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Impacts of Personal Experience: Informing Water Conservation Extension Education

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Abstract

Extension educators have diligently educated the general public about water conservation. Incorporating audiences' personal experience into educational programming is recommended as an approach to effectively enhance audiences' adoption of water conservation practices. To ensure the impact on the audiences and environment, understanding the differences in issues audiences are concerned and audiences' behavioral pattern is needed. This study examined the regional differences in how U.S. residents' experiences with water issues related to their engagement and intention to engage in water conservation in order to facilitate the development of Extension educational programming in different regions. An online survey was administered to collect responses from U.S. residents in this descriptive and correlational study. Respondents' water issues experience, water use behaviors, water conservation practice application, and willingness to act on water conservation were measured. Regional differences in how experience were associated with water use behaviors, water conservation practices application, and willingness to act were found. Extension educators should be aware of such regional differences when developing water conservation educational programs and provide recommendations tailored to regional audiences' needs and interests. By doing so, audiences' adoption of water conservation practices is expected to increase.

Keywords: Extension education, water conservation, public opinions, experience

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Introduction

Experience is an important component in both formal and non-formal educational settings (Huang & Lamm, 2015; Knowles, Holton, & Swanson, 2005; Kolb, 1984; Rubenstein & Thoron, 2014). In the realm of environmental education, previous experience has been found to influence perceptions, awareness of, and motivations to learn about environmental conservation (Brasier et al., 2011; Fuss, Bornkessel, Mattern, & Stamminger, 2011). Water issues are recurrently identified as one of the largest issues facing the country (United States Environmental Protection Agency [USEPA], 2015a) and the world (Roberts, Harder, & Brashears, 2016). Cooperative Extension, an organization "[providing] non-formal education and learning activities to people throughout the country" (National Institute of Food and Agriculture [NIFA], 2016, para. 1), has been actively involved in water conservation education. To maximize the impact education can have on an audiences' behavior change regarding water conservation, Extension has targeted specific audiences that have personal experiences with water issues along with incorporating simulated

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personal experiences into educational programming for those that do not (Pratt & Bowman, 2008; Singletary & Daniels, 2004). By simulating personal experiences into educational programming, participants can directly see the relevance of water issues to their daily lives, resulting in a higher tendency to take environmental protection action, such as conserving water resources (Huang & Lamm, 2015; Laughlin et al., 2004).

Individuals tend to respond and react to issues more directly linked to their lives, such as daily water demand, than those with loose linkages and uncertainties, such as climate change (Haasnoot, Middelkoop, Van Beek, & Van Deursen, 2011). However, residents in different states interact with water differently depending on their life styles and the water issues they face. For example, in California water is limited due to drought and is paired with a high level of demand for water by the agricultural industry (USEPA, 2015b). In Florida, population growth, climate change, and residents' reliance on groundwater for lush landscapes has put pressure on water resources (USEPA, 2013a). Residents of Maryland are actively engaged in water sports and fishing, but the Chesapeake Bay area is facing water quality issues due to nutrient pollution (USEPA, 2013b; USEPA, 2016); and residents in the Great Lakes area are known for their active fishing but industrial water use in the area has resulted in water quality issues and contamination of fish populations (USEPA, 2015c). These differences in experience and exposure to water issues are expected to influence individuals' attitudes and behaviors regarding water protection (Borisova, Smolen, Boellstorff, McFarland, & Adams, 2013; Mahler et al., 2010; Shaw, Hazel, Bardon, & Jayaratne, 2012).

While individuals' environmental perceptions and behaviors may be influenced by their personal experiences (Gifford & Nilsson, 2014), additional understanding of how this influences their engagement in water conservation may help Extension educators develop educational programs relevant to their audiences' needs (Huang, Lamm, & Dukes, 2016). By providing relevant and practical advice, Extension educators can effectively enhance their audiences' acceptance and adoption of water conservation behaviors (Wagner & Kuhns, 2013), fulfilling the first research priority of the National Research Agenda: "public and policy maker understanding of agriculture and natural resources" (Roberts et al., 2016, p. 13). Extension educators can use the findings to facilitate and strengthen the development of future water conservation educational programs targeting the general public to realize greater impact.

