

Bridging Water Issue Knowledge Gaps Between the General Public and Opinion Leaders

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Abstract

Global conflicts have rapidly made water the most contentious issue in the world today. Considering water drives health, industry, recreation, and the agricultural food system it is no surprise that it has become such a hot topic. As a result, the general public has an increased interest in water-focused policy; policy that can have a large impact on the agriculture industry. Agricultural and natural resource opinion leaders may differ or agree with the general public on water related issues, as well as perceptions of government influence. Identifying similarities and differences will allow agricultural educators to identify ways to resolve disagreements through improved education, communication and messaging, and leadership development of agricultural and natural resource opinion leaders. The findings indicated there are significant differences between agricultural and natural resource opinion leaders and the general public as it related to their knowledge of water issues and perceptions of government support for individual decision-making regarding environmental issues. Based on these findings it is suggested agricultural educators establish a common language that can be used with all audiences to discuss water issues, develop educational programming to assist opinion leaders when addressing observed knowledge gaps, and create educational coalitions to provide source credibility across audiences.

Keywords: water, opinion leaders, public opinion, knowledge gap

Water is the lifeblood of our society (Young & Dhanda, 2013). Water drives health, industry, recreation, and the agricultural food system. Although the majority of the earth is covered in water, only 3% of that water is freshwater; the rest is held in the earth's oceans (Chiras, 2010). As such, water is one of the most important, and most contentiously debated issues in modern society (Levy & Sidel, 2011). Ismail Serageldin, a vice-president at the World Bank said "many of the wars of this century were about oil, but wars of the next century will be over water," (as quoted in Morris, 1995, p. 1). In addition to the possibility of large-scale physical conflict between nations over water, more local and regional conflict (often in the form of legislation and litigation) is occurring (Greenberg, 2009).

The state of Florida is a prime example of where local and regional conflicts over water are beginning to occur with greater frequency (Barnett, 2007). Florida is a very unique geographic region because it is surrounded by water on three sides, and yet frequently faces freshwater shortages (Barnett, 2007). Water issues in Florida have resulted in a number of legal actions within the state and between states in the region (Greenberg, 2009). For example, the prolonged drought conditions in 2007 which impacted Lake Lanier northeast of Atlanta had a domino effect on Florida, as expected water releases from the lake were drastically limited. The lack of downstream

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flow to Florida had direct impacts on several industries including agriculture and aquaculture. In turn the state of Florida has pursued legal recourse for damages sustained during this period reinforcing that “the arguments from neighboring states about Georgia’s water consumption exemplified how the scarcity of water can lead to conflict, both political and real” (Young & Dhanda, 2013, p. 65).

The ongoing conflict between various parties regarding the restoration and protection of the Everglades is a classic example (Carter, 2004). “As the population continues to grow, balancing agricultural needs, business and development needs, and public use has become challenging” (Odera & Lamm, 2014, p. 5). The ability to understand the needs and expectations of various groups regarding water issues is critical (Young & Dhanda, 2013).

In the early 2000’s the demand for public water supply became greater than that of agricultural irrigation. In addition, over the next 20 years public water supply demands are projected to grow by 29% while agricultural irrigation demands are expected to grow by only 7.5% (Florida Department of Environmental Protection, 2013). The potential for conflict between public consumption and the agricultural and natural resource (ANR) industry needs is significant.

With a global population of 9 billion persons projected by the year 2050 (United States Census 2012a, 2012b) “agricultural productivity must increase accordingly” (Kohlhase, 2013, p. 158). However, agricultural productivity increases may be halted by both water quantity limitations (Florida Department of Environmental Protection, 2013) as well as calls from the public to clean up ANR production practices and improve water quality (Lohan, 2008).

Within the ANR industry, individuals that are viewed as knowledgeable and are established, or emergent, leaders are considered opinion leaders within their networks of influence (Lamm, Lamm, & Carter, 2014). Consequently, ANR opinion leaders may be a valuable source of information regarding the ANR industry perspective regarding water related issues (Lamm et al., 2014).

