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## **Information Sources, Learning Opportunities, and Priority Water Issues in the Pacific Northwest**

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**Abstract:** Extension programs should closely match citizen water resource priorities and be delivered in a format that the public will use. This article documents changes in public water resource priorities, preferred information sources, and learning opportunities between 2002 and 2007. Pacific Northwest citizens place a high priority on water resource issues and would prefer to learn about these issues via newspapers, television, and printed fact sheets.

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Since 2000, USDA-CSREES has placed an increased emphasis on regional rather than state-by-state water resources Extension programming. To encourage this regional programming, approximately \$50,000,000 has been made available on a competitive basis (ARREA, 406 program) over the last 8 years.

To accurately determine the effectiveness of regional programming, it is important both to establish base-line information about public perceptions and literacy, and then to measure change in public attitudes and actions

over time. Furthermore, to identify the best opportunities for successful regional programming, it is imperative to understand the similarities and differences that exist among the target audiences.

In the four-state (Alaska, Idaho, Oregon, Washington) Pacific Northwest Region, a survey instrument was developed to provide base-line information on public attitudes regarding water resources in 2002 from which future Extension programming outcomes can be measured (Mahler, Simmons, Sorensen, & Miner, 2004). This initial regional survey documented public attitudes about water resources in 2002. At that time it was anticipated that follow-up water resource surveys would be conducted at 5- (2007), 10- (2012), 15- (2017), 20- (2022) and 25- (2027) year intervals. The first follow-up survey was conducted in 2007 and was used to compare changes in attitudes about water resource issues since 2002 and examine geographic similarities and differences.

The objectives of this article are to document changes in the public's perception of water resource priorities, identify trends in the information sources used by the public, and examine recent and future water resources learning opportunities most likely to be used by the public.

## Materials and Methods

In 2006, a 48-question follow-up survey similar to the survey conducted in 2002 was developed to assess public attitudes and actions taken to address water resource issues in the Pacific Northwest. The specific survey questions discussed in this article dealt with: (1) water resource priority issues, (2) sources of water resource information most often used by the public, and (3) preferred learning opportunities the public has used in the past and are likely to use in the future to address water resource issues. The survey target audience was the 9,000,000 adult residents of the four Pacific Northwest states.

In addition, demographic information, including state of residence, community size, length of time residing in the region, gender, age, and educational level were also collected from survey respondents.

A target of 900 completed questionnaires was chosen as the survey goal to result in a sampling error of 4 to 6% (Salant & Dillman, 1994). The survey process was designed to receive a completed survey return rate in excess of 50%. Consequently, 1,800 surveys were sent to random adult residents of Alaska, Idaho, Oregon, and Washington on a proportional population basis. Addresses were obtained from a professional social sciences survey company (SSI, Norwich, CT). Four mailings were planned to achieve the 50% return rate (Dillman, 2004). The mailing strategy used was identical to that of the 2002 sampling (Mahler, Simmons, Sorensen, & Miner, 2004).

Survey answers were coded and entered into Microsoft Excel. Missing data were excluded from the analysis. The data were analyzed at two levels using SAS (SAS, 2004). The first level of analysis generated frequencies, while the second level evaluated the impacts of demographic factors. Significance ( $P < 0.05$ ) to demographic factors was tested using a chi-square distribution (Babbie, 1983).

## Results and Discussion

The 2007 water issues survey achieved a return rate of 56.2% (1,012 out of 1,800 surveys). The individual state responses ranged from 52.6 (Alaska) to 60.3% (Idaho). The demographic distribution of survey respondents was similar to that achieved in the 2002 survey. For instance, 32.0, and 31.1% of the survey respondents lived in communities of more than 100,000 in 2002 and 2007, respectively. As in the 2002 survey, in 2007 the demographics of survey respondents (except for gender) closely reflected the actual demographics of the region. As in 2002, male respondents to the 2007 survey were disproportionately

over-represented.

## Priority Water Issues

In the water attitude portion of the 2007 survey, residents were asked about 10 specific regional water issues. Respondents were asked to label each water issue as not important, somewhat important, very important, extremely important, or having no opinion. When the very important and extremely important responses were added together a majority of respondents in 2007 considered nine of the ten issues as having high priority. Over 90% of the respondents considered clean drinking water, clean rivers, and clean groundwater as high priority (Table 1). Seventy-seven percent of the 2007 respondents indicated that having enough water for agriculture was high priority despite the fact that over 85% of Pacific Northwest residents live in urban areas.

**Table 1.**

The Percentage of Pacific Northwest Respondents Rating Specific Water Resource Issues as Very or Extremely Important in Regional Surveys Conducted in 2002 and 2007

Issue	Very or Extremely Important		
	2007	2002	Change
	%		
Drinking water	99	99	--
Clean rivers	94	94	--
Clean groundwater	93	93	--
Water for agriculture	77	84	-7
Water for salmon	74	69	+5
Wetlands	73	69	+4
Watershed restoration	72	68	+4
Power generation	71	72	-1
Economic development	65	70	-5
Recreation	49	58	-9

Over two-thirds of Pacific Northwest residents in 2007 indicated that prevention of salmon extinction, loss of wetlands, watershed restoration, and water for power generation were high-priority items (Table 1). Water for economic development was considered high priority by almost two-thirds of respondents, while slightly less than 50% of the people who completed the survey considered water for recreation a high-priority item.

