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Using Perceived Differences in Views of Agricultural Water Use to Inform Practice

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Abstract

Water use has become increasingly contentious as the population grows and water resources become scarcer. Recent media coverage of agricultural water use has brought negative attention potentially influencing public and decision makers' attitudes towards agriculture. Negative perceptions could result in uninformed decisions being made that impact the agricultural industry such as increased regulation and decreased permitting. Without adequate water resources the agricultural industry will be unable to enhance or even sustain current production. This study uses knowledge gap theory to identify and compare public and local decision makers' attitudes towards and perceptions of agricultural water use to inform educational programs and communication approaches that could assist in educating and informing about agricultural water use. The findings revealed the public had a positive attitude towards agricultural water use, which significantly differs from decision makers, who were neutral. The public is also more interested in learning about water issues, while decision makers appear to be more apathetic. The findings imply there is a need for education and communication in this realm, particularly with decision makers that are working closely with water authorities in driving water policy.

Keywords: agricultural water use; decision makers; public opinion; knowledge gap

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Introduction

"The mass media plays a major role in shaping America's agenda" (Whitaker & Dyer, 2000, p. 125). According to Kingdon (2003), the media drives the importance of an issue by highlighting specific events while downplaying those of equal importance. Therefore, media coverage, such as the LA Times stating, 708 gallons of water were used to make this plate (Kim, Schleuss & Krishnakumar, 2015) and radio personalities on KFI AM 640 (the most listened to talk radio program in the United States including approximately 1.2 million weekly listeners) touting the farming industry is using 80 percent of the water and they're 2 percent of the economy, justify that! (Kobylt, 2015) is bringing agricultural water use under public scrutiny. While these media statements refer to the battle over water in California as it faces extreme drought and the media wrestles with arguments both for and against agricultural water use, other states are facing a similar future. In Florida, where there is a perceived abundance of freshwater resources, "high levels of

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commercial, real estate, and agricultural development have caused withdraws to increase over time, putting pressure on natural resources" (Odera, Lamm, Dukes, Irani, & Carter, 2013, p. 4).

The United States Geological Survey (USGS, 2010) identified that between 1970 and 2000 withdrawals from freshwater sources in Florida increased from 5.6 billion gallons per day (bgd) to 8.2 bgd. Then, from 2000 to 2010 water use decreased to 6.3 bgd (USGS, 2010) indicating the state's agricultural sector is taking action to preserve water from a myriad of fronts. One way this has been accomplished is through the adoption of best management irrigation practices ensuring only the minimal amount of water needed for crops is applied (Schaible & Aillery, 2012).

However, there is a widespread public lack of knowledge regarding water quantity and quality issues (Gorham, Lamm, & Rumble, 2014; Lamm, Lamm, & Carter, 2015; Leal, Rumble, & Lamm, 2015), which only serves to foster biased perceptions of water use (Huang & Lamm, 2015b). Agricultural settings are often targeted because the general public associates agriculture with large-scale water use due to societal perceptions and media portrayal of industrial agriculture (Whitaker & Dyer, 2000; Gaines, 2014). As a result of media coverage, decision makers may believe their constituents feel a certain way, when in reality they may not hold the strong views suspected.

It is important for decision makers, both elected officials and non-elected personnel, to understand and have a high sense of knowledge when it comes to agricultural water use (Molden, 2007), as they "represent the structure in which water related views and conversation occurs" (Lamm et al., 2015, p. 237). Local decision makers in particular are central to the monitoring and regulation of water related policies (Molden, 2007) working hand in hand with the state's five water management districts under the Florida Department of Environmental Protection (DEP). This is no simple task given there were over 115 rules regulating water issues managed by the DEP (Florida Department of Environmental Protection, 2014).

In order to avoid future water conflicts, water concerns need to be understood and recognized by all interest groups including the general public and decision makers (Warner, Rumble, Martin, Lamm, & Cantrell, 2015; Young & Dhanda, 2013). These groups must understand one another and work together if society wants to develop and implement sustainable solutions to the widespread water problems that are increasing over time (Huang & Lamm, 2015a; Odera et al., 2013). Therefore, research designed to understand how both the general public and decision makers perceive agricultural water use, and how the two differ, can offer many insights for agricultural educators and aligns with priority one of the National Research Agenda: American Association for Agricultural Education 2011 – 2015 (Doerfert, 2011). By identifying similarities and differences between the general public and decision makers, agricultural educators and communicators will begin to identify ways in which to resolve potential issues through improved education, communication and messaging designed for both groups.

