



Identifying Audience Needs to Effectively Communicate about the Cost of Implementing Sustainable Farming Practices

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Abstract

Water is a complex issue across the globe and is largely affected by a growing world population and higher standard of living. Within the United States, the security of the freshwater supply is an increasing concern and water resource protection may increase if residents are knowledgeable about the issue. Sustainable farming systems will lessen the impact of agriculture on water resources but may cost the end user more to ensure sustainability. Therefore, the purpose of this study was to determine if rural, urban, and suburban audiences differ in their willingness to pay for sustainable farming practices that protect water resources so that communication messages can be tailored. Audience segmentation was used to guide the study. Data were collected with a researcher-developed online survey instrument. The results found water consumers' overall willingness to pay for more sustainable farming practices was fairly high. Statistically significant differences were found between urban and rural residents' willingness to pay for sustainable farming practices. Thus, the findings imply residents with differing rurality need tailored communication messages delivered through specific channels.

Keywords

audience segmentation, sustainable farming, water, willingness to pay

Introduction

Conventional farming uses the largest amount of freshwater globally and, although salinization, water logging, and silting are affecting productivity, irrigated land continues to expand (García-Tejero et al., 2011). A leading cause of non-point source pollution is surface runoff from agricultural fields that carries sediments, pesticides, and nutrients into water sources. Additionally, water is withdrawn from aquifers in the United States (U.S.) much faster than the aquifers can recharge naturally, causing a serious threat to agricultural water supplies (García-Tejero et al., 2011). Therefore, it is crucial sustainable farming practices that address water conservation are implemented.

An increased public concern in the U.S. about the negative environmental consequences of conventional farming methods has led to a greater interest in sustainable farming practices (Constance, 2010; Crowder & Reganold, 2015). According to García-Tejero et al. (2011), “biodiversity, soil and water conservation, the welfare of rural communities, and the long-term success of human activities all depend on sustainable agriculture” (p. 36). However, the implementation of sustainable farming practices must be economically and socially viable (Gomiero et al., 2011). Sustainable farming techniques that benefit environmental resources often increase farmers’ costs; therefore, what farmers have to charge for their products will ultimately impact the consumer who has little knowledge of the additional cost associated with integrating sustainable farming practices.

Assessing consumer willingness to pay is one approach to determining public acceptance of higher price products as sustainable agriculture becomes more prominent in the U.S. Willingness to pay measures an individual’s value of a good or service (Clark et al., 2017). There is a large body of literature focused on consumer willingness to pay for agricultural products (Burnett et al., 2011; Clark et al., 2017). For example, Burnett et al. (2011) examined consumers’ willingness to pay for locally grown fresh produce in Indiana, and found the majority of respondents were willing to pay for local foods. Clark et al. (2017) conducted a metanalysis on consumers’ willingness to pay for farm animal welfare and found a positive but small willingness to pay for improved animal welfare, with socio-demographic factors causing the majority of the variation in the data. Schäufele and Hamm (2017) examined consumer willingness to pay for wine with sustainable characteristics in the U.S. and Europe and found consumers’ willingness to pay was determined by several attributes, including sex, income, and rurality.

Despite multiple research studies that have indicated the public believes water resource protection is important (e.g. Lockett et al., 2002; Stoutenborough & Vedlitz, 2014), little is known about residents’ willingness to pay for sustainable farming practices that benefit water resource protection and if geographic differences alter willingness to pay more for products produced using sustainable farming. Therefore, this study sought to identify consumers’ willingness to pay for sustainable farming practices and then determined if willingness to pay for sustainable farming practices differed between rural, suburban, and urban consumers.