When the 2007 and 2002 survey responses are compared, it is obvious that water priorities in the region had changed very little over those 5 years (Table 1). The three highest priority issues (clean drinking water, clean rivers, clean groundwater) were rated identically in both surveys. Using the value of 4% as a statistically significant level of change between the 2002 and 2007 surveys, prevention of salmon extinction, loss of

wetlands, and watershed restoration had become more important to the public in the region. Conversely, water for agriculture, water for economic development, and water for recreation had become less important compared to 2002.

Water for agriculture probably became less important because the demographic shift toward urbanization has continued to accelerate in the 5 years. It may also represent the need for additional programming on the importance of agriculture with respect to regional economies, sustainability, and food security. Conversely, as the region became increasingly urbanized, water for recreation became less important to a larger percentage of the region's residents.

The demographic factors of state of residence, occupation, education level, and length of residence in the region did not influence answers to most of the water issues; however, gender and age did significantly affect answers to several of the issues. Based on the survey reported here, females were more likely to place a high priority rating on seven of the 10 water issues contained in the survey than males. Younger respondents were more likely to consider loss of wetlands, prevention of salmon extinction, watershed restoration, and water for recreation as high priority issues than respondents over the age of 50.

### Information Sources

In the 2007 survey data, newspapers and television are the most frequently cited sources of water resource information by citizens of Alaska, Idaho, Oregon, and Washington (Table 2). Municipal governments (51%), environmental agencies (47%), and environmental groups (41%) are reported as providing over 40% of the adults in the region with water resources information. Conversely, Extension, universities, the Internet, and public schools have a lesser reach. Compared to the 2002 survey results, except for the Internet, all information sources are being used less frequently for information about water issues by the public in Alaska, Idaho, Oregon, and Washington. In the 5-year reporting period (2002-2007), the Internet's reach increased from 15 to 20% of the public.

**Table 2.**

Water Resource Information Sources Reported by Pacific Northwest Respondents to Regional Surveys Conducted in 2002 and 2007

Information Source	Year		
	2007	2002	Change
	%		
Newspapers	65	68	-3
Television	56	59	-3
Municipal government	51	NA	NA
Environmental agencies	47	51	-4
Citizen groups	41	46	-5
Extension	25	28	-3
Universities	24	25	-1
Internet	20	15	+5

Schools	18	20	-2
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Municipal governments were not a water information source choice on the 2002 survey. However, because municipalities provide annual reports to citizens on the quality of drinking water supplies, it was included as a choice on the 2007 survey.

Extension as a water information source lost some ground in the 5 years (28% in 2002 vs. 25% in 2007). Compared to newspapers, television, municipal governments, environmental agencies, and citizen groups, Extension had a smaller reach. However, almost half of Pacific Northwest residents living in communities of less than 25,000 in 2007 cited Extension as a water information source. Therefore, Extension is making a water resources information impact on the citizens in the more rural communities in the region that has been its traditional target group.

### Learning Opportunities

A majority of respondents indicated that they had learned about water quality issues via the newspaper, television coverage, and/or by reading printed fact sheets in the 5 years (Table 3). These three responses were far more common learning opportunities than the other 10 survey choices. Viewing a display (21.3%), visiting a Web site (18.5%), or attending a fair or festival (14.3%) were the next most frequently cited water learning opportunities used by survey respondents since 2002. Conversely, less than 10% of survey respondents selected taking part in a one-time volunteer activity (6.5%), attending a short course (5.2%), learning to conduct a water practices assessment (3.1%), taking a course for certification or credit (2.9%), or training for a volunteer position (0.8%). Only 12.9% of 2007 survey respondents indicated that they have not taken advantage of a water quality learning opportunity in the last 5 years.

**Table 3.**

Response to the Question *"Since January 2002, which of the following learning opportunities have you taken advantage of for water quality issues?"* Answered by 1,012 Residents of the Pacific Northwest in Early 2007

Learning Activity	Percent Citing
Read a newspaper article or series	60.5
Watched TV coverage	58.2
Read printed fact sheets, bulletins or brochures	57.6
Looked at a demonstration or display	21.3
Visited a Web site for information and tips	18.5
Attended a fair or festival	4.3
None of these	2.9
Took part in a one-time volunteer activity	6.5
Attended short course	5.2
Watched a video or DVD of information	4.9

Learned how to conduct a home, farm or workplace water practices assessment	3.1
Took a course for certification or credit	2.9
Been trained for a regular volunteer position	0.8

The demographic factors of age and education affected both the type and frequency of using water quality learning opportunities since 2002. Age affected the use of newspapers, television, printed materials, and the Internet as water learning opportunities (Table 4). Older survey respondents were more likely to use the newspaper and/or television as water learning opportunities. Conversely, middle-aged (40 to 60) respondents preferred the use of printed materials compared to younger (<40) and older (>60) Pacific Northwest citizens. As expected, younger respondents were more likely to use the Internet to obtain information in the 5 years. Respondents who were less than 40 years old were most likely to not have taken part in a water quality learning opportunity since 2002. Conversely, 93% of respondents aged 40 to 60 years old took advantage of at least one listed water quality learning opportunity in the 5 years.