Theoretical Framework

The study presented here was based on knowledge gap theory proposed by Tichenor, Donohue, and Olien (1970). Knowledge gap theory posits there are two groups when it comes to understanding social, political, or other publically relevant content: a group with higher levels of knowledge and a group with lower levels of knowledge. The theory assumes that as a topic is given more exposure, those parts of the population with higher socio-economic status (SES) will acquire information at a faster rate than the lower SES population (Tichenor et al., 1970).

Historically, the groups were found to be divided based on SES and levels of education (those with higher knowledge levels had higher levels of education). Further research to explain knowledge gap theory has also examined motivational factors. For example, a person's behavioral involvement with an issue (political campaign involvement, interpersonal communication, and

attending lectures) has demonstrated a strong relationship to knowledge acquisition (Kwak, 1999). In the motivation-contingency model theory, it is expected that if one's motivation level is high, the effect of education on knowledge acquisition will be cancelled out; thereby resulting in a small knowledge gap between high and low SES groups among highly motivated people (Kwak, 1999). For example, in Ettema and Kline's study (1977), it was suggested that when the low SES group's motivation was higher than that of the high SES group, there was a reversed knowledge gap.

In general, individuals belonging to a group that holds higher positions of status in society benefit from greater access to educational materials and social resources (Kraus & Callaghan, 2014). High status individuals also tend to hold public office more than their low status counterparts and state legislators tend to be far more educated than their constituents (Domhoff, 2014) This level of higher education indicates an expanded and more differentiated life space, including a greater number of reference groups, more interest in, and awareness of science and other public issues, and more exposure to content in these areas (Tichenor et al., 1970).

Based on previous research, knowledge gaps between the general public and decision makers related to their knowledge of and perceptions of agricultural water use should exist. These gaps should be attributed to decision makers having a higher level of behavioral involvement with water due to their higher social status, higher level of education, and unique access to information needed to make decisions within their communities (Kwak, 1999). Specifically, decision makers are expected to have a higher level of involvement due to their unique access to decision-making power on matters related to environmental policy (Domhoff, 2014). Higher levels of involvement should therefore lead to more knowledge related to water issues (Tichenor et al., 1970).

Purpose and Research Objectives

The purpose of this study was to examine whether the general public and decision makers differed in their perceptions regarding agricultural water use. The study was driven by the following research objectives:

1. Describe the general public and decision makers' attitude towards and perceptions of agricultural water use.
2. Determine if differences in attitude towards and perceptions of agricultural water use exist between the general public and decision makers.
3. Describe the general public and decision makers' preferred ways of learning about agricultural water use.

Methods

An online survey research design was employed to reach the objectives of the study. The population of interest was Florida residents age 18 or older and local decision makers in Florida consisting of county commissioners, county clerks, county managers and city mayors. The survey instrument was based on the 2012 RBC Canadian Water Attitudes Study (Patterson, 2012). The original instrument was adapted to fit the state audience and researcher-developed questions specific to agricultural water use were added. Given this research was part of a larger study, five sections of the survey instrument were germane to the findings: attitude towards agricultural water use, perceptions of agricultural water use, preferred subject matter learning areas, preferred learning ways of learning and demographics.

Prior to disbursement, a panel of experts that included faculty and members of the agricultural industry involved in water quality and quantity issues, agricultural water issues, and public opinion research reviewed the survey instrument. The panel included the Associate Director of the UF/IFAS Center for Public Issues Education, the Associate Director of the Office of

Agriculture Water Policy at the Florida Department of Agriculture and Consumer Services, the Director of Government and Community Affairs at the Florida Farm Bureau, the Chief Executive Officer at the Florida Dairy Farmers Association, and an evaluation specialist with knowledge in survey design and construction. Once the instrument was finalized, approval from the University of Florida institutional review board was obtained.