As the primary source of regulation and standards related to water, the government, including both elected officials and non-elected personnel, represents the structure in which water related views and conversation occurs (Molden, 2007). Governmental institutions are central to the ongoing monitoring and legislation of water related policies (Molden, 2007). As of 2014, there were over 115 specific Florida Department of Environmental Protection rules that regulated water related issues in Florida (Florida Department of Environmental Protection, 2014). These policies ranged from drinking water standards, monitoring, and reporting to mandatory phosphate mine reclamation, each with varying levels of specificity related to guidelines for compliance (Florida Department of Environmental Protection, 2014). Although ANR opinion leaders and the general public are both expected to operate within the governmental structure, there are differences in the amount of direct influence governmental policies have on the two groups (Florida Department of Environmental Protection, 2013). For example, drinking water regulations would be expected to apply to all citizens, whereas phosphate mine reclamation may only be relevant to a very specific industry, such as agricultural fertilizer production.

Knowing how the general public and ANR opinion leaders differ or agree on water related issues, as well as perceptions of government influence, in a specific state would be an important benchmark for understanding differences or similarities between these two groups more broadly. Identifying similarities and differences will allow agricultural educators, Extension educators, and policy makers to begin to identify ways in which to resolve potential issues through improved education, communication and messaging, and leadership within the ANR industry and the general public. Priority one of the National Research Agenda: American Association for Agricultural Education 2011 – 2015 emphasizes public and policy maker understanding of agriculture and natural resources (Doerfert, 2011). A study focused on knowledge of water issues, as well as perception of government influences, by both the general public and ANR opinion leaders will serve as a catalyst to improve understanding of the ANR industry by both the public and policy makers.

Theoretical Framework

The theoretical framework for this research is based on knowledge gap theory proposed by Tichenor, Donohue, and Olien (1970). The theory asserts that knowledge about social, political, or other publically relevant content will generally cluster into two groups, those with higher levels of knowledge about the topic and those with lower levels of knowledge. The antecedent grouping variable was originally found to be socio-economic status (SES) and in particular higher levels of education (and therefore knowledge) were associated with higher SES (Tichenor et al., 1970).

A condition for knowledge gap formation around a particular topic is a significant amount of publicity. In particular, without a media catalyst to foment appreciable differences between groups it would be assumed that knowledge levels would be relatively similar regardless of the chosen grouping variable (Tichenor et al., 1970). In the past five years, the citizens of Florida have been exposed to numerous print, television, and radio media spots all related to Florida water. For example, the ongoing efforts to restore the Everglades have resulted in multiple newspaper articles and television coverage regarding the ongoing challenges Florida has with water quality as well as current and proposed legislation to address water quality issues (e.g. Palm Beach Post, 2012). Water quantity has also received significant media coverage. Recently the drought conditions from 2009 and 2011 focused on local water shortages as well as broader statewide challenges (e.g. Hiers, 2009; Latham-Carr, 2011; Spinner, 2009). In addition to sufficient media coverage, another condition for knowledge gaps to occur is an antecedent grouping variable (Tichenor et al., 1970).

Although the original theory focused on SES and education level (Tichenor et al., 1970), other research has found that alternative grouping variables may explain knowledge gap formation (e.g. Gaziano, 1983; Lee & Yang, 2014). For example, Ettema and Kline (1977) suggested that motivation or interest in a particular topic may be better predictors of knowledge gaps than socio-economic variables. Genova and Greenberg (1979) also found that individual interest was a more effective variable for grouping high and low levels of knowledge. Kwak (1999) found that broadly defined interest could be further defined as issue interest (McLeod & Perse, 1994) as well as behavioral involvement (Horstmann, 1991). The uniqueness in the two constructs was found to add discrete predictive capacity related to knowledge level when empirically analyzed. In this regard, knowledge disparities are related to not only issue interest but also to whether an individual has taken action, or become behaviorally involved, in a particular topic (Kwak, 1999). The ANR industry is completely dependent on water for survival (Young & Dhanda, 2013) therefore individuals engaged in the ANR industry have an increased amount of behavioral involvement with water related issues than the general public (Nettle & Paine, 2009).

