

6-1-2017

Understanding Residential Irrigation Users to Target Water Conservation Extension Programs

Laura A. Warner
University of Florida

Alexa J. Lamm
University of Florida

Recommended Citation

Warner, L. A., & Lamm, A. J. (2017). Understanding Residential Irrigation Users to Target Water Conservation Extension Programs. *Journal of Extension*, 55(3), Article 11.
<https://tigerprints.clemson.edu/joe/vol55/iss3/11>

This Research in Brief is brought to you for free and open access by TigerPrints. It has been accepted for inclusion in *Journal of Extension* by an authorized editor of TigerPrints. For more information, please contact kokeefe@clemson.edu.

Understanding Residential Irrigation Users to Target Water Conservation Extension Programs

Abstract

Water scarcity is one of the most important current issues, and Extension can play a role in helping people conserve water in the home landscape. Residential irrigation users make up an important target audience. The study reported here showed that residential irrigators are different from the general public in important ways. Home irrigation users value clean water more, value plentiful water less, and perceive stronger positive governmental support for water conservation. Extension professionals can target programs to this critical audience by partnering with governmental organizations and working to help home irrigation users understand the impacts of irrigation practices on both water quantity and water quality.

Laura A. Warner
Assistant Professor
University of Florida
Department of
Agricultural Education
and Communication
Gainesville, Florida
lsanagorski@ufl.edu

Alexa J. Lamm
Assistant Professor
University of Florida
Department of
Agricultural Education
and Communication
Gainesville, Florida
alamm@ufl.edu

Introduction

It is becoming increasingly necessary to conserve and protect Florida's water supply to meet growing domestic demands while supporting water requirements of agriculture, horticulture, tourism, industry, and natural systems (University of Florida Institute of Food and Agricultural Sciences, 2015). Water conservation is a fundamental way to mitigate increasing demands, and residential water use has been identified as an important area of focus for Extension (Huang & Lamm, 2015). The majority of household water use is applied as landscape irrigation and often can be reduced substantially without compromising landscape aesthetics (St. Hilaire et al., 2008; Warner, Lamm, Rumble, Martin, & Cantrell, 2016). Thus, Extension can play a key role in this complex issue by helping people adopt good irrigation practices and technologies (Huang & Lamm, 2015; Warner et al., 2016). Further, it is essential that Extension professionals who focus on water conservation target people who use residential landscape irrigation (Warner, Rumble, Martin, Lamm, & Cantrell, 2015). Targeting programs provides an opportunity to be "both cost-effective and results-effective" (Skelly, Hill, & Singletary, 2014, para. 2) in today's resource-stretched Extension environments.

It is important to understand unique characteristics of residential irrigation users as a target audience to successfully encourage adoption of technologies and practices that save water (Leal, Rumble, & Lamm, 2015). This target audience is relatively undefined, although it has been suggested that residential irrigation users differ from the general public (Warner et al., 2015). Because residential irrigation users have not been

adequately studied, research is needed to describe this group and guide targeted educational initiatives. Others have argued that the effort it takes to segment an audience and identify its members' needs is worthwhile (Brown & Bewsell, 2010). Therefore, we conducted a study to examine the unique needs of residential irrigation users by comparing them with the general public.

Purpose and Objectives

The purpose of our study was to understand how residential irrigation users differ from the general public so that Extension programs focused on water can be targeted to reach this audience, an audience known to use an excessive amount of water. The following objectives guided the study:

1. Describe demographic characteristics of residential irrigation users and the general public and each group's perceptions of the importance of clean and plentiful water and governmental influence on water conservation behaviors.
2. Determine whether differences in demographic characteristics, perceptions of the importance of clean and plentiful water, and perceptions of governmental influence on water conservation behaviors exist between residential irrigation users and the general public.

Methods

We used two web-based survey instruments to achieve the study objectives: a general public survey and a home irrigation user survey. We implemented the surveys twice (December 2014 and December 2015) to gather data across a 2-year span, thereby mitigating the impacts of external effect on response. We adapted survey questions originally used in the RBC Canadian Water Attitudes Study (Patterson, 2012), and questions were identical across the instruments. Both surveys were reviewed by a panel of experts to ensure external validity, and pilot testing with 50 respondents representative of the target populations was used for determining reliability of the adapted items prior to full data collection. All research protocols were approved by the University of Florida Institutional Review Board.

We collected data using nonprobability opt-in sampling methods in collaboration with a survey research company. The general public target audience comprised Florida residents over the age of 18 who were representative of the population. Prior to data analysis, we weighted the results according to 2010 U.S. Census data (Baker et al., 2013) using post-stratification methods (Kalton & Flores-Cervantes, 2003) to reduce error associated with nonprobability sampling. We obtained a total of 1,306 responses from the 1,489 surveys sent to the general public audience, resulting in a response rate of 88%. Additionally, we used five screening questions for identifying members of the residential irrigation user target audience to ensure that respondents were Florida residents over the age of 18 who had lawn or landscaping and an irrigation system they had control over. We obtained a total of 1,669 responses from the 2,827 surveys sent to target audience members, resulting in a response rate of 59%.

The variables of interest for the study included perceived importance of clean and plentiful water for various purposes, perceived governmental influence on engagement in water conservation behaviors, and demographics. We collected data identifying respondents' perceptions about importance of clean water and importance of plentiful water using two series of seven statements (Table 1); respondents indicated associated levels of importance on a 5-point Likert scale with the response options 1 = *not at all important*, 2 = *slightly*

important, 3 = *fairly important*, 4 = *highly important*, and 5 = *extremely important*. We averaged the responses to each set of seven items to create importance-of-clean-water and importance-of-plentiful-water index scores, both ranging from 1 (low importance) to 5 (high importance). We calculated Cronbach's alpha ex post facto to ensure reliability and found that the indexes were reliable across both audiences, with scores greater than .70.

Table 1.
 Statements Comprising Indexes Relating to Importance
 of Clean
 Water and Importance of Plentiful Water for Various
 Purposes

Index	Individual statement^a
Importance of clean water for various purposes	Clean lakes, springs, rivers
	Clean oceans
	Clean bays and estuaries
	Clean water for shellfishing
	Clean beaches
	Clean drinking water
	Clean groundwater
Importance of plentiful water for various purposes	Plentiful water for commerce/industry/power
	Plentiful water for household landscapes
	Plentiful water for golf courses
	Plentiful water for agriculture
	Plentiful water for recreation
	Plentiful water in aquifers, springs, rivers, and lakes
	Plentiful water for cities

^aTo address the statements in each index, respondents reacted to the stem "Please identify the level of importance you associate with each of the

following water-related items." Possible responses ranged from 1 (*not at all important*) to 5 (*extremely important*).

We collected data identifying respondents' perceptions of governmental influence on water conservation behaviors using two series of statements developed by Lavergne, Sharp, Pelletier, and Holtby (2010) (Table 2). We measured negative governmental influence using four items addressing whether respondents felt the government pressured them to partake in water conservation. We measured positive governmental influence using three items addressing whether respondents perceived that the government gave them the freedom to partake in water conservation. For both series of items, respondents indicated their level of agreement with each statement on a five-point Likert scale with the response options 1 = *strongly disagree*, 2 = *disagree*, 3 = *neither agree nor disagree*, 4 = *agree*, 5 = *strongly agree*. We averaged responses to both sets of items to create two indexes, one negative and one positive, ranging from 1 (low perceived influence) to 5 (high perceived influence). We calculated Cronbach's alpha ex post facto and found both indexes to be reliable across the two audiences, with scores greater than .80.