A public opinion survey research company, Qualtrics, was consulted to obtain an opt-in non-probability based sample. Qualtrics sent a link allowing access to the developed survey to Florida residents representative of the state population based on the 2010 Census data. An initial pilot test of 50 respondents was conducted and the pilot data for the scales was analyzed to ensure reliability. All of the scales were found to be reliable with a Cronbach's $\alpha > .70$. Therefore, no changes were made to the instrument.

Qualtrics sent the survey link to a total of 582 residents. A response rate of 89% ($N = 525$) was obtained. Potential exclusion, selection, and non-participation biases can limit the use of non-probability samples (Baker et al., 2013). To alleviate the impacts of exclusion, selection and bias weighting procedures were implemented prior to data analysis (Baker et al., 2013). More specifically, post-stratification weighting methods were executed (Kalton & Flores-Cervantes, 2003). Demographics were used to balance the results to ensure the composition of the sample reflected the adult Florida population and to provide results intended to approximate the population of interest.

The survey was also sent to county level decision makers in Florida. A list of email addresses for all county commissioners, county clerks, and county managers ($N = 1,212$) was obtained through an online search. Some counties did not have email addresses readily available and therefore were excluded from participation. The researcher requesting participation in the study sent a link to the survey via email. Three reminders were sent over three weeks with 194 responses received resulting in a response rate of 16%. To account for nonresponse bias, the respondents were compared to the entire population using a series of Chi-square tests based on the sex, political affiliation and geographic location. The results were non-significant based on an alpha level of less than .05 set *a priori* and the sample deemed to be representative of the population of interest. Descriptive statistics and ANOVAs were calculated using the Statistical Package for the Social Sciences (SPSS) to address the research objectives.

To understand attitude and perceptions of agricultural water use, respondents were given the sentence "When it comes to protecting water in Florida, farmers are…" and asked to select where, on a five-point scale between two words, their attitude most closely aligned. This question was conducted in a semantic differential format, with two opposing words displayed from left to right. The word pairings were good/bad, positive/negative, careful/careless, thoughtful/thoughtless, and cautious/reckless, innovative/old-fashioned. A score of one indicated a negative attitude and a five indicated a positive attitude.

To further determine if differences in attitudes towards perceptions of agricultural water use existed between the general public and decision makers a researcher-developed scale was created. The scale requested respondents indicate their level of agreement or disagreement to a variety of questions about farmers and farming practices. Key concepts examined included: trust in water use and protection, use of resources, relationship with the natural environment – positive frame, relationship with the natural environment – negative frame, and impact of agriculture on open space and wildlife. Respondents were asked to indicate their response to each item using a 5-point Likert-type scale. Possible answers included 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neither Agree nor Disagree*, 4 = *Agree*, 5 = *Strongly Agree*.

An example of the four statements making up the trust in water use and protection concept area was "farmers can be relied upon to keep their promises when it comes to water use." Responses

to the four items were averaged to create the scale and checked for reliability *ex post facto*. The scale was found to be reliable with a Cronbach's α of .73.

Three statements made up the use of resources concept area. An example of a statement from this concept area was "farmers should use as little fertilizer as absolutely necessary even if it means I have to pay more for the food I purchase." Responses to the three items were averaged to create the scale and checked for reliability *ex post facto*. The scale was found to be reliable with a Cronbach's α of .85.

An example of the five statements making up the relationship with the natural environment – positive frame concept area was "farmers conserve water." Responses to the five items were averaged to create the scale and checked for reliability *ex post facto*. The scale was found to be reliable with a Cronbach's α of .84.

Five statements made up the relationship with the natural environment – negative frame concept area. An example of a statement from this concept area was "fertilizers used on farms pollute natural water sources." Responses to the five items were averaged to create the scale and checked for reliability *ex post facto*. The scale was found to be reliable with a Cronbach's α of .85.

An example of the seven statements making up the relationship with the impact of agriculture on open space and wildlife concept area was "protecting farms is a way to preserve open space." Responses to the seven items were averaged to create the scale and checked for reliability *ex post facto*. The scale was found to be reliable with a Cronbach's α of .81.

Finally, respondents were asked about the water topics they were most interested in learning about and their preferred methods for learning about water topics. First, both groups were provided with a list of water-related topics such as restoring fish and aquatic habitats, shoreline cleanup, and irrigation management. Respondents were asked to indicate any of the subject matter areas they were interested in learning more about.