Previous research has found individuals employed in agriculture have a strong interest in water-related education (e. g. Bruening & Martin, 1992; Cox, Lawver, Baker, & Doerfert, 2004). However, there have been studies that found higher levels of involvement were not always related to higher levels of knowledge. Griffin (1990) found that energy waste (higher behavioral involvement) predicted lower levels of knowledge, "in short, those who could benefit most from information...had an additional information deficit" (p. 564).

In terms of examining the directionality of the ANR industry related to water knowledge, and potential knowledge gaps, it is most appropriate to focus on the knowledge level of opinion leaders within the industry (Rogers, 2003). Opinion leaders "can be important determinants of rapid and sustained behavior change" within their social, community, and industry networks (Valente & Davis, 1999, p. 57). In this regard, opinion leaders are an appropriate audience to research as these individuals are already seen as leaders within their spheres of influence (Lazarsfeld, Berelson, & Gaudet, 1948). Previous research has found participants in ANR leadership development programs act as opinion leaders when it comes to water issues (Lamm et al., 2014). In much the same way that "gaining an understanding of the reasons individuals choose to lead will assist associations in determining where to target their recruitment efforts" (Nistler, Lamm, & Stedman, 2011, p. 118),

gaining an understanding of the knowledge level of opinion leaders in the ANR industry will inform areas where educational interventions may be appropriate.

Conceptually, knowledge gaps related to water issues in the state of Florida are expected to be related to level of behavioral involvement with water (Kwak, 1999). Specifically, individuals from the ANR industry are expected to have a higher level of involvement due to the role water plays in ensuring their livelihoods (Young & Dhanda, 2013). Higher levels of involvement should therefore lead to more knowledge related to water issues (Tichenor et al., 1970).

The role of government in environmental issues, water in particular, is well established. Molden (2007) stated, "Governments everywhere are challenged by the need to provide food for their citizens...while sustainably managing natural resources as well as water infrastructure" (p. 199). To address perceived issues, governments typically employ specific policy measures. Policies are viewed as "interrelated decisions taken by a political actor or group concerning the selection of goals and the means of achieving them within a specified situation where these decisions should, in principle, be within the power of those actors to achieve" (Howlett & Ramesh, 1995, p. 5). However, the implementation of such policies can result in drastically different impacts and interpretations depending on the audience. For example, previous policy decisions have had a significant bearing on the "use of water and other resources impacted by these production related decisions—all of which is typically misunderstood by the public" (Doerfert, 2011, p.12).

Based on the higher level of behavioral involvement in water issues by the ANR industry (Young & Dhanda, 2013), it would also be expected that governmental policy associated with water should have a differential effect on ANR opinion leaders and the general public. Specifically, perceptions of governmental influences are expected to be different between ANR opinion leaders and the general public (Ludwig, 1994; Molden, 2007).

Purpose and Research Questions

The purpose of this study was to examine whether ANR opinion leaders and members of the general public differed in their level of knowledge of water related issues and perceptions of governmental influence. The study was driven by the following research objectives:

1. Describe ANR opinion leaders and the general publics' perceived knowledge level of water related issues.
2. Identify differences in perceived knowledge levels between ANR opinion leaders and the general public.
3. Describe ANR opinion leaders and the general publics' perceptions of governmental influence.
4. Identify differences in perceptions of governmental influences between ANR opinion leaders and the general public.