Table 2.
Statements Comprising Indexes Relating to Negative and Positive Governmental Influences

Index	Individual statement^a
Perception of negative governmental influence	I feel the government puts a lot of pressure on people to adopt environmentally-conscious behaviors.
	I feel the government imposes its environmental strategies on us.
	I feel that the government is trying to force me to adopt environmental behaviors.
	I feel the government wants to make me feel guilty when I do nothing for the environment.
Perception of positive governmental influence	I feel I have choice to use the strategies provided by the government in order to help the environment.
	I feel the government gives me the freedom to make my own decisions in regards to the environment.
	I feel I have the choice to participate in the environmental programs established by the government.

^aTo address the statements in each index, respondents reacted to the stem "Please indicate your level of agreement or disagreement with the following statements." Possible responses ranged from 1 (*strongly disagree*) to 5 (*strongly agree*).

We used SPSS 22 to analyze the results. We calculated frequencies and means for objective one. We used chi

square tests and analyses of variance for objective two to compare the groups for statistically significant differences, with a significance level of $p < .05$ established a priori.

Results

There were demographic similarities and differences between the general public and residential irrigation users (Table 3). One difference was that there were more homeowners among those who used irrigation. In addition, more residential irrigation users reported that they were governed by restrictions imposed by a homeowners' association (HOA). We did not find statistical differences related to sex or to the average number of years residents had lived in Florida, with residential irrigation users reporting an average tenure in Florida as 23.5 years and the general public 25.3 years. Irrigation users reported higher education levels overall.

Table 3.
Demographic Characteristics of Florida General Public and Florida Residential Irrigation Users

Characteristic	General public	Residential
	(<i>n</i> = 1,306)	irrigation users (<i>n</i> = 1,669)
	%	%
Sex		
Male	48.2	48.4
Female	51.8	51.6
Homeownership ^a **		
Own	54.7	86.6
Rent	38.9	12.4
Governed by rules of homeowners' association**	36.4	50.3
Highest level of education**		
Did not graduate	4.9	0.6
High school	24.7	12.5
Some college, no degree	28.6	23.5
2-year college degree	12.1	13.1
4-year college degree	21.6	32.4
Graduate or professional degree	8.1	17.9

^aHomeownership percentages do not sum to 100% because *other* was a possible option and was excluded from the data reported here.

** $p < .001$ based on Pearson chi-square test.

We found significant differences in perceptions about the importance of both clean and plentiful water for various purposes when we compared the two groups (Table 4). Florida residential irrigation users placed higher importance on clean water than the general public did. Conversely, the irrigation users placed lower importance on plentiful water than the general public did.

Table 4.

Comparison of Florida General Public and Florida Residential Irrigation Users Relative to Perceived Importance of Clean Water and Perceived Importance of Plentiful Water

Index	General public M (SD)	Residential irrigation users M (SD)	F	p
Importance of clean water for various purposes	4.42 (.67)	4.54 (.60)	26.982	< .001
Importance of plentiful water for various purposes	3.75 (.69)	3.68 (.68)	7.896	.005

Note. Possible range of 1 (*not at all important*) to 5 (*extremely important*).

Data analysis revealed that Florida's residential irrigation users perceived stronger positive governmental influence than the general public did (Table 5). The two groups perceived negative governmental influence equally.

Table 5.

Comparison of Florida General Public and Florida Residential Irrigation Users Relative to Perceived Governmental Influence

Index	General public M (SD)	Residential irrigation users M (SD)	F	p
Perception of positive governmental influence	3.44 (.78)	3.52 (.85)	6.76	.01
Perception of negative governmental influence	3.04 (.95)	2.99 (1.01)	1.78	.18

Note. Possible range of 1 (*low influence*) to 5 (*strong influence*).

Conclusions and Discussion

Residential irrigation users are an important target audience for Extension, and an awareness of the unique traits of such a target audience can empower Extension professionals to conduct effective programs that encourage behavior change and lead to water conservation (Warner et al., 2015). The results reported here suggest practical ways Extension can promote landscape water conservation behaviors on the basis of important audience characteristics. Extension professionals should use these findings to create more impactful

programs.