Next, both groups were given a list of learning opportunities they would be interested in engaging in and allowed to select all that applied. The list included getting trained for a regular volunteer position, attending a seminar or conference, attending a fair or festival, taking part in a one-time volunteer activity, attending a short course or workshop, looking at a demonstration or display, reading a newspaper article or series, watching a video, watching TV coverage, or visiting a website.

Results were exported and analyzed using SPSS version 22. Descriptive statistics were calculated to determine the attitude and perception of agriculture water use of the general public and decision makers and ANOVAs were used to examine if differences were statistically significant with an *a priori* alpha level set at .05.

Results

Demographics

Respondents to the general public survey were fairly evenly split in terms of gender, were primarily Caucasian/White (Non–Hispanic) with 17% reporting they were Hispanic (see Table 1). Most of the respondents were over 40 years of age and an almost equal proportion of respondents had lived in the state for 0 - 9 years (21.9%), 10 - 19 years (25%), 20 - 29 years (25.3%), and 30 or more years (27.8%).

Respondents to the decision makers survey were also primarily Caucasian/White (Non-Hispanic) but 70% were male. A little over 5% of this group reported being Hispanic. Over 90% of the respondents were between the ages of 40 and 69 and unlike the general public respondents, the majority had lived in Florida for 30 or more years (67.5%).

Table 1

Demographics

	General Public		Decision Makers	
	n	*%*	*n*	*%*
Sex				
Female	271	51.6	28	29.8
Male	254	48.4	66	70.2
Race				
African American	83	15.8	5	5.4
Asian	34	6.5	0	0
Caucasian/White (Non–Hispanic)	397	75.6	83	89.2
Native American	0	0	3	3.2
Other	11	2.1	2	2.2
Hispanic Ethnicity	89	17.0	5	5.4
Age				
18 - 29	112	21.5	1	.60
30-39	89	17.0	10	6.0
40-49	81	15.5	32	19.3
50-59	107	20.5	48	28.9
60-69	95	18.2	49	29.5
70-79	31	5.9	23	13.9
80 and older	7	1.3	3	1.8
Years Living in Florida				
0-9	115	21.9	11	6.5
10-19	131	25.0	22	13.0
20-29	133	25.3	22	13.0
30 and above	146	27.8	114	67.5

Note. Percentages have been rounded and may not total to 100.

Attitude towards and perceptions of agricultural water use

On average, the general public had a more positive perception of agricultural water use than the decision makers (see Table 2). When looking at attitude, the general public indicated a positive attitude while decision makers indicated a neutral attitude with the difference between them being larger than a standard deviation. Both the general public and decision makers agreed agriculture uses water resources appropriately and that agriculture has a positive impact on open space and wildlife.

Table 2

Attitudes Towards and Perceptions of Agricultural Water Use

	General Public *M (SD)*	Decision Makers *M (SD)*	Mean Difference
Attitude towards agricultural water use[a]	4.28 (.83)	3.30 (91)	.98
Trust in agricultural water use and protection[b]	3.69 (.66)	3.20 (.74)	.49
Agriculture's relationship with the natural environment – positive frame[b]	3.80 (.67)	3.37 (.71)	.43
Agricultural use of resources[b]	3.82 (.89)	3.75 (.95)	.07
Impact of agriculture on open space and wildlife[b]	3.75 (64)	3.71 (.58)	.04
Agriculture's relationship with the natural environment – negative frame[b]	3.50 (.76)	3.56 (.75)	-.06

Note. [a]Semantic differential scale ranged from 1 – *Negative* to 5 – *Positive;* [b]Scale: 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neither Agree nor Disagree*, 4 = *Agree*, 5 = *Strongly Agree*.

Differences in attitude towards and perceptions of agricultural water use

A series of ANOVAs were run to determine if statistically significant differences existed between the general public and decision makers (see Table 3). There were significant differences in their attitudes, with the general public having a stronger positive attitude than decision makers about agricultural water use. There were also significant differences in trust in the agricultural industry when it comes to water use and protection, with the public exhibiting a higher level of agreement than the decision makers. Lastly, the general public also had significantly higher levels of agreement with statements indicating agriculture has a positive relationship with the natural environment.

Table 3

ANOVA Examining Differences Between the General Public and Decision Makers Perceptions of Agricultural Water Use

	df	*F*	*ρ*
Attitude towards agricultural water use	1	164.59	.00**
Trust in agricultural water use and protection	1	69.58	.00**
Agriculture's relationship with the natural environment – positive frame	1	54.76	.00**
Agricultural use of resources	1	.81	.37
Impact of agriculture on open space and wildlife	1	.51	.47
Agriculture's relationship with the natural environment – negative frame	1	.65	.42

Note. $^{**}p < .01$.

Learning preferences

Respondents were asked what water subjects they would be most interested in learning more about. Results can be seen in Table 4. In both surveys they were able to select all that apply. Overall, the general public showed more interest in learning about water issues than the decision makers. The general public was most interested in fertilizer and pesticide management, fish and wildlife water needs, shoreline cleanup, and home and garden landscaping ideas for Florida yards. The decision makers were most interested in community actions concerning water issues and home and garden landscaping ideas for Florida yards.

Table 4

Preferred Water Subject Matter Areas

	General Public (N = 524) %	Decision Makers (N = 194) %
Fertilizer and pesticide management	39.0	17.5
Fish and wildlife water needs	36.2	13.4
Shoreline cleanup	34.9	17.5
Home and garden landscaping ideas for Florida yards	33.2	21.1
Restoring fish and aquatic habitat	31.3	17.5
Watershed restoration	28.4	14.9
Community actions concerning water issues	28.3	23.2
Irrigation management	25.7	13.9
Septic system management	20.9	18.6
Forest management	20.1	2.6
Private well protection	16.9	11.3
Landscape buffers	16.4	13.9

A summary of how respondents would like to learn about water issues is displayed in Table 5. Overall, the general public would like to learn through visiting a website (75%), watching TV coverage (51%), or watching a video (36%). Decision makers would like to learn through visiting a website (34%), reading a newspaper article or series (23%), attending a short course or workshop (19%) or attending a seminar or conference (19%).

Table 5

Preferred Ways of Learning About Agricultural Water Use

	General Public (N = 524) %	Decision Makers (N = 194) %
Visit a Website	75.7	34.0
Watch TV coverage	50.6	13.9
Watch a video	36.2	14.4
Read a newspaper article or series	33.6	23.2
Look at a demonstration or display	19.7	14.4
Attend a short course or workshop	14.3	19.1
Take part in a one-time volunteer activity	13.9	11.3
Attend a fair or festival	12.0	10.3
Attend a seminar or conference	9.8	18.6
Get trained for a regular volunteer position	7.6	2.1

Conclusions, Implications and Recommendations

The results of this study identified differences in perceptions of agricultural water use between decision makers and the general public exist. Prior to providing recommendations based on the results, it is important to recognize the limitations of this research. First, the study was limited due to the relatively small number of decision maker participants. Statistical tests were performed to determine whether the decision maker respondents were typical of the larger population, and they were found to be so, but only in select demographic characteristics. A second potential limitation was the use of a non-probability sample. While weighting techniques were applied to alleviate concern, the relationship between the sample and the population was unknown. Therefore, it is unclear how representative the sample was of the population as a whole.

The limitations being acknowledged, there are implications emerging from the data that can inform agricultural education and communication practice. According to knowledge gap theory, groups tend to coalesce according to identifiable antecedent conditions. Within this particular research it was expected that the public might have differing views of agricultural water use relative to decision makers surveyed within the same state based on the role condition of the two groups. Specifically, based on decision makers expected increase in media consumption relative to the general public, decision makers should have a different view of agricultural water use than the general public. Accordingly, it was hypothesized that the tone and tenor of media may serve as a benchmark for the directionality of the difference between the two groups (Kingdon, 2003). The findings from this study confirmed that decision makers had a significantly less positive attitude towards agricultural water use than the general public. Although beyond the scope of this particular research, anecdotal examples of negative perceptions of agricultural water use in the media are readily available (e.g. Kim et al., 2015; Kobylt, 2015) whereas positive media examples are less common (Young & Dhanda, 2013). The exposure to more media, and the nature of the news within the media surrounding agricultural water use, may serve as a likely condition for the differences being observed between these two groups.

