC web site at <http://seagrant.oregonstate.edu/wsep/publications.cfm> or by calling 541-737-2513.

The *Learning Guide* is divided into three major sections, based on three thematic areas identified in the planning sessions (described above). The first section, Working Together to Create Successful Groups, contains chapters on:

- Successful Partnerships,
- Organizational Structures,
- Effective Meetings Management,
- Decision Making,
- Communication, and
- Common Stumbling Blocks.

The second section, Watershed Science and Monitoring Principles, has chapters on:

- Planning,
- Watershed Hydrology,
- Stream Processes,

- Watershed Soils,
- Erosion,
- Conservation, and
- Assessment and Monitoring Considerations.

The third section, Evaluating, Managing, and Improving Watershed Functions, has chapters on:

- Riparian Area Functions;
- Management, Evaluation and Enhancement;
- Livestock and Forage;
- Stream Ecology and Assessment;
- Rural Homes and Acreages;
- Wetland Functions; and
- Water Quality Monitoring.

The *Learning Guide* is written at a basic level with the goal of identifying a base of material that should be understood by all who are involved in watershed management and enhancement. Like watersheds, it continually evolves and was revised in January 2002 in response to audience needs and to keep the price of the *Learning Guide* affordable.

Training to Establish a Firm Foundation

One of the major themes of successful restoration and water quality improvement programs is effective collaboration by a number of different parties. In addition to the local landowners, watershed councils include funding and regulatory agency staff, volunteers, diverse local expertise, businesses, and local officials. All involved must arrive at common water resource goals and understand how specific projects fit in with the larger goal of watershed restoration. Local watershed councils are groups of diverse people with varying levels of knowledge and skills. Most watershed councils have acknowledged that the group itself should establish some core, common foundation of knowledge and skills. The basic WSEP trainings, called the "Core Program," are designed to provide this foundation.

A team of Extension Agents and Specialists, technical professionals from federal and state resource agencies, and industry experts teach the WSEP Core Program. The Core Program consists of eight basic thematic modules:

- Watershed and Stream Processes;
- Salmonid Biology;
- Soils, Erosion, and Conservation;
- Riparian Area Functions and Management;
- Stream Assessment and Restoration;
- Wetland Evaluation and Enhancement;
- Creating Successful Groups; and
- Water Quality Monitoring.

Core Programs are hosted regionally by a local Extension Agent and co-organized by the regional watershed council and Soil and Water Conservation District representatives. They are coordinated at the state level by a .75 FTE WSEP Coordinator and a full-time Program Assistant. Members of up to two to four watershed councils in the region participate in the trainings. While the overarching principles of each module are standardized (there is an instructor guide for each module), the examples and delivery format of the trainings is be tailored to meet the local needs and desires of the councils attending. Each module consists of one 2-hour classroom plus one 4-hour field learning session. By completing the 48 hours successfully, participants of a Core Program graduate as Watershed Stewards. There is also an option to become a *Master Watershed Steward*, as described below.

Master Watershed Stewards

Becoming a Master Watershed Steward entails completing the 48-hour Core Program plus completing an additional 40-hour watershed project (with assistance from the OSU Extension Service, resource agencies, or watershed groups). The project can vary in type (on-the-ground activity; property management planning; monitoring; survey or assessment; or working with a group) and can be on the Steward's own property or in the local area. Projects apply what has been learned in the trainings to further each participant's goals as well as address local watershed issues.

After completing the Core Program and their projects, Master Watershed Stewards use their applied knowledge (watershed functions and processes), strive to maintain or improve watershed conditions for salmon and water quality, and support watershed groups with similar goals. Master Watershed Stewards serve as "points of contact" for community members seeking assistance and refer people to OSU Extension Service and local supporting agencies and watershed groups for reference materials, training, and assistance. Master Watershed Stewards are not expected to serve as watershed management educators to the community.