Theoretical Framework

This study was driven by the theory of cognitive dissonance (Festinger, 1957). This theory describes the situation when an individual has more than one cognition, such as knowledge, opinions, beliefs, values, and attitudes, conflicting with one and another. A conflict between cognitions can lead to an uncomfortable feeling that the individual would want to minimize the discrepancy between cognitions or avoid situations that may increase the discrepancy (Festinger, 1957). Cognitive dissonance may occur due to past experience. When a later cognition is related to, but inconsistent with, past experience, individuals will be motivated to change the dissonant situation to a consonant one (Festinger, 1957). Cognitive dissonance may have different magnitudes depending on the importance or relevance to one's personal values, and/or the level of dissonant to consonant elements. The higher the dissonance magnitude is, the more likely individuals are to change their situation (Festinger, 1957).

Cognitive dissonance has been frequently used to explain individuals' behavioral decision and cognition related to environmental conservation. Thøgersen (2004) examined consumers' performance of different environmentally responsible behaviors and found patterns of both consistent and inconsistent environmentally responsible behaviors. While consumers preferred to

behave in a consistent manner, some may choose to remain their inconsistent behaviors because they subjectively perceived the cost to change the behavior exceeded the value to conserve environment (Thøgersen, 2004). Similarly, the study of Whitmarsh and O'Neill (2010) revealed cognitive dissonance between individuals' pro-environmental behaviors and self-identity related to their environmental value may lead to behavioral change. While individuals' past behavior was associated with their self-identity, they tended to engage in pro-environmental behaviors to remain consistency in past behaviors (Whitmarsh & O'Neill, 2010).

Individuals gain experience through past behaviors (Whitmarsh & O'Neill, 2010), therefore their gained experience is paired with later information which may result in behavioral change or denial of behavioral change. Individuals who have experienced water issues and learned about water conservation have a high potential for adopting water conservation practices and behaviors (Fielding et al., 2013; Nieswiadomy, 1992). However, without continuous experience with water issues, individuals may gradually lose the connection between water conservation behaviors and water issues over time and discontinue their engagement in water conservation behaviors (Fielding et al., 2013).

Huang and Lamm (2015) found individuals' past experience with water issues can influence their perception of water. Fielding et al. (2013) and Harriden (2013) found keeping a "Water Diary" was an approach that made individuals stay aware of how they use water and motivated them to conserve water. Wolfe (2012) found decision-making regarding engaging in water conservation was influenced by knowledge and experience with water and water issues. Individuals who perceived water conservation efforts should be behavior-driven and possessed knowledge and experience with water and water issues tended to adopt water conservation practices, as well as feel personally responsible for water conservation. On the other hand, individuals who perceived water conservation efforts should be technology-driven and possessed knowledge and experience with water and water issues tended to not adopt water conservation practices, as well as feel personally responsible for water conservation (Wolfe, 2012).

Empirical studies have shown cognitive dissonance, when properly used, may influence individuals' perceptions and create behavioral change toward engaging in water conservation. Further examination is needed to determine how water-related experiences influence engagement in water conservation differently based on the water issues facing different areas. Recommendations and guidance can be provided to the nationwide Extension system to effectively communicate with audiences and increase engagement in water conservation (Huang & Lamm, 2015; Monz, Cole, Leung, & Marion, 2010).

Purpose and Objectives

The purpose of this study was to examine if regional differences existed in how U.S. residents' experiences with water issues related to their engagement in water use behaviors, application of water conservation practices, and willingness to act on water conservation in order to guide and facilitate future Extension programming. The objectives were to:

1. Describe U.S. residents' experiences with water issues, engagement in water use behaviors, application of water conservation practices, and willingness to act on water conservation by regions;
2. Identify regional differences in U.S. residents' experiences with water issues, engagement in water use behaviors, application of water conservation practices, and willingness to act on water conservation; and

3. Examine the relationships between U.S. residents' experiences with water issues, engagement in water use behaviors, application of water conservation practices, and willingness to act on water conservation by regions.

Methods

This study was descriptive and correlational using an online survey developed by researchers to examine U.S. residents' experiences with water issues and opinions about water conservation. The survey instrument was developed based on the 2012 RBC Canadian Water Attitudes Study (Patterson, 2012). The survey was administered electronically by collaborating with a public opinion survey research company to recruit respondents representative of the U.S. general public aged 18 years or older. Data were collected using a non-probability opt-in sampling technique.

The instrument was distributed to 2,948 U.S. residents with 1,050 complete responses received after quotas and manipulation checks were passed, resulting in a 36% participation rate. Non-probability opt-in sampling techniques have been widely used in public opinion research with data adjustment approaches recommended to strengthen the representativeness of the results (Baker et al., 2013). In this study, post-stratification weighting methods (Kalton & Flores-Cervantes, 2003) were used to overcome non-participation bias, selection, and exclusion limitations (Baker et al., 2013). Data were weighted based on the 2010 U.S. Census of age, sex, and race/ethnicity (Kalton & Flores-Cervantes, 2003). Data analysis, including descriptive statistics and correlational analysis, was conducted using SPSS® 24.0.

Experience with water issues was measured by asking respondents to indicate if they have experienced any of the five listed water issues within the past year. "*I have not experienced any of these*" was also provided as the sixth option. One point was assigned to respondents for each issue they indicated they had experienced. The overall points were summed to create the index score of water issue experience ranging from zero to five.

The respondents were then asked three sets of questions regarding their water use behaviors, application of water conservation practices, and willingness to act on water conservation. Respondents' water use behaviors were measured using a five-point Likert-type scale ranging from 1 = *Never*, 2 = *Almost Never*, 3 = *Sometimes*, 4 = *Almost Every Time*, 5 = *Every Time* with seven statements. *Does Not Apply* was also included as an option respondents could choose, and responses of *Does Not Apply* were transformed as missing values. The index score of water use behaviors was calculated by averaging the seven items and found reliable ($\alpha = .86$).

To measure respondents' application of water conservation practices, six statements on a three-point scale of -1 = *No*, 0 = *Not Sure*, 1 = *Yes* was used. The index score of water conservation practice application was created by averaging the scores to the six items. In terms of willingness to act on water conservation, 20 statements were used on a five-point Likert-type scale ranging from 1 = *Very Unlikely*, 2 = *Unlikely*, 3 = *Undecided*, 4 = *Likely*, 5 = *Very Likely*. *Not Applicable* was an available option in the willingness to act questions, and responses of *Not Applicable* were transformed as missing values. The index score of willingness to act was calculated by averaging the 20 items and found reliable ($\alpha = .87$). Lastly, respondents' demographics were collected by questions asking their sex, race, ethnicity, and age.

The instrument was validated by a panel of experts specializing in water quality issues, public opinion research, and survey design. The panel of experts included the Chief Executive Officer of the Florida Nursery, Growers and Landscape Association, an Extension specialist in

water economics and policy, the Director of the Center for Landscape Conservation and Ecology, the Director of the University of Florida Water Institute, the Director and associate director of the Center for Public Issues Education, and an assistant professor specializing in agricultural communication.

Table 1

Demographics

	Frequency (%)			
	Midwest (*n* = 240)	Northeast (*n* = 236)	South (*n* = 364)	West (*n* = 210)
Sex				
Female	59.4	54.5	56.1	29.6
Male	40.6	45.5	43.9	70.4
Race (Non–Hispanic)				
African American	11.9	6.8	14.9	10.9
Asian	1.3	3.4	4.9	11.3
Caucasian/White	73.0	75.0	64.9	54.4
Native American	1.0	.7	.6	.4
Other	2.5	1.9	1.5	.5
Hispanic Ethnicity	10.3	12.3	13.2	22.5
Age				
20-29	11.4	22.5	17.4	22.5
30-39	16.8	14.8	21.3	12.7
40-49	19.3	19.7	19.7	14.5
50-59	20.3	18.2	18.4	13.9
60-69	13.4	14.0	12.2	10.1
70-79	8.5	5.5	7.7	6.2
80 and older	10.3	5.2	3.3	20.1

The demographics were displayed in Table 1. In the Midwest, Northeast, and South, female respondents were more prevalent than male respondents, while male respondents were more prevalent than female respondents in the West. The majority of respondents were Non-Hispanic Caucasian/White in all regions. As for age, the majority of respondents were aged between 30-59 in the Midwest and South, 20-49 in the Northeast, and 20-59 in the West.

Results

Experiences with Water Issues

Respondents were asked to indicate their water issues experiences (see Table 2). More than 60% of the respondents had not experienced any listed water issues in the past year regardless of regions. The water issue that respondents experienced most was "Closed rivers, lakes or springs due to poor water quality" in the Midwest and West, "Closed beaches due to red tide/poor water quality" in the Northeast, and "Poor quality of drinking water at home" in the South. Significant differences among regions were found across two water issues: "Closed rivers, lakes or springs due to poor water quality" ($\chi^2(3) = 11.22$, $p = .01$) and "Poor quality of drinking water at home" ($\chi^2(3) = 8.82$, $p = .03$).

Table 2

Experiences with Water Issues by Regions

Water Issues	Frequency of Water Issue Experiences (%)				χ^2	p
	Midwest (n = 240)	Northeast (n = 236)	South (n = 364)	West (n = 210)		
Closed rivers, lakes or springs due to poor water quality	19.3	10.7	10.8	11.8	11.22	.01**
Poor quality of drinking water at home	12.7	13.7	19.3	11.4	8.82	.03*
Closed beaches due to red tide/poor water quality	11.6	19.2	13.2	11.5	7.53	.06
Closed rivers, lakes or springs due to low water levels	5.4	6.9	10.2	10.3	6.24	.10
Prohibitions on eating fish you have caught	13.8	10.8	8.4	9.4	4.47	.22
I have not experienced any of these	58.4	58.9	61.8	64.7	2.50	.48

Note. **$p < .01$; *$p < .05$.

Engagement in Water Use Behaviors

Respondents' engagement in water use behaviors was examined using seven listed items (see Table 3). Among all regions, "I allow used motor oil to run down a storm drain" was the behavior with most respondents indicated they never or almost never perform, followed by "I hose down my driveway" in the Midwest, "I allow oil from cooking to run down the drain" in the Northeast and South, and "I let my sprinklers run when it has rained or is raining" in the West. Significant regional differences were found in enagement in all the listed water use behaviors.

Application of Water Conservation Practices

Respondents were asked whether they have applied six water conservation practices (see Table 4). Low-flow shower heads and water-efficient toilets were the two conservation practices the most respondents have applied in all regions. However, significant regional differences also existed in respondents' application of water conservation practices. Three items found with significant reginal differences include: "I have low-flow shower heads installed in my home" ($\chi^2(3) = 22.67$, $p = .00$), "I have water-efficient toilets installed in my home" ($\chi^2(3) = 17.06$, $p = .00$), and "I have low-water consuming plant materials in my yard" ($\chi^2(3) = 14.46$, $p = .00$).

Willingness to Act on Water Conservation

Twenty water conservation-related behaviors/activities were used to measure respondents' willingness to act (see Table 5). Respondents in the Midwest, Northeast, and South indicated the highest likelihood of conserving water through only running their washing machine when it was full and responsibly disposing of hazardous materials, while those in the West through responsibly disposing of hazardous materials and voting to support water conservation programs. When comparing the regions, significant differences were found in 10 out of 20 water conservation-related behaviors/activities.

Table 3

Water Use Behavior Engagement by Regions

	Frequency of Water Issue Experiences (%)													
	Never/Almost Never				Sometimes				Almost Every Time/Every Time					
Water Use Behavior	M	N	S	W	M	N	S	W	M	N	S	W	χ^2	*p*
I leave the water running in the kitchen when washing and/or rinsing dishes	47.3	43.2	54.5	45.6	29.4	25.5	31.2	22.9	19.3	29.3	12.9	28.1	55.33	.00**
I allow soapy water to run down a storm drain	61.0	54.2	54.9	51.5	9.5	13.1	12.4	14.2	10.2	11.7	15.9	20.8	45.30	.00**
I hose down my driveway	65.7	60.3	59.2	57.6	10.1	14.5	11.6	15.7	3.8	3.2	13.1	5.3	36.23	.00**
I let my sprinklers run when rain is predicted in the forecast	64.5	59.7	66.8	59.2	2.2	3.7	5.0	9.7	4.7	5.7	3.9	7.0	35.64	.00**
I let my sprinklers run when it has rained or is raining	65.0	59.6	70.1	63.2	.4	5.7	1.7	7.2	6.0	4.0	3.1	3.4	32.06	.01**
I allow oil from cooking to run down the drain	64.4	65.2	70.3	57.9	20.4	21.8	20.7	20.2	10.7	10.4	7.3	16.3	28.62	.02*
I allow used motor oil to run down a storm drain	78.6	73.1	80.8	72.4	1.3	2.2	2.9	1.5	2.2	5.2	2.9	6.4	26.98	.03*

Note. **$p < .01$; *$p < .05$; Respondents were allowed to select *Does Not Apply*, and the *Does Not Apply* responses are not included in the table. M = *Midwest*, N = *Northeast*, S = *South*, W = *West*.

Table 4

Water Conservation Practice Application by Regions

Water Conservation Practice	Frequency of Water Conservation Practice Application (%)												χ^2	*p*
	No				Unsure				Yes					
	M	N	S	W	M	N	S	W	M	N	S	W		
I have low-flow shower heads installed in my home	37.6	41.5	37.9	29.8	21.2	18.6	19.3	8.9	41.3	39.9	42.8	61.3	30.75	.00**
I have water-efficient toilets installed in my home	40.6	36.1	37.1	30.6	14.4	16.9	18.8	8.5	45.0	47.1	44.0	61.0	21.79	.00**
I have low-water consuming plant materials in my yard	48.2	53.7	53.1	46.3	21.9	22.0	16.0	13.0	29.9	24.3	30.9	40.7	19.93	.00**
I use rain barrels to collect water for use in my garden/lawn	81.2	74.9	81.2	85.4	2.3	6.0	3.4	2.4	16.5	19.1	15.4	12.2	11.03	.09
I have donated money at least once in the past five years to a nonprofit that works to provide access to drinking water in another country	80.5	74.2	82.1	79.1	4.8	8.9	5.3	4.2	14.7	16.9	12.5	16.7	8.81	.18
I use recycled wastewater to irrigate my lawn/landscape	74.6	74.0	75.5	78.3	9.7	10.5	5.9	6.5	15.7	15.5	18.6	15.1	7.17	.31

Note. **$p < .01$; M = *Midwest*, N = *Northeast*, S = *South*, W = *West*.