Literature Review and Conceptual Framework

Complex and multi-faceted environmental issues, such as water resource protection, are often addressed with ambiguity and limited research (Spruijt et al., 2014; Warner et al., 2017). Additionally, conflicting and competing concerns, such as economic benefit, are considered

when discussing solutions to complex environmental issues (Spruijt et al., 2014; Warner et al., 2017). Water resource protection, which is one of the most complex issues effecting the world today (Lamm et al., 2015), must be addressed by public attitude and behavior changes in order to be viable in the long-term (Andenoro et al., 2016; Warner et al., 2017). However, information-only messages have rarely influenced behavior change, especially with environmental behaviors (Lehman & Geller, 2004; O'Donnell & Rice, 2012). Therefore, more integrative approaches, such as targeting characteristics of the public audience, may be beneficial in improving communication and education efforts that influence public attitude and behavior toward water conservation (Brownlee et al., 2014; O'Donnell & Rice, 2012; Telg & Irani, 2012; Warner et al., 2017).

Social marketing is a strategy used to encourage community and individual behavior change that promotes health while protecting the environment (Lee & Kotler, 2011; Warner et al., 2016). Warner et al. (2016) noted “social marketing strategies are designed to increase the benefits of an audience associates with adopting a behavior while decreasing their perceived barriers to change” (p. 239). Audience segmentation, which is derived from the traditional mass marketing approach, is a primary technique used in social marketing (Andreasen, 2006; Kotler & Roberto, 1989). The purpose of audience segmentation is to target specific audiences within a group with shared characteristics, including geographic (e.g. region, population density, and climate), socio-demographic (e.g. income, age, and class), psychological (e.g. values, attitudes, and personality traits), and behavioral characteristics (e.g. decision making or behavior patterns) (Andreasen, 2006; Kotler & Roberto, 1989). Segmenting audiences allows the homogeneous groups needs to be best met, which enables effective communication and education strategies (Andreasen, 2006; Kotler & Roberto, 1989). Lee and Kotler (2011) suggested the goal of audience segmentation was to “select only one or a few segments as target audiences for the campaign and then develop a rich profile of their distinguishing characteristics that will inspire strategies to uniquely and effectively appeal to them” (p. 135). For example, Warner et al. (2016) used audience segmentation to identify three distinct clusters of landscape water users in Florida. They found the clusters “were meaningful and provided insight into strategies that may be used to deliver programs that effectively promote water conservation practice changes” (Warner et al., 2016, p. 248-249).

Previous environmental and conservation efforts have frequently used social marketing strategies (Shaw, 2010), and researchers have suggested using audience segmentation in the development of educational initiatives (Huang et al., 2016). Hine et al. (2014) reviewed 25 studies where audience segmentation was used in the context of climate change communication and evaluated conceptual considerations of audience segmentation, concluding audience segmentation “holds considerable promise as a communication strategy” for climate change (p. 455). Kim and Weiler (2013) examined attitudes of visitors towards environmentally responsible fossil collection and found two distinct groups of park visitors, including individuals with high environmental attitudes and low environmental attitudes, need tailored communication strategies to ensure responsible fossil collecting behavior. Warner et al. (2017) examined audience segmentations role in addressing water issues and found three groups of residential irrigation users (water savvy conservationists, water considerate majority, and unconcerned water users), implying a need for education and communication objectives to be focused on specific audiences. Nsiah-Kumi (2008) reviewed water contamination event communication and found “effective communication is audience centered” (p. 71), ultimately indicating “it is essential to be familiar with the community’s characteristics, needs, concerns, and who is considered

credible in that community” prior to delivering an effective communication message (p. 63). Thus, identifying audiences based on shared characteristics may assist with developing more effective communication strategies about water resource protection in the future when clustering by distinct demographic characteristics (e.g. Lamm et al., 2019).

Even though numerous studies have indicated tailoring outreach programs results in greater success, many programs do not focus on the needs of specific audiences due to time and resource constraints (Warner et al., 2016). In addition, while audience segmentation has targeted water resource protection efforts previously, little is known about the influence rurality has on water residents’ willingness to pay for sustainable farming practices that benefit water resource protection.

Purpose and Objectives

The purpose of this study was to explore diverse residents’ willingness to pay for sustainable farming practices. The objectives were to:

1. Determine resