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Understanding Public Engagement in Water Conservation Behaviors and Knowledge of Water Policy: Promising Hints for Extension

Abstract

Sustaining water resources is a primary issue facing Florida Extension. The study reported here identified how experience with water issues and familiarity with water policies affected individuals' engagement in water conservation behaviors. A public opinion survey was conducted online to capture Florida residents' responses. The findings indicated experience with water issues and familiarity with water policies were predictors of individuals' engagement in civic water conservation behaviors. Given this, Extension educators developing programs and educational materials about water conservation behaviors should cover information related to water policies because participants will be more inclined to engage if they are familiar with policies.

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Introduction

Water issues have been widely studied and emphasized in Extension programming across the nation due to the increased water demand resulting from population growth (Vörösmarty, Green, Salisbury, & Lammers, 2000). Reported water issues include water pollution and contamination, water scarcity, degradation of water quality, waterlogging, and increased water salinity levels (Friedman, 2011). Personal experience with water issues has been shown to influence awareness, perceptions, and behaviors associated with water issues (Emmel, Parrott, & Beamish, 2003; Francis & Rothlisberger, 2006) because if someone has a negative experience they are more likely to take action (Huang & Lamm, 2014). Extension has used personal experience as a basis for program recruitment (Singletary & Daniels, 2004) and as a persuasive tool to facilitate participants' engagement in water-related programs to meet specific program goals for years (Emmel et al., 2003; Francis & Rothlisberger, 2006).

Extension also plays a role in public policy education (Schumacher & Lloyd, 1997). In cases where conflict surrounds water issues, Extension has been involved in educating the general public about associated policies to reduce public fear, enhance decision making, and strive to solve local problems (Terlizzi, 2006; Welch & Braunworth, 2010). Additionally, it has been encouraged in the

literature that Extension includes discussion around the government's role in programs associated with public policy (Vaughn, 1989). Understanding policies can influence an audience's motivations to engage in conservation behavior (Fischer & Bliss, 2008). Fischer and Bliss (2008) found an audience's behaviors may be inspired and promoted by policies through ethical and moral obligation, rewards, rule violations, and the need for autonomy and flexibility.

As Extension strives to educate the general public about the importance of water conservation, research exploring approaches to engagement in conservation efforts is essential to program planning. By understanding how water conservation behaviors can be predicted by both experience with water issues and knowledge of water policies, Extension can better develop educational programs for improved effectiveness.

Purpose and Objectives

The purpose of the study reported here was to identify how experience with water issues and familiarity with water policies affected individuals' engagement in water conservation behaviors. By examining these factors, the findings can be used by Extension educators to better target and develop their programs to encourage adoption of water conservation behaviors. The objectives were to:

1. Describe respondents' experiences with water issues, familiarity with water policies, and level of engagement in water conservation behaviors, and
2. Determine if experiences with water issues and familiarity with water policies predicted level of engagement in water conservation behaviors.

Methods

An online survey was conducted to capture Florida residents' water conservation behaviors, previous experiences with water issues, and familiarity with water policies. Despite an abundance of water resources in Florida, a growing population, prosperous tourism, and an active agricultural industry have led to increased pressure on water resources (Barnett, 2007; Marella, 2013). Therefore, Florida residents were chosen as the population of interest because of Florida's unique geographical location, water demand and supply, and associated water issues.

The instrument was researcher-developed but based on items from the 2012 RBC Canadian Water Attitudes Study (Patterson, 2012). Once created, the survey was reviewed by a panel of experts and pilot tested by 50 respondents representative of the target population. The University of Florida's Internal Review Board approved the study. Data were collected using a non-probability opt-in sampling method by collaborating with a public opinion survey research company. A participation rate of 96% was obtained, with 537 individuals entering the survey resulting in 516 useable responses. In order to enhance the representativeness of the results and overcome the limitations of non-probability sampling, post-stratification weighting methods were used (Baker et al., 2013; Kalton & Flores-Cervantes, 2003). Weighted demographics of the respondents can be viewed in Table 1.

Table 1.
Weighted Respondent
Demographics

Characteristic	%
<i>Sex</i>	
Male	48.9
Female	51.1
<i>Race</i>	
African American	17.0
Asian	3.0
Caucasian/White	77.1
Native American	0.2
<i>Hispanic Ethnicity</i>	22.5
<i>Age</i>	
19 and younger	1.3
20-29	12.8
30-39	12.2
40-49	14.2
50-59	13.5
60-69	11.1
70-79	7.4
80+	4.9

While part of a larger research project, the study reported here used five survey questions that were germane to examining the research objectives (Table 2). Respondents were asked to indicate their experience with five water issues; their level of familiarity with various water policies on a five-point Likert-type scale; and their likelihood of engaging in water conservation behaviors, including civic

behaviors, alternative landscaping practices, and willingness to take water conservation action, using five-point Likert-type scales. Details regarding the questions can be seen in Table 2. Frequencies of responses to each item were calculated using descriptive statistics.

An experience score was assigned to each participant by adding up the number of experiences they reported having in Question 1 (Table 2) and could range from a zero (indicating they had not experienced any issues) to a five (indicating they had experienced all five issues). Index scores were generated for the other variables of interest by averaging the responses within each construct so that each individual had an overall level of familiarity with various water policy score, a likelihood of engaging in civic behaviors score, a likelihood of engaging in alternative landscaping practices score, and a likeliness of being willing to take water conservation action score. Reliability of each index was calculated using Cronbach's alpha, and all were found to be reliable. Reliability coefficients are as follows: familiarity with water policies ($\alpha = .93$), likelihood of engaging in civic behaviors ($\alpha = .80$), likelihood of engaging in alternative landscaping practices ($\alpha = .80$), and likeliness of being willing to take water conservation action ($\alpha = .83$). The index scores were used for inferential data analysis.

Table 2.
Survey Question Descriptions

Survey Questions	Statements	Selection Items
Which, if any, of the following have you experienced within the past year? (Select all that apply).	A. Closed beaches due to red tide/poor water quality B. Closed springs, rivers, or lakes due to low water levels C. Closed springs, rivers, or lakes due to algae blooms D. Prohibitions on eating fish you have caught E. Poor quality of drinking water at home F. None of above	
Please indicate how likely or unlikely you are to participate in the following actions (civic behaviors)	A. Join a water conservation organization B. Volunteer for a stream clean up or wetland restoration event C. Vote for candidates who support	a. Very unlikely b. Unlikely c. Undecided d. Likely

	<p>water conservation</p> <p>D. Vote to support water conservation programs</p> <p>E. Visit springs, lakes, state parks, etc., to learn about water issues</p> <p>F. Support water restrictions issued by my local government</p>	<p>e. Very likely</p>
<p>Please indicate how likely or unlikely you are to participate in the following actions (landscaping behaviors)</p>	<p>A. Only water your lawn in the morning or evening</p> <p>B. Reduce the number of times a week you water your lawn</p> <p>C. Reduce use of fertilizer if your landscape quality would decrease</p> <p>D. Reduce use of pesticides if your landscape quality would decrease</p> <p>E. Reduce your use of natural resources</p>	<p>a. Very unlikely</p> <p>b. Unlikely</p> <p>c. Undecided</p> <p>d. Likely</p> <p>e. Very likely</p>
<p>I would be willing to take action to conserve water even if...</p>	<p>A. My lawn would be less green</p> <p>B. I would have to purchase new plants for my yard</p> <p>C. I would have to reduce the amount I water my lawn</p> <p>D. I would have to purchase water-efficient household utilities (e.g., dishwasher, shower head)</p> <p>E. Portions of my grass might die and need replacing</p>	<p>a. Very unwilling</p> <p>b. Unwilling</p> <p>c. Undecided</p> <p>d. Willing</p> <p>e. Very willing</p>

Descriptive and correlational statistics and multiple regression were used to analyze the data in

SPSS® 22. In the multiple regression models, respondents' experiences with water issues and familiarity with water policies were the independent variables, while civic behaviors, landscaping behaviors, and willingness to take water conservation action were the dependent variables.

Results

Experience with Water Issues

Respondents' experience with water issues were examined (Table 3). Almost 60% of the respondents indicated they had not experienced any of the listed water issues ($n = 303, 58.7\%$). Within the listed water issues, poor home drinking water quality received the most responses ($n = 105, 20.3\%$), followed by poor beach water quality ($n = 99, 19.2\%$).

Table 3.
Experience with Water Issues

	<i>f</i>	%
Poor quality of home drinking water	105	20.3
Poor water quality at closed beaches	99	19.2
Prohibition on eating caught fish	64	12.4
Algae blooms at closed springs, rivers, or lakes	61	11.8
Low water levels at closed springs, rivers, or lakes	40	7.8
<i>None of above</i>	<i>303</i>	<i>58.7</i>

Familiarity with Water Policies

Respondents indicated their familiarity with eight listed water policies (Table 4). Within the listed water policies, the Clean Water Act was the policy the most respondents indicated they were highly or extremely familiar with (24.1%), followed by the Everglades Restoration Plan (21.2%). However, more than half of the respondents indicated they were not at all or slightly familiar with all the listed water policies except the Clean Water Act. The mean index score of the eight familiarity with water policy items was 2.10 ($SD = .93$) indicating only a slight familiarity with water policies broadly.

Table 4.
Familiarity with Water Policies

Policies	Familiarity with Water Policies (%)				
	1	2	3	4	5

Clean Water Act	23.6	22.1	30.2	19.4	4.7
Everglades Restoration Plan	31.4	24.4	23.1	17.1	4.1
Air and Water Pollution Control Act	32.4	24.8	25.0	14.5	3.3
Florida Safe Drinking Water Act	38.4	20.2	25.2	12.8	3.5
The Water Quality Assurance Act	42.2	22.3	22.5	9.5	3.5
Florida Spring Initiative	51.7	19.4	17.8	9.5	1.6
Total Maximum Daily Loads	64.9	14.7	13.0	5.6	1.7
Basin Management Action Plans	64.5	16.3	13.2	4.8	1.2
Note. Scale: 1 = Not at All Familiar, 2 = Slightly Familiar, 3 = Fairly Familiar, 4 = Highly Familiar, 5 = Extremely Familiar.					

Engagement in Water Conservation Behaviors

The likelihood that respondents engaged in civic behaviors related to water conservation can be seen in Table 5. More than half of the respondents indicated they were likely or very likely to engage in civic behaviors, including "Support water restrictions issued by my local government" (n = 412, 79.9%), "Vote to support water conservation programs" (n = 406, 78.7%), and "Vote for candidates who support water conservation" (n = 356, 69.0%). The overall index score of the likelihood to engage in civic behaviors was 3.54 (SD = .77), indicating they were likely to engage in civic behaviors related to water conservation broadly.

Table 5.
Likelihood to Engage in Civic Behaviors Related to Water Conservation

Description Items	Likelihood to Engage in Civic Behaviors (%)				
	1	2	3	4	5
Support water restrictions issued by my local government	0.8	2.3	15.9	37.8	42.1
Vote to support water conservation programs	1.4	1.4	16.1	40.3	38.4
Vote for candidates who support water conservation	1.6	1.4	25.4	34.7	34.3
Visit springs, lakes, state parks, etc., to learn about water issues	6.0	17.8	27.9	25.4	20.0
Volunteer for a stream clean up or wetland restoration event	17.2	23.4	29.8	15.9	9.5

Join a water conservation organization	16.7	24.6	25.5	14.0	7.0
Note. Scale: 1 = Very Unlikely, 2 = Unlikely, 3 = Undecided, 4 = Likely, 5 = Very Likely.					

The likelihood of respondents engaged in alternative landscaping practices can be seen in Table 6. "Reduce your use of natural resources" (n = 353, 68.5%), "Only water your lawn in the morning or evening" (n = 322, 62.4%), and "Reduce the number of times a week you water your lawn" (n = 298, 57.7%) were the three alternative landscaping practices that received more than half of the responses as likely or very likely. The overall index score for the likelihood to engage in alternative landscaping practices was 4.16 (SD = .63) indicating respondents were likely to engage in alternative landscaping practices broadly.

Table 6.
Likelihood to Engage in Alternative Landscaping Practices

Description Items	Likelihood to Engage in Alternative Landscaping Practices (%)				
	1	2	3	4	5
Reduce your use of natural resources	1.2	5.4	21.3	35.7	32.8
Only water your lawn in the morning or evening	0.4	0.8	3.7	14.0	48.4
Reduce the number of times a week you water your lawn	1.0	1.6	6.4	15.3	42.4
Reduce use of fertilizer if your landscape quality would decrease	1.2	5.6	17.1	27.3	22.5
Reduce use of pesticides if your landscape quality would decrease	1.2	6.2	17.6	24.4	24.2
Note. Scale: 1 = Very Unlikely, 2 = Unlikely, 3 = Undecided, 4 = Likely, 5 = Very Likely.					

Last, the respondents were asked to indicate their willingness to engage in five water conservation actions (Table 7). Most respondents indicated they were willing or very willing to reduce the amount they water their lawns (n = 422, 81.7%), followed by willing or very willing to make their lawns less green (n = 357, 69.2%). "Portions of my grass might die and need replacing" was the only listed water conservation action that received less than half of the responses as willing or very willing to engage (n = 220, 42.6%). The index score averaged over the five water conservation actions was 3.54 (SD = .73), indicating respondents were willing to engage in water conservation actions broadly.

Table 7.

Willingness to Engage in Water Conservation Actions

Description Items	Willingness to Engage in Water Conservation Actions (%)				
	1	2	3	4	5
I would have to reduce the amount I water my lawn	1.0	3.1	14.1	58.3	23.4
My lawn would be less green	0.6	6.4	23.8	50.6	18.6
I would have to purchase water-efficient household utilities	3.9	6.8	25.8	44.8	18.8
I would have to purchase new plants for my yard	3.9	12.6	28.9	40.5	14.1
Portions of my grass might die and need replacing	7.6	16.7	33.1	30.4	12.2
Note. Scale: 1 = Very Unwilling, 2 = Unwilling, 3 = Undecided, 4 = Willing, 5 = Very Willing.					

Predicting Level of Engagement in Water Conservation Behaviors

Regression analysis was used to determine if engagement in water conservation behaviors was predicted by experiences with water issues and familiarity with water policies (Table 8). The results indicated respondents' experiences with water issues were significant predictors of civic water conservation behaviors ($\beta = .20, p = .00$) and willingness to conserve water ($\beta = .13, p = .00$), while familiarity with water policies was a significant predictor of civic water conservation behaviors ($\beta = .39, p = .00$), willingness to use alternative landscaping practices ($\beta = .23, p = .00$), and willingness to conserve water ($\beta = .15, p = .00$). However, the prediction of the engagement in water conservation behaviors using experience with water issues and familiarity with water policies was only meaningful for civic behaviors ($R^2 = .22$) rather than in alternative landscaping practices ($R^2 = .07$) and water conservation actions ($R^2 = .05$) due to the low effect sizes.

Table 8.

Water Conservation Behaviors Predicted by Experience with Water Issues and Familiarity with Water Policies

	Water Conservation Behaviors					
	Civic Behavior ($R^2 = .22$)		Alternative Landscaping Practice ($R^2 = .07$)		Willingness to Conserve Water ($R^2 = .05$)	
	β	p	β	p	β	p

Experiences with water issues	0.20	0.00	0.10	0.08	0.13	0.00
Familiarity with water policies	0.39	0.00	0.23	0.00	0.15	0.00

Conclusions, Implications, and Recommendations

The findings of the study reported here revealed that, in general, the respondents had limited experiences with water issues and a low level of familiarity with water policies, but were likely/willing to engage in water conservation behaviors. Respondents' limited familiarity with water policies implied a need for public water policy education, which Extension should provide.

In the study, the respondents were more likely/willing to engage in alternative landscaping practices than civic behaviors or water conservation actions that had a negative impact on either their landscape quality or required purchasing products such as new plant materials or water efficient utilities. These findings imply that respondents understand the importance of alternative landscaping as long as it does not cost them anything. Extension should focus on the importance of engaging in additional behaviors, such as voting for candidates who prioritize water conservation efforts or visiting local water sources to learn more about water and water issues. Perhaps Extension programs could be held in these locations. In addition, educators should consider finding sponsors who could donate, or support the purchasing of, low water consuming plants or water efficient utilities to alleviate the cost to the general public, because the financial aspect of water conservation was found to be a barrier to engagement in conservation actions.

The key finding from the study was that experience with water issues and familiarity with water policies were significant and effective predictors of engagement in civic water conservation behaviors. This finding aligns with Emmel et al.'s (2003), Francis and Rothlisberger's (2006), and Fischer and Bliss' (2008) studies that found experiences and knowledge of policies can be used to facilitate behavior change. Thus, Extension educators should include information about water policies in their educational programs to further develop public understanding, enhance the possibility for civic behavior change after program participation, and ensure programmatic impact. Furthermore, Extension should develop marketing materials focused on water conservation issues, including information about water policies to enhance people's awareness of water issues and connect people's lives with behavioral solutions to water issues.

In Florida, the abundance of water resources has led to a high amount of human activity being reliant on water. As a result, Extension has put a lot of emphasis on water conservation education in an effort to enhance the sustainability of water resources. The study reported here reinforced the need to enhance Florida residents' awareness of water issues and to improve their knowledge about water policies.

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