Methods

A descriptive and causal-comparative research design was used for this study. A causal-comparative method was chosen to account for the antecedent differentials in water involvement (causes) between ANR opinion leaders and the general public, and the expected influence this involvement might have on knowledge levels or perceptions of governmental influences (effects) (Edwards & Briers, 2000). The populations of interest included ANR opinion leaders in Florida as well as the Florida general public. Florida was selected as an appropriate case study based on the variety of water related issues the state is facing (Delorme, Hagen, & Stout, 2003).

Data for the ANR opinion leader population were obtained through a purposive sample made up of a current class of participants in an ANR leadership development program. These individuals represented emergent, or established, leaders within the ANR industry and had been identified as appropriately representative of the population previously (Kelsey & Wall, 2003;

Lamm et al., 2014). Data were collected using a paper-based questionnaire in the spring of 2014. The questionnaire was distributed, and responses collected, at the end of a four-day seminar associated with the leadership development program. Of the 29 class members, 27 usable responses were obtained for a response rate of 93%. The number of respondents was determined to be sufficient given the proposed statistical analysis associated with the research (Agresti & Finlay, 2009).

Demographic data was self-reported by the respondents. Sixty-three percent ($n = 17$) were male and 29.6% ($n = 8$) female; one respondent did not indicate sex. The average age of respondents was 39 ($M = 38.6$, $SD = 8.4$) with a range of ages between 28 and 60. Regarding respondents' race, 92.6% ($n = 25$) identified themselves as White, two respondents did not indicate a race. Additionally, 7.4% ($n = 2$) of respondents identified their ethnicity as Hispanic/Latino(a)/Chicano(a).

The data collected from the Florida general public sample was done in conjunction with a larger study conducted by the University of Florida Center for Public Issues Education in Agriculture and Natural Resources (Odera & Lamm, 2014) using non-probability sampling (Baker et al., 2013). Specifically, a sample of the general public was recruited through opt-in procedures in December of 2013. A total of 516 invitations to an online questionnaire were sent to potential respondents and 516 usable responses were obtained for a response rate of 100%. To mitigate potential exclusion, selection, or opt-in biases associated with non-probability sampling, post-stratification weighting was employed (Kalton & Flores-Cervantes, 2003). Respondent demographics, including gender, race, ethnicity, age, and community size were weighted based on 2010 census data.

Demographic data was self-reported by the respondents. The Florida general public sample was 46.3% ($n = 239$) male and 53.7% ($n = 277$) female. The average age of respondents was 55 ($M = 55.5$, $SD = 15.9$) with a range of ages between 19 and 95. Regarding respondents' race, 88.8% ($n = 458$) identified themselves as White, 7.6% ($n = 39$) identified themselves as African American or Black, 1.2% ($n = 6$) identified themselves as Native American, 1% ($n = 5$) identified themselves as Asian, and 2.1% ($n = 11$) identified themselves in the Other category. Additionally, 8.7% ($n = 45$) identified their ethnicity as Hispanic.

The instrument used with both groups was developed using a combination of previously established and researcher-developed scales. The use of previously established scales improves reliability and validity (Ary, Jacobs, & Sorensen, 2010). A panel of experts representing research methods, hydrology, public opinion polling, and social science research reviewed the researcher-developed scales for face and content validity. Furthermore, the expert panel reviewed the entire instrument for validity prior to implementation.

To measure knowledge of water issues a researcher-developed scale was employed. The scale requested respondents indicate their level of familiarity with eight water-related policies. Respondents indicated their responses to the eight items on a five-point Likert-type scale. Possible responses to each item included: 1 – *Not at all familiar*, 2 – *Slightly familiar*, 3 – *Somewhat familiar*, 4 – *Moderately familiar*, 5 – *Extremely familiar*. Responses to the eight items were averaged to create an overall water knowledge index score. *Ex post facto* reliability was calculated on the water knowledge index construct and a Cronbach's α of .94 was obtained.

To measure perception of governmental influence the Government Style Questionnaire (GSQ) was employed (Green-Demers, Blanchard, Pelletier, & Bèland, 1994). The GSQ is a seven-item scale comprised of two subscales that requests respondents indicate their level of agreement with the seven statements on a five-point, Likert-type scale. Possible responses to each item included: 1 – *Strongly Disagree*, 2 – *Disagree*, 3 – *Neutral*, 4 – *Agree*, 5 – *Strongly Agree*. The first subscale consisted of four items and assessed perceived governmental control related to environmental issues (GSQ-Control). Specifically, whether the government pressures citizens to make environmental decisions. Responses to the four items were averaged to create a GSQ-Control index score. The second subscale consisted of three items and assessed perceived governmental

support related to environmental issues (GSQ-Support). Specifically, whether the government provided its citizens with autonomy to make their own choices related to environmental issues. Responses to the three items were averaged to create GSQ-Support index score. *Ex post facto* reliability was calculated for both subscales. The GSQ-Control construct had a Cronbach's α of .90. The GSQ-Support construct had a Cronbach's α of .79.

Data were manually entered from the ANR opinion leader paper based surveys into an online survey tool, Qualtrics. Data from the Florida general public were entered directly by respondents into the Qualtrics tool. Once data were entered into the online tool, results were exported. The ANR opinion leader data set was merged with the Florida general public data set and subsequently analyzed using the Statistical Package for the Social Sciences (SPSS) version 21. Descriptive statistics were calculated to determine level of knowledge of water issues and perceptions of governmental influences for both ANR opinion leaders and the Florida general public (Ary et al., 2010). A one-way, between subjects ANOVA was conducted to compare the effect of group on level of knowledge of water issues and perceptions of governmental influences (Agresti & Finlay, 2009).

Results

Perceived knowledge level of water issues

Perceived knowledge level of water issues was identified by requesting respondents identify their level of familiarity with a series of seven statements on a five point Likert-type scale. A level knowledge of water issues index score was then calculated for both ANR opinion leaders and the general public by averaging the responses to the seven items.

Table 1 displays ANR opinion leaders level of knowledge of water issues. ANR opinion leaders had the highest level of knowledge of the Everglades Restoration Plan and Total Maximum Daily Loads. ANR opinion leaders had the lowest level of knowledge of The Florida Safe Drinking Water Act. The knowledge of water issues index results had a minimum score of 1.13 and maximum score of 4.25 ($M = 2.69$, $SD = .81$).

Table 1

ANR Opinion Leader Level of Knowledge of Water Issues

<i>Statements</i>	<i>n</i>	<i>Not at all Familiar %</i>	<i>Slightly Familiar %</i>	<i>Somewhat Familiar %</i>	<i>Moderately Familiar %</i>	<i>Extremely Familiar %</i>
Everglades Restoration Plan	27	3.7	25.9	25.9	37.0	7.4
Total Maximum Daily Loads	27	3.7	33.3	18.5	44.4	0.0
Florida Spring Initiative	27	7.4	29.6	37.0	14.8	11.1
Basin Management Action Plans	26	19.2	23.1	19.2	34.6	3.9
Clean Water Act	27	7.4	37.0	25.9	29.6	0.0
The Water Quality Assurance Act	27	22.2	40.7	22.2	14.8	0.0
Air and Water Pollution Control Act	27	25.9	33.3	33.3	7.4	0.0
The Florida Safe Drinking Water Act	25	28.0	40.0	20.0	12.0	0.0

Table 2 displays the general public's level of knowledge of water issues. The general public had the highest level of knowledge of the Clean Water Act and the Everglades Restoration Plan. The general public had the lowest level of knowledge of Basin Management Action Plans. The knowledge of water issues index results had a minimum score of 1.00 and a maximum score of 5.00 ($M = 2.08$, $SD = 1.02$).