Future research should further explore the nature of the relationships between media consumption, tone of media stories, and outcomes within an audience. For example, a longitudinal study could examine a stated belief about agricultural water use at time zero, be followed by the consumption of media (including media source and tone), and then a restatement of belief measured at a future point in time to determine if the media had an impact. Recent research examining priming and emotional contagion within a large social network has demonstrated the efficacy of message salience and persistence (Kramer, Guillory, & Hancock, 2014). A more comprehensive understanding of how media influences perceptions and attitudes of agricultural water use would benefit agricultural educators and communicators and may further illuminate best practices and approaches.

According to Young and Dhanda (2013), water concerns must be understood by both the general public and decision makers to avoid future water conflicts. The results of this study indicated that decision makers might be representing views and subsequently supporting policies that their constituents do not back. A more proactive messaging approach on behalf of the agricultural industry may assist in bridging the gap between these two groups. It is recommended that agricultural educators and communicators use interventions to improve both groups understanding of agricultural water use (Hahn, Greene, & Waterman, 1994), how the use of best management practices protect natural resources, and to encourage and empower the general public to express their perspectives with decision makers proactively (Anderson, 2011). This recommendation is directly aligned with priority one of the National Research Agenda: American Association for Agricultural Education 2011 – 2015 (Doerfert, 2011) with the research confirming the need for more education in this area to enhance understanding that could assist the agricultural industry while protecting natural resources.

The results of this study may also be used to inform the operational and tactical educational content areas and delivery channels most effective for informing and empowering the general public and decision makers. For example, to inform both groups on current agriculture water use a website was identified as the preferred educational channel. However, there were different content preferences identified between the two groups. In particular, the general public had the highest interest in fertilizer and pesticide management whereas decision makers were most interested in community actions concerning water issues. A recommendation for practice would be to establish a common website advertised and available to both groups; however, the content for the website should be very specific within discrete categories. Within the environment a high degree of inter-topic fidelity and navigability should be purposively built to allow the user to begin on one topic of interest and then naturally move to other topics within different areas of interest. The stickiness of the website should naturally lend itself to knowledge exposure and improved understanding across a wider variety of agricultural water topics (Lin, 2007).

A further recommendation would be to develop educational workshops bringing members of the public and decision makers together to discuss water issues. These workshops could be facilitated by extension professionals in their communities and would provide an opportunity and forum for perspectives and beliefs to be discussed within a fact-based environment. Creating a common environment would allow for more effective communication where perceptions might be challenged through credible sources mitigating the potential knowledge and perception gap between the two groups (Hahn et al., 1994).

Lastly, future research is suggested to replicate this study within different states or with a larger decision maker sample. A more robust set of empirical studies may help to further illuminate the differences between decision makers and the general public regarding key agricultural issues such as water. Nevertheless, the results of this study should serve as a benchmark and starting point to help identify similarities and differences between the general public and decision makers, providing agricultural educators and communicators with important insights to resolve issues

through improved education, communication and messaging designed for both groups (Doerfert, 2011).

References

Anderson, J. E. (2011). *Public policymaking* (7th ed.). Boston, MA: Cengage Learning.

Baker, R., Brick, J. M., Bates, N. A., Battaglia, M., Couper, M. P., Dever, J. A., et al. (2013). *Report of the AAPOR task force on non-probability sampling.* American Association for Public Opinion Research. Retrieved at http://www.aapor.org/AM/Template.cfm?Section=Reports1&Template=/CM/ContentDisplay.cfm&ContentID=5963

Doerfert, D. (2011). *National research agenda for agricultural education, 2011-2015.* American Association of Agricultural Education.

Domhoff, G. W. (2014). *Who rules america? The triumph of the corporate rich* (7th ed.).New York: McGraw-Hill.

Ettema, J., & Kline, F. (1977). Deicits, differences, and ceilings: Contingent conditions for understanding the knowledge gap. *Communication Research , 4*(2), 179-202.

Florida Department of Environmental Protection. (2014). *Water rules by program area.* Retrieved from http://www.dep.state.fl.us/water/rulesprog.htm#gw

Gaines, E. (2014). Media representations of science, and implications for neuroscience and semiotics. *Semiotica, 200*, 103-117. Doi:10.1515/sem-2014-0011

Gorham, L., Lamm, A. J., & Rumble, J. (2014). The critical target audience: Communicating water conservation behaviors to critical thinking styles. *Journal of Applied Communications, 98*(4), 42-55.

Hahn, A. J., Greene, J. C., & Waterman, C. (1994). *Educating about public issues. Lessons from eleven innovative public policy education projects*. Ithaca, NY: Cornell University.

Huang, P., & Lamm, A. J. (2015a). Impact of experience and participation in Extension programming on perceptions of water quality issues. *Journal of International Agricultural and Extension Education, 22*(3). Doi:10.5191/jiaee.2015.22303

Huang, P., & Lamm, A. J. (2015b). Understanding public engagement in water conservation behaviors and knowledge of water policy: Promising hints for Extension. *Journal of Extension, 53*(6). Retrieved from http://www.joe.org/joe/2015december/rb1.php

Kalton, G., & Flores-Cervantes, I. (2003). Weighting methods. *Journal of Official Statistics, 19(*2), 81-97.

Kim, K., Schluess, J., & Krishnakumar, P. (2015). *708 gallons of water were used to make this plate.* Los Angeles Times. Retrieved from http://graphics.latimes.com/food-water-footprint/

Kingdon, J. W. (2003). *Agendas, alternative, and public policies.* New York: Longman.

Kobylt, J. (2015). *Personal communication on the KFI Radio show.* Retrieved from http://www.cnbc.com/2015/04/15/california-drought-farmers-under-attack-for-heavy-water-use.html

Kramer, A. D., Guillory, J. E., & Hancock, J. T. (2014). Experimental evidence of massive-scale emotional contagion through social networks. *Proceedings of the National Academy of Sciences*, *111*(24), 8788-8790.

Kraus, M. W., & Callaghan B. (2014). Noblesse oblige? Social status and economic inequality maintenance among politicians. *PLoS ONE, 9*(1): e85293. Doi: 10.1371/journal.pone.0085293

Kwak, N. (1999). Revisiting the knowledge gap hypothesis: Education, motivation, and media use. *Communication Research, 26*(4), 385-413. Doi:10.1177/009365099026004002

Lamm, K. W., Lamm, A. J., & Carter, H. (2015). Bridging water issue knowledge gaps between the general public and opinion leaders. *Journal of Agricultural Education, 56*(3), 146-161. DOI: 10.5032/jae.2015.03146

Leal, A., Rumble, J., & Lamm, A. J. (2015). Setting the agenda: Exploring Floridian's 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

Lin, J. C. C. (2007). Online stickiness: its antecedents and effect on purchasing intention. *Behaviour & Information Technology*, *26*(6), 507-516.

Molden, D. (Ed.). (2007). *Water for food, water for life: A comprehensive assessment of water management in agriculture*. Sterling, VA: Earthscan.

Odera, E., Lamm, A. J., Dukes, M., Irani, T., & Carter, H. (2013). *Water issues in Florida: How extension can facilitate stakeholder engagement and involvement*. University of Florida EDIS Document WC151. Retrieved from https://edis.fl.edu/wc151

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

Schaible, G., & Aillery, M. (2012). *Water conservation in irrigated agriculture: Trends and challenges in the face of emerging demands.* EIB-99. U.S. Department of Agriculture, Economic Research Service. Retrieved from http://www.ers.usda.gov/media/884158/eib99.pdf

Tichenor, P. J., Donohue, G. A., & Olien, C. N. (1970). Mass media flow and differential growth in knowledge. *The Public Opinion Quarterly, 34*(2), 159-170. doi:10.1086/267786

United States Geological Survey [USGS]. (2010). *Water-use data tables, 2010.* Florida Water Science Center. Retrieved from http://florida.water.usgs.gov/infodata/wateruse/datatables2010.html

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*(3). 59-74. Doi: 10.5032/jae.2015.04059.

Whitaker, B. K., & Dyer, J. E. (2000). Identifying sources of bias in agricultural news reporting. *Journal of Agricultural Education, 41*(4), 125-133. Doi:10.5032/jae.2000.04125

Young, S. T., & Dhanda, K. K. (2013). *Sustainability; essentials for business*. Thousand Oaks, CA: Ringgold Inc.