Advanced Watershed Stewardship Education

As the Core Program is completed in an area, there are frequent requests for more in-depth,

advanced training on certain topics covered in the Core Program. Advanced training can be developed and delivered by local- or state-level Extension educators, in partnership with other resource professionals, and can be offered locally, regionally, or centrally. Advanced training programs offered to date include a Fish Passage Short Course (offered regionally throughout the state), a centrally offered Forest Road Stewardship Conference, a centrally offered workshop on developing Forest Stewardship Plans that are consistent with the Oregon Plan, and an advanced communication skills program (offered regionally). Advanced programs under development include locally delivered trainings on Riparian Area Management and Controlling Upland Erosion.

Evaluation of Materials and Programs

Since 1999, a diverse audience of over 700 Oregonians has participated in WSEP, with nearly 300 having completed a project to become Master Watershed Stewards. In a time when many people and organizations are working to improve watershed stewardship, few are clear on how to gauge whether or how community-based (Extension) education is improving watershed stewardship.

Our WSEP evaluation is conducted in two stages. First, at the end of each of the eight thematic module training sessions delivered in the Core Program (and advanced sessions as well), all attendees fill out a one-page evaluation form (Training Session evaluation form). The learners assess each instructor (with 10 criteria in a four-category format ranging from poor to excellent), the overall effectiveness of the training (in a four-category format ranging from strongly disagree to strongly agree), and provide qualitative feedback. The evaluations are averaged within one day of the training session to make immediate adaptive improvements.

Second, we evaluate the overall WSEP with a one-page evaluation form (WSEP Project evaluation form) using a Post-Then-Pre Evaluation (Rockwell & Kohn, 1989). We sample participants in both core and advanced programs with a single, one-page Post- Then-Pre Evaluation. This test approximates the comprehensive difference that the training programs made by asking a sample of individuals how they think the program changed their confidence levels, self-reported behaviors, and opinions.

The "post-then-pre" design accounts for changes in the participants' knowledge by asking them to report present behaviors or confidence levels (post) before they report how they perceived these same behaviors (opinions or confidence levels) prior to the training program (then pre). The retrospective pretest at the end of the training program is more accurate than a standard pretest because it's answered in the same mindset as the posttest. The problem of "response-shift bias" in self-report, pre-post designs is therefore minimized.

A total sample of 30 people is necessary for a powerful statistical comparison (Devore & Peck, 1986), and we sample 70 people to account for attrition (from core and advanced programs separately). At the final session of the Core Program, seven randomly selected participants are asked to fill out a one-page WSEP Project evaluation form indicating how frequently they did a specific practice before the training program and at the end of the training program, and if their confidence levels and opinions changed.

We use this information in several ways. We review changes participants made or did not make and associate this data (averages, medians, and ranges; t-tests) with the training content and teaching methods. If the majority of participants made no change in certain behaviors, confidence levels, or opinions, we consider altering the training modules of the Core Program, the teaching methods, and/or the amount of emphasis placed on a given thematic area. The data that does indicate behavior change or increase in confidence supports training impact. Ultimately this yields information regarding the optimal ways to increase the amount of restoration and water resource protection efforts in a watershed.

Coordination, Funding, and the Future

A team of three faculty members (the first three authors) representing the Sea Grant, Forestry, and Agriculture Extension Program Areas initially coordinated the WSEP. In the pilot phase (1996-1999), the *Learning Guide* was developed and evaluated locally, regionally, and nationally. The basic trainings were initially designed and delivered in three regions along the Oregon coast. The production and delivery costs of the WSEP pilot phase were funded by an internal OSU Extension Innovative Grant, and an external grant from the Oregon Forest Resources Institute (OFRI). The 3-year pilot phase of the WSEP (from idea conception to pilot delivery) was conducted with roughly \$30,000. This does not include the salaries of OSU Extension faculty and staff who worked on the program.

The successful evaluation of the pilot phase of WSEP confirmed our belief in the value of the program. OSU President Paul Risser labeled the WSEP a "flagship program" for OSU.

A full-time coordinator (the fourth author) leads the current phase (1999-2003) of WSEP with the direction of a WSEP Advisory Committee. Grant funding (from the Oregon Watershed Enhancement Board [OWEB], the Oregon Forest Resources Institute (OFRI), and USDA Forest Service) supplement the considerable investment OSU Extension has in the WSEP (for example, educator salary and benefits).

Core Programs have been delivered in over 14 regions of the state, the *Learning Guide* was revised

in 2002, instructor guides, and train-the-trainer sessions were developed for each module. A WSEP Web site has been developed, which includes items such as statewide training schedules, project examples, and links to other resources (<http://seagrant.oregonstate.edu/wsep/>). A program brochure has also been created and distributed to over 3,000 people, and a more in-depth program description containing program evaluation results has also been developed and used effectively in marketing the value of the program to both user groups and decision makers.

Requests for WSEP Core Programs and supplemental and advanced sessions continue to occur in both urban and rural parts of the state. Future plans of WSEP include:

- Continuing the locally-driven core and advanced program;
- Developing new delivery methodologies such as regional, retreat-style institutes;
- Continuing updates and revisions of the *Learning Guide*;
- Continuing the three-quarter-time coordinator and full-time program assistant; and
- Continuing diversification of funding to keep the WSEP running strongly into the future.

Implications for Extension: Locally and Nationally

More and more, Extension educators find themselves doing multi-disciplinary programming and working with non-traditional audiences. Multi-disciplinary programming is necessary to meet today's multi-disciplinary problems. We could not have addressed the watershed needs in Oregon without using faculty and expertise from the Agriculture, Sea Grant, and Forestry Program Areas, or a myriad of academic disciplines ranging from bio-resource engineering to sociology.

Working with non-traditional audiences is necessary to address today's problems. We could not have adequately addressed the watershed problems in Oregon by only working with traditional landowners and landowner groups. We needed to work with watershed councils, including members of non-governmental organizations, environmental groups, citizen-based associations, etc., in order to implement educational programs that enhanced watershed resources.

It has not always been easy to work across three Extension Program Areas, across academic disciplines, or to work with non-traditional Extension clients such as watershed councils or local environmental groups. We appreciate our administrators and fellow Extension faculty for encouraging us to think outside the box and supporting us when we did.

Despite the challenges, we believe that the Watershed Stewardship Education Program has and will continue to make a difference in the quality of local watersheds and in the quality of life for local citizens and landowners who depend upon its productivity, health and well-being. The success of the WSEP program. The fact that OSU President Paul Risser called it a "flagship program" for OSU shows that Extension can play a major role in developing education programs for watershed groups and landowners that help them coordinate efforts to enhance the condition and function of watershed resources.

Multi-disciplinary watershed programming aimed at non-traditional audiences is not only needed in Oregon. Practical watershed educational materials and standardized training with local relevance are currently a hot topic in many areas throughout the country. WSEP has received both national and international inquiries regarding the possibility of duplicating the program. The *Learning Guide* has been ordered (and used for workshops or as a university course workbook) by more than 500 people (Extension educators, academics, agency professionals, and others) from several states outside of Oregon, including Pennsylvania, North Carolina, Louisiana, Nevada, Texas, Oklahoma, and Washington. In addition, we have received inquiries from India, Pakistan, and Mexico.

Members of the WSEP team are also partners in the development of a National Coastal Ecosystem Restoration Manual, funded with a National Outreach Initiative Grant from the Sea Grant Program (National Oceanic and Atmospheric Administration). This national manual will incorporate the general principles of the *Learning Guide* with specific examples from Louisiana, New York, and Oregon to support the coastal watershed restoration educational programming of educators nationwide. The national manual will soon be available from Extension Sea Grant.

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