Overall, Florida residential irrigation users are more educated and are more likely to own homes governed by HOAs that detail how they must maintain their landscapes. Wentz, Rode, Li, Tellman, and Turner (2016) noted that landscape composition and water use behaviors are "increasingly intertwined with community associations" (p. 3373), and HOAs have great power to either promote or hinder water conservation. People tend to adhere to the social pressure to manage one's landscape according to perceived expectations (Larson & Brumand, 2014), and perhaps appealing to this group's adherence to social norms could affect their engagement in water conservation. Extension professionals should consider emphasizing the increased resale value or reduction in maintenance time associated with proper irrigation with this audience. In addition, getting neighbors together to discuss water conservation practices and encouraging HOA boards to promote or even enforce water conservation could be effective approaches with this target audience.

Compared to the general public, residential irrigation users place a higher level of importance on water quality and a lower level of importance on water quantity. One conclusion that can be drawn from this finding is that residential irrigation users rationalize their water use because they value their landscapes. By downplaying the importance of water quantity, they can justify their high use of water for maintaining their lawns, thereby reducing cognitive dissonance (Festinger, 1957). On the other hand, residential irrigation users may be placing a higher value on water quality because they perceive they have less personal influence on water quality issues. This finding is similar to reports that people do not feel connected to the management of their home landscape as it relates to water quality issues (Blaine, Clayton, Robbins, & Grewal, 2012). Extension can build on home irrigators' valuing of clean water by helping them understand how irrigation practices affect both water quantity and water quality. By assisting residents in making connections between their actions and both water issues, Extension professionals can have larger impacts on proper landscape management.

Because residential irrigation users perceived government influence positively, Extension professionals should consider partnering with local government agencies, including water management districts, in creating and disseminating messages about government programs that support water conservation efforts. Perhaps Extension professionals could serve as conduits for the distribution of information about incentive programs sponsored by government agencies and even build programs around new incentives that are being offered. Extension professionals also should consider having government officials known in their communities speak at programs or guest blog on their websites. In addition to Extension professionals who traditionally conduct urban water conservation programming, those in family and consumer sciences, 4-H, and community development should consider conducting more education on outdoor water use and conservation strategies.

Future Work

The results reported here revealed that residential irrigation users are different from the general public. Therefore, more research exploring these differences and capitalizing on residential irrigation users' specific needs should be conducted. Our study was specific to a state that places a high value on green landscapes, and a study exploring whether these effects are found across the United States could be useful.

The differences identified are relatively small, and we present these findings as a preliminary indication that there are important differences between the public and home irrigation users that can be used to guide impactful Extension programs. We note that the general public is a broad group that includes residential irrigators. For this reason, we believe that the differences we identified are very conservative and have greater

practical significance than we identified here. Future research should more closely examine the practical differences.

The recommendations previously suggested should be tested to determine whether residential irrigation users are responsive to them. For example, Extension could conduct programming with a water management district, distributing incentives on its behalf and tracking participants to find out whether more residential irrigation users are engaging in the program than were prior to Extension's involvement. Finally, qualitative research should be used to gain an in-depth perspective on what would incentivize residential irrigation users to reduce water use. The good news is that residential irrigation users' high education levels indicate that they value learning and would likely be interested in educational opportunities offered by Extension. Further, residential irrigation users feel water is important; therefore, opportunities abound for Extension to capitalize on this group's connections to water and further target programs to reduce pressure on this limited natural resource.