Table 5

Willingness to Act on Water Conservation by Regions

	Frequency of Willingness to Act (%)													
	Very Unlikely/Unlikely				Undecided				Likely/Very Likely					
Willingness to Act	M	N	S	W	M	N	S	W	M	N	S	W	χ^2	*p*
Vote to support water conservation programs	2.4	6.1	4.9	9.6	23.8	20.7	16.5	6.3	70.3	69.3	72.7	83.1	72.45	.00**
Join a water conservation organization	40.1	43.7	41.9	51.4	35.0	28.2	30.4	17.9	20.8	22.8	22.2	25.9	49.81	.00**
Reduce use of pesticides if your landscape quality would decrease	7.0	6.7	8.1	6.6	12.9	14.9	18.5	9.7	44.5	45.9	52.0	48.5	43.14	.00**
Reduce use of fertilizer if your landscape quality would decrease	10.1	7.6	7.5	5.5	17.2	15.9	18.6	12.5	41.5	43.5	51.3	44.4	42.11	.00**
Support water restrictions issued by my local government	6.7	5.5	7.6	13.9	22.5	16.6	19.0	10.2	61.6	72.1	68.6	73.6	41.94	.00**
Only run the dishwasher when it is full	4.7	2.5	4.7	10.8	4.5	3.9	7.2	3.5	64.7	64.2	66.4	67.9	39.54	.00**
Responsibly dispose of hazardous materials	1.0	2.9	2.2	2.1	6.0	9.8	8.5	3.9	81.5	71.6	78.8	83.3	36.69	.00**

Table 5 (continued)

Willingness to Act on Water Conservation by Regions

	Frequency of Willingness to Act (%)													
	Very Unlikely/Unlikely				Undecided				Likely/Very Likely					
Willingness to Act	M	N	S	W	M	N	S	W	M	N	S	W	χ^2	*p*
Buy a specialty license plate that supports water protection efforts	59.8	56.3	56.5	59.8	20.2	18.6	19.3	13.2	12.3	15.2	18.3	21.7	33.76	.00**
Reduce your use of natural resources	9.7	10.4	14.1	13.5	28.2	25.7	20.7	16.1	57.7	55.6	59.5	68.9	31.97	.01**
Avoid purchasing plants that require a lot of watering	9.1	9.8	7.9	7.2	20.0	19.6	15.9	20.6	56.9	54.9	63.8	66.3	31.82	.01**
Volunteer for a stream clean up or wetland restoration event	43.9	35.8	40.7	47.3	21.4	32.0	27.6	28.6	25.5	24.9	23.8	20.3	24.25	.06
Keep a timer in the bathroom to help you take a shorter shower	53.6	47.8	50.2	54.4	19.6	20.7	23.8	12.3	19.8	24.9	21.4	29.8	21.87	.11
Only water your lawn in the morning or evening	4.3	3.7	7.1	5.2	9.3	12.2	8.2	12.3	51.0	49.6	56.9	56.7	21.63	.12
Use biodegradable cleaning products	14.3	15.3	17.1	18.2	23.5	26.1	22.8	16.4	60.9	55.5	55.9	62.8	21.48	.12

Table 5 (continued)

Willingness to Act on Water Conservation by Regions

	Frequency of Willingness to Act (%)													
	Very Unlikely/Unlikely				Undecided				Likely/Very Likely					
Willingness to Act	M	N	S	W	M	N	S	W	M	N	S	W	χ^2	*p*
Vote for candidates who support water conservation	2.7	4.5	5.3	4.4	23.5	26.3	24.5	23.1	70.0	65.6	64.4	68.3	20.60	.15
Donate to an organization that protects water	32.0	29.4	34.0	42.2	27.0	29.1	27.2	23.2	34.9	35.0	33.3	27.4	18.50	.24
Only run the washing machine when it is full	9.2	5.5	7.3	6.1	7.3	4.2	6.7	5.9	79.9	85.7	83.5	82.2	15.67	.40
Sweep patios and sidewalks instead of hosing them down	5.0	4.7	5.4	5.9	8.6	6.8	6.9	4.7	65.4	64.7	73.2	68.4	15.32	.43
Visit springs, lakes, state parks, etc., to learn about water issues	17.7	24.9	22.8	23.8	27.2	26.0	27.5	29.8	48.8	43.9	44.3	42.5	13.77	.54
Reduce the number of times a week you water your lawn	7.5	4.0	5.8	5.4	8.3	7.3	10.4	5.9	49.4	53.7	52.5	51.8	13.30	.58

Note. **$p < .01$; Respondents were allowed to select *Not Applicable*, and the *Not Applicable* responses are not included in the table. M = *Midwest*, N = *Northeast*, S = *South*, W = *West*.