Table 2

General Public Level of Knowledge of Water Issues

<i>Statements</i>	<i>n</i>	<i>Not at all Familiar %</i>	<i>Slightly Familiar %</i>	<i>Somewhat Familiar %</i>	<i>Moderately Familiar %</i>	<i>Extremely Familiar %</i>
Clean Water Act	516	23.6	22.1	30.2	19.4	4.7
Everglades Restoration Plan	516	31.4	24.4	23.1	17.1	4.1
Air and Water Pollution Control Act	516	32.4	24.8	25.0	14.5	3.3
The Florida Safe Drinking Water Act	516	38.4	20.2	25.2	12.8	3.5
The Water Quality Assurance Act	516	42.3	22.3	22.5	9.5	3.5
Florida Spring Initiative	516	51.7	19.4	17.8	9.5	1.6
Total Maximum Daily Loads Basin Management Action Plans	516	64.9	14.7	13.0	5.6	1.7
	516	64.5	16.3	13.2	4.8	1.2

Analysis of perceived knowledge level differences

A one-way between subjects ANOVA was conducted to compare the effect of group on perceived knowledge level of water issues in ANR opinion leaders and general public conditions using the index scores developed. There was a significant effect of group on perceived knowledge level of water issues at the $p < .01$ level for the two conditions [$F(1, 541) = 9.00, p = .00$]. These results indicated that the higher mean values associated with ANR opinion leaders ($M = 2.69, SD = .81$) were statistically significantly different than those associated with the general public ($M = 2.08, SD = 1.02$).

Perceptions of governmental influence

Perception of governmental influence was identified by requesting respondents identify their level of agreement with a series of seven statements on a five point Likert-type scale. Four were associated with governmental control and three with government support. GSQ-Control and GSQ-Support index scores were calculated by averaging the four control items and four support items respectively.

Table 3 displays ANR opinion leaders level of perceived governmental control as well as ANR opinion leaders level of perceived governmental support. ANR opinion leaders reported the strongest level of agreement that the government imposes its environmental strategies on them from a control perspective. However, ANR opinion leaders also reported a strong level of agreement that they have a choice to use the strategies provided by the government in order to help the environment

from a support perspective. The GSQ-Control index results had a minimum score of 1.25 and maximum score of 5.00 ($M = 3.10$, $SD = .90$). The GSQ-Support index results had a minimum score of 2.00 and maximum score of 4.33 ($M = 2.99$, $SD = .82$).

Table 3

ANR Opinion Leader Level of Perceived Governmental Control and Support

<i>Statements</i>	<i>n</i>	<i>Strongly Disagree %</i>	<i>Disagree %</i>	<i>Neither Agree or Disagree %</i>	<i>Agree %</i>	<i>Strongly Agree %</i>
Perceived Governmental Control						
I feel the government imposes its environmental strategies on us	27	3.7	14.8	33.3	37.0	11.1
I feel the government is trying to force me to adopt environmental behaviors	27	3.7	29.6	22.2	37.0	7.4
I feel the government wants to make me feel guilty when I do nothing for the environment	27	0.0	37.0	25.9	29.6	7.4
I think the government puts a lot of pressure on people to adopt environmentally-conscious behaviors	27	7.4	33.3	37.0	14.8	7.4
Perceived Governmental Support						
I feel I have a choice to use the strategies provided by the government in order to help the environment	27	3.7	22.2	18.5	51.9	3.7
I feel I have the choice to participate in the environmental programs established by the government	27	7.4	29.6	22.2	37.0	3.7
The government gives me the freedom to make my own decisions in regards to the environment	27	7.4	48.2	14.8	29.6	0.0

The general public most strongly agreed the government imposes its environmental strategies on them from a control perspective (Table 4). However, the general public also agreed that they have a choice to use the strategies provided by the government in order to help the environment from a support perspective. The GSQ-Control index results had a minimum score of

1.00 and maximum score of 5.00 ($M = 2.97$, $SD = .95$). The GSQ-Support index results had a minimum score of 1.00 and maximum score of 5.00 ($M = 3.38$, $SD = .84$).

Table 4

General Public Level of Perceived Governmental Control and Support

<i>Statements</i>	<i>n</i>	<i>Strongly Disagree %</i>	<i>Disagree %</i>	<i>Neither Agree or Disagree %</i>	<i>Agree %</i>	<i>Strongly Agree %</i>
Perceived Governmental Control						
I feel the government imposes its environmental strategies on us	516	7.6	24.4	31.2	28.9	8.0
I feel the government wants to make me feel guilty when I do nothing for the environment	516	10.7	26.6	27.7	25.0	10.1
I feel that the government is trying to force me to adopt environmental behaviors	516	8.7	28.1	31.4	23.5	8.3
I think the government puts a lot of pressure on people to adopt environmentally-conscious behaviors	516	6.8	31.6	30.4	26.0	5.2
Perceived Governmental Support						
I feel I have a choice to use the strategies provided by the government in order to help the environment	516	5.0	9.5	30.2	45.7	9.5
I feel I have the choice to participate in the environmental programs established by the government	516	5.4	12.4	26.7	44.2	11.2
The government gives me the freedom to make my own decisions in regards to the environment	516	6.6	16.1	32.2	37.6	7.6

Analysis of perception of governmental influences differences

A one-way between subjects ANOVA was conducted to compare the effect of group on level of perceived governmental control (GSQ-Control) in ANR opinion leader and general public conditions. There was not a significant effect of group on GSC-Control for the two conditions [$F(1, 541) = 0.48, p = .49$]. These results indicated that the higher mean values associated with ANR opinion leaders ($M = 3.10, SD = .90$) are not statistically significantly different than those associated with the general public ($M = 2.97, SD = .95$).

A second one-way between subjects ANOVA was conducted to compare the effect of group on level of perceived governmental support (GSQ-Support) in ANR opinion leader and general public conditions. There was a significant effect of group on GSQ-Support at the $p < .05$ level for the two conditions [$F(1, 541) = 5.68, p = .02$]. These results indicated the lower mean values associated with ANR opinion leaders ($M = 2.99, SD = .82$) are statistically significantly different than those associated with the general public ($M = 3.38, SD = .84$).

Conclusions, Implications, and Recommendations

The results of this study indicated there are significant differences between ANR opinion leaders and the general public as it related to knowledge of water issues. Furthermore, differences between these two groups as it related to perceptions of government support for individual decision-making regarding environmental issues were found.

Prior to further analyzing study results, a number of limitations must be addressed. A primary limitation of the study is the relatively small number of ANR opinion leaders. The use of a purposive sample to represent this population limits the statistical power available to generalize findings more broadly. Additionally, the use of non-probability sampling techniques in obtaining a representative sample of the general public may result in biased results. Employing appropriate weighting techniques to mitigate this potential were applied as directed in the literature (Kalton & Flores-Cervantes, 2003).

Granting the acknowledged limitations associated with the study, a number of noteworthy observations were made. First, based on knowledge gap theory, higher levels of knowledge about a particular topic should be preceded by some antecedent-grouping variable (Tichenor et al., 1970). The results of this study add to the existing literature by empirically examining whether occupational antecedents and higher levels of expected behavioral involvement could serve as an appropriate antecedent to differential perceived knowledge level. Previous research found SES (Tichenor et al., 1970), interest (e.g. Ettema & Kline, 1977), and behavioral involvement (Horstmann, 1991) were all appropriate antecedent grouping conditions. The results from this study further confirmed the underlying theory, that differing levels of knowledge are expected between groups based on appropriate antecedent conditions. Of critical importance is the discovery that, on average, ANR opinion leaders have higher levels of knowledge related to water issues than the general public. Specifically, the ANR opinion leader population had higher levels of knowledge related to particular policies or management legislation. For example, 44.4% of ANR opinion leaders were extremely or moderately familiar with Total Maximum Daily Loads (TMDL), whereas only 7.4% of the general public was extremely or moderately familiar.

Based on these conclusions, a number of recommendations for working with the general public and policy makers are suggested. First, establishing a common language to discuss water related issues is necessary. Use of acronyms (such as TMDL or BMAP) and technical jargon should be limited until it can be determined they are well understood by a broader audience. Without first confirming a common understanding, subsequent education of the general public on important topics will be severely limited. This initial step is crucial as a baseline knowledge level expectation (based on peer experiences) and is likely overestimated by individuals involved in the ANR industry (Rumble & Buck, 2013).

Another recommendation is that agricultural educators, communicators, and Extension educators use educational interventions to improve the general public's understanding of agriculture and natural resources (Hahn, 1994). Using rich descriptions and anecdotes of how water issues impact the ANR industry can have a lasting effect. However, agricultural educators must also use flexibility in determining the appropriate learning channel to deliver information. Tailoring messages to specific audiences, or using audience segmentation techniques (Andreasen, 2006), can be more effective than a "stump speech" given regardless of context (Hahn, 1994). For example, higher levels of knowledge may be assumed when working directly with ANR opinion leaders and so use of more technical jargon may be appropriate.

A third recommendation is for agricultural educators to form education and communication coalitions with individuals or groups that have similar goals. Harnessing the added reach and exposure of the coalition to reach a broader and more diverse audience could improve message dissemination and efficacy through improved source credibility (Hahn, 1994).

Based on the research findings, both ANR opinion leaders and the general public tended to agree the government pressures citizens to make environmental decisions (Green-Demers, Blanchard, Pelletier, & Bèland, 1994). These findings were consistent with previous research using a general population sample (Lavergne, Sharp, Pelletier, & Holtby, 2010). A recommendation is to actively manage perceptions, cultures, and ideologies to improve the effectiveness of educational interventions that the coalitions can provide (Sloper, 2004).

Perceptions of government support for autonomy of citizens to make their own choices related to environmental issues was statistically significantly lower for ANR opinion leaders than for the general public. Although both groups tended to agree the government was supportive, the general public felt more strongly that this was the case. Interestingly, the mean values in government support for both groups were lower than values previously observed (Lavergne et al., 2010).

Based on their higher level of behavioral involvement in water related issues (for example pulling well permits or having runoff and retention ponds inspected), ANR opinion leaders may feel less able to self-direct environmental (water) related projects. Consequently, this perception differential between ANR opinion leaders and the general public must be actively addressed. When educating the general public it is recommended that agricultural educators avoid making strong claims about lack of governmental support to be self-directed. A deft touch must be used when delivering messages that may be contradictory to a currently held belief. Moving too swiftly may cause a state of cognitive dissonance where an individual will actively avoid any sort of new information or education that is inconsistent with their current belief (Festinger, 1957).

Implications from this study extend beyond understanding the differential level of water issue knowledge and perceptions of government influences between ANR opinion leaders and the general public. The results can be used as a benchmark across a number of other agricultural and natural resources issues and serve as a guide for informing how to best frame messages and construct learning interventions to educate the general public about agriculture. A more informed public will be better equipped to engage in meaningful dialog about the role of agriculture in society and how to best meet the needs of agriculturalists and non-agriculturalists alike (Doerfert, 2011).

Additional research into appropriate precursors for knowledge gaps to occur is suggested to continue to build upon these findings (Tichenor et al., 1970). Perhaps there are other demographic or cognitive attributes that may provide additional insight. Furthermore, the knowledge and perceptual differences between ANR opinion leaders and the general public should be explored further. Extending beyond knowledge to include actual water related behaviors would be informative. For example, Patterson (2012) found differences between thoughts (knowledge) and action (behaviors) was frequently misaligned. Additionally, replication studies with a larger ANR opinion leader sample would help to provide further confirmation for the findings associated with this research. Replication of the study in different states or countries may also provide insights regarding the generalizability of the findings. Finally, an analysis of the relationships between

variables is recommended. Understanding the magnitude and directionality of relationships will further inform the development of appropriate educational interventions (Lamm et al., 2014).

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