**Table 4.**

The Interaction Between Age of Respondents and the Use of Learning Opportunities for Water Quality Issues from 2002 to 2007 by Pacific Northwest Citizens

Learning Opportunity	Age			P value
	<40	40 to 60	>60	
	percent citing			
Newspaper	45	62	65	0.0001***
Television	39	59	64	0.0001***
Printed materials	47	67	54	0.0001***
Web site	30	24	8	0.0001***
Nothing	23	8	12	0.0001***

The highest formal educational level obtained by survey respondents was also related to the frequency of using newspapers, television, printed materials, and the Internet as water quality learning opportunities since 2002 (Table 5). Increasing educational level was positively related to the use of newspapers, printed materials, and the Internet as water quality learning opportunities over the 5 years. Conversely, people who had obtained at least a high school diploma or equivalent (GED) were more than twice as likely to not have used a cited learning opportunity since 2002 than people in other educational achievement categories.

**Table 5.**

The Interaction Between Formal Educational Level of Respondents and the Use of Learning Opportunities for Water Quality Issues from 2002 to 2007 by Pacific Northwest Citizens

Learning Opportunity	Educational Level					P value
	<HS	High School	Some College	College Graduate	Advanced Degree	
	percent citing					
Newspaper	43	62	55	62	69	0.006**
Television	33	62	59	57	55	0.05*
Printed materials	33	49	56	62	67	0.0001***
Web site	3	8	17	23	25	0.0001***
Nothing	40	18	14	10	8	0.0001***

### Future Preferred Learning Opportunities

When the public was asked about their three preferred water resources learning opportunities in 2007, 62% cited reading printed fact sheets, bulletins, or brochures (Table 6). This preference for printed materials increased from 53% in 2002 to 62% in 2007. This is a significant finding because most educators assume that printed materials should be less important in our modern, electronic information age.

**Table 6.**

Preferred Water Resource Learning Opportunities Reported by Pacific Northwest Respondents to Regional Surveys Conducted in 2002 and 2007

Preferred Learning Opportunity	Year		
	2007	2002	Change
	%		
Reading fact sheets	62	53	+9
Reading newspapers	48	54	-6
Watching television	47	55	-8
Visiting a Web site	32	30	+2
Viewing a display	17	21	-4
Watching a DVD	12	16	-4
Attending a short course	7	18	-11
Taking a course for credit	4	7	-3

Almost half of the 2007 survey respondents cited newspapers and television as preferred learning opportunities for water information (Table 6). The choice of newspapers and television as preferred learning opportunities for water resources information declined by 6 and 8% since 2002, respectively. As a preferred learning opportunity, significant declines compared to the 2002 survey were observed for viewing a display, watching a DVD, attending a short course, and taking a course for credit. Attending a short course as a preferred learning opportunity suffered the greatest decline (11%) compared to the 2002 survey.

It is interesting to note that learning opportunities that require the most time expenditure by the public declined by the greatest percentages in the 5 years. Apparently, the public is interested in water resource information; however, increasing time constraints are limiting the popularity of learning opportunity options in the Pacific Northwest.

## Conclusions

In the late 1990's, many politicians, planners, and educators thought that water resource issues were just the latest environmental issue fad that had piqued the interest and concern of Pacific Northwest citizens. Many of these officials felt that by 2005 air quality or waste issues would supplant water resources in importance. Results from the 2007 survey indicate that water resource issues were as important in 2007 as they were 5 years before. In fact, water-related issues, including wetland preservation, watershed restoration, and saving salmon runs, increased in importance to citizens based on this survey. Well over 90% of the region's citizens continued to list clean drinking water, clean rivers and clean groundwater as high-priority issues. The similarities in attitudes also suggest that regional programming can be effective at conveying information to stakeholders.

Newspapers and television continued to be the water resources information sources of choice; however, all evaluated information sources except the Internet lost ground between 2002 and 2007. Over 60% of the 2007 survey respondents identified printed fact sheets as their preferred learning opportunity for water resources information. The preference for printed materials increased since 2002. Most other identified learning opportunities were less preferred in 2007 compared to survey results from 2002. Traditional Extension delivery methods, including short courses, volunteer training displays at fairs, and providing courses for credit, continued to decline in popularity with the public. Extension needs to reassess its planned movement from traditional printed materials to electronic materials dissemination, because at least in the Pacific Northwest, it is out of step with its clientele.

Almost 50% of adult Pacific Northwest residents living in rural communities of less than 25,000 in 2007 cited Extension as a water information source. It appears that Extension is making a water resources information impact on the citizens in the more rural communities in the region that have been its traditional target group. Based on our experience, surveys continue to be the best evaluation method for determining information sources, learning opportunities, and priority water issues in the Pacific Northwest.

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