Relationships among Variables

The relationships among water issue experience, water use behaviors, water conservation practice application, and willingness to act on water conservation by regions were examined (see Table 6). To describe the relationships, Davis' (1971) convention was used with $.01 \geq R \geq .09$ = *Negligible*, $.10 \geq R \geq .29$ = *Low*, $.30 \geq R \geq .49$ = *Moderate*, $.50 \geq R \geq .69$ = *Substantial*, $R \geq .70$ = *Very Strong*. In the Midwest, low to moderate relationships were found among some variables: respondents who had experienced more water issues tended to performed more listed water use behaviors, apply more water conservation practices, and more willing to act on water conservation behaviors/activities; respondents who had performed more listed water use behaviors tended to apply more water conservation practices. In the Northeast, experience showed low to moderate relationships with water use behaviors, water conservation practice application, and willingness to act, while a substantial relationship was found between water use behavior and water conservation practice application. As for respondents in the South, low to moderate relationships were found between experience and water use behavior, experience and water conservation practice application, experience and willingness to act, and water use behavior and water conservation practice application. Lastly, in the West, relationships were in low magnitudes between experience and water use behavior, experience and water conservation practice application, and water use behaviors and water conservation practice application; but the relationship between water use behaviors and willingness to act was in a substantial magnitude.

Table 6

Relationships among Water Issue Experience, Water Use Behaviors, Water Conservation Practice Application, and Willingness to Act on Water Conservation by Regions

		1. Experience	2. Water Use Behaviors	3. Water Conservation Practice Application	4. Willingness to Act
Region	Constructs	*r*	*r*	*r*	*r*
Midwest	1	1.00			
	2	.15	1.00		
	3	.25	-.09	1.00	
	4	.10	.47	.02	1.00
Northeast	1	1.00			
	2	.21	1.00		
	3	.40	.10	1.00	
	4	.28	.58	.03	1.00

Table 6 (continued)

Relationships among Water Issue Experience, Water Use Behaviors, Water Conservation Practice Application, and Willingness to Act on Water Conservation by Regions

South	1	1.00			
	2	.18	1.00		
	3	.36	.07	1.00	
	4	.10	.47	-.07	1.00
West	1	1.00			
	2	.19	1.00		
	3	.19	-.21	1.00	
	4	.07	.56	.07	1.00

Conclusion and Implications

The key findings of this study aligned with the studies of Borisova et al. (2013), Mahler et al. (2010), Shaw et al. (2012), and Whitmarsh and O'Neill (2010), which all indicated that individuals' application of water conservation practices and intention to conserve water may be associated with their experience of water issues and experience gained through performing certain water use behaviors, and such associations differed by region. In this study, individuals who had experienced more water issues tended to be more likely to apply water conservation practices (in all regions) and more willing to conserve water in the future (in the Midwest, Northeast, and South). Such findings were similar to the studies of Fielding et al. (2013) and Nieswiadomy (1992), which reported that experience with water issues can make individuals more aware of water issues and water conservation. Interestingly, in this study, when experience with water issues increased, individuals tended to perform more water-consuming behaviors in all regions. This finding conflicted with the studies of Fielding et al. (2013) and Nieswiadomy (1992) but to a certain level resonated with Thøgersen's (2004) study that individuals' environmental responsible behaviors might be inconsistent with individuals' value to conserve environment. Note that in this study the water use behaviors listed were all water-consuming behaviors. Such a finding reflected a situation that the general public may have difficulty to relate their water use behaviors to their water issue experiences, or the general public may outvalue some other factors, such as time and effort, to their value to conserve water when making their water user behavior decision.

This study revealed that the levels of association between experience with water issues, negative water use behaviors, application of water conservation practices, and willingness to act differed by region. Such a finding implies individuals living in different regions may have different levels of awareness of how water can be conserved to protect water resources and alleviate water issues that influence their lives. Individuals with more water issue experience tended to conserve water to ensure their behaviors and experience are cognitively consonant (Festinger, 1957). Therefore, Extension educators can target cognitive dissonance existing between audiences'

experience and behaviors about water conservation to strengthen the effectiveness of the educational programs.