References

- Baker, R., Brick, J. M., Bates, N. A., Battaglia, M., Couper, M. P., Dever, J. A., . . . Tourangeau, R. (2013). *Report of the AAPOR task force on non-probability sampling*. Retrieved from <http://www.aapor.org/AM/Template.cfm?Section=Reports1&Template=/CM/ContentDisplay.cfm&ContentID=5963>
- Blaine, T. W., Clayton, S., Robbins, P., & Grewal, P. S. (2012). Homeowner attitudes and practices towards residential landscape management in Ohio, USA. *Environmental Management*, 50(2), 257–271.
- Brown, M., & Bewsell, D. (2010). Using a market segmentation approach to better target agricultural Extension programs—Aligning learner needs with learning programs. *Journal of Extension*, 48(5), Article 5FEA6. Available at: <http://www.joe.org/joe/2010october/a6.php>
- Festinger, L. (1957). *A theory of cognitive dissonance*. Evanston, IL: Row Peterson.
- Huang, P., & Lamm, A. J. (2015). Understanding public engagement in water conservation behaviors and knowledge of water policy: Promising hints for Extension. *Journal of Extension*, 53(6), Article 6RIB1. Available at: <http://www.joe.org/joe/2015december/rb1.php>
- Kalton, G., & Flores-Cervantes, I. (2003). Weighting methods. *Journal of Official Statistics*, 19(2), 81–97.
- Larson, K. L., & Brumand, J. (2014). Paradoxes in landscape management and water conservation: Examining neighborhood norms and institutional forces. *Cities and the Environment*, 7(1), Article 6. Retrieved from <http://digitalcommons.lmu.edu/cate/vol7/iss1/6>
- Lavergne, K. J., Sharp, E. C., Pelletier, L. G., & Holtby, A. (2010). The role of perceived government style in the facilitation of self-determined and non-self-determined motivation for pro-environmental behavior. *Journal of Environmental Psychology*, 30(2), 169–177. doi:10.1016/j.jenvp.2009.11.002
- Leal, A., Rumble, J., & Lamm, A. J. (2015). Setting the agenda: Exploring Floridians' perceptions of water quality and quantity issues. *Journal of Applied Communications*, 99(3), 53–67. Retrieved from http://journalofappliedcommunications.org/images/stories/issues/2015/jac_v99_n3_article4.pdf
- Patterson, L. (2012). *2012 RBC Canadian water attitudes study*. RBC Blue Water Project. Retrieved from

<http://www.rbc.com/community-sustainability/environment/rbc-blue-water/index.html>

Skelly, J., Hill, G., & Singletary, L. (2014). Probing needs assessment data in depth to target programs more effectively. *Journal of Extension*, 52(2), Article 2RIB1. Available at: <http://www.joe.org/joe/2014april/rb1.php>

St. Hilaire, R., Arnold, M. A., Devitt, D. A., Hurd, B. H., Lesikar, B. J., Lohr, V. I., . . . Zoldoske, D. F. (2008). Efficient water use in residential urban landscapes. *HortScience*, 43(7), 2081–2092.

University of Florida Institute of Food and Agricultural Sciences. (2015). *Enhancing and protecting water quality, quantity, and supply*. Retrieved from extadmin.ifas.ufl.edu/roadmap

Warner, L. A., Lamm, A. J., Rumble, J. N., Martin, E., & Cantrell, R. A. (2016). Classifying residents who use landscape irrigation: Implications for encouraging water conservation behavior. *Environmental Management*. Advance online publication. doi:10.1007/s00267-016-0706-2

Warner, L. A., Rumble, J. N., Martin, E., Lamm, A. J., & Cantrell, R. A. (2015). The effect of strategic message selection on residents' intent to conserve water in the landscape. *Journal of Agricultural Education*, 56(4), 59–74. doi:10.5032/jae.2015.04059

Wentz, E. A., Rode, S., Li, X., Tellman, E. M., & Turner, B. L. II (2016). Impact of homeowner association (HOA) landscaping guidelines on residential water use. *Water Resources Research*, 52(5), 3373–3386. doi:10.1002/2015WR018238.

Copyright © by Extension Journal, Inc. ISSN 1077-5315. Articles appearing in the Journal become the property of the Journal. Single copies of articles may be reproduced in electronic or print form for use in educational or training activities. Inclusion of articles in other publications, electronic sources, or systematic large-scale distribution may be done only with prior electronic or written permission of the *Journal Editorial Office*, joe-ed@joe.org.

If you have difficulties viewing or printing this page, please contact [JOE Technical Support](#)