Additionally, this study showed findings similar to Haasnoot et al. (2011), Huang and Lamm (2015), and Laughlin et al. (2004), in that individuals tend to respond to issues with higher personal relevancy. For example, respondents in the Midwest and Northeast, who are known to be active in water sports and fishing, were more responsive to water quality issues in rivers, lakes, springs, and beaches, while respondents in the West who are known to be intensively influenced by drought were relatively more responsive to the water quantity issue. This study also revealed individuals were less likely to conserve water during routine household cleaning. Such a finding also resonates with Thøgersen's (2004) study and implies that individuals may see conserving water during routine household cleaning activities as behaviors with higher cost, such as labor.

Similar to Huang et al. (2016), more respondents applied water conservation practices related to personal hygiene, which are highly relevant to their daily life, than practices related to landscaping use and donation, which are less relevant to their daily life. Given the majority of respondents in all regions indicated they are willing to vote and support water conservation-related programs and candidates supporting water conservation, such a finding implies the general public may expect the involvement of authority in water conservation to make greater impact to the issue. Overall, the findings of this study revealed directions Extension educators can focus on to strengthen their efforts on water conservation.

Recommendations

Extension educators have taken various steps to ensure the impact of water conservation on the sustainability of water resources, such as providing face-to-face educational programs to audiences (e.g., workshops, site visiting), collaborating with local, state, and federal governments, and conducting research to optimize the effectiveness of educational or technical impact on the audiences and the environment (NIFA, 2016). This study provides insight into how national Extension should reframe existing or develop new water conservation educational programs with improved effectiveness and persuasiveness to audiences in different regions of the country.

Given that respondents of this study showed how personal relevancy of certain water issues, water use behaviors, and water conservation practice application may influence their responses by regions, Extension educators should be aware of such regional differences. When developing water conservation educational programs, the content should be relevant to local water issues, and recommendations of water conservation practices should be provided with the ones the audiences tend to adopt. For example, Extension educators serving in the South should draw audiences' attention to water conservation by initiating communication about drinking water quality issues and discussing household water use behaviors that may degrade water quality (e.g., allowing soapy water to run down a storm drain), as well as providing water conservation practices guides that are relevant and easy to adopt to alleviate the drinking water quality issue (e.g., to vote and support water conservation programs and water restrictions issued by local government and reduce fertilizer and pesticide uses for landscaping maintenance). Extension educators serving in the West should take a different route by initiating conversation about water scarcity in local water resources, discussing household water use behaviors that may increase water consumption (e.g., leaving the water running when washing dishes), and providing recommendations on water conservation practices to mitigate water shortage issues (e.g., to vote to support water conservation programs and only run the washing machine when it is full).

Extension educators should enhance audiences' awareness of how their water use behaviors and engagement in water conservation may influence water resources and their life. Extension educators in each region should be aware of how audiences in their region respond to their experience with water issues regarding their water conservation engagement. Although experience with water issues is suggested to be an effective trigger to encourage individuals' engagement in water conservation (Singletary & Daniels, 2004; Pratt & Bowman, 2008), audiences in different regions may respond to their water issue experience with different levels of water use and water conservation engagement and intention to conserve water. At program development stage, Extension educators should be aware if the references and recommendations are applicable and relevant to their region of service.

While Extension educators are aware of the regional differences in audiences' cognition and behavior regarding water conservation, Extension educators working with audiences at county or state levels are recommended to conduct similar studies on their local audiences to ensure the water conservation program can be developed tailored to audiences' need and interest. Future research is needed to verify how the effectiveness and impact of Extension water conservation programs are improved by implementing the recommendations of this study. By understanding audiences' cognition and behavior to develop water conservation educational program, increased public engagement in water conservation can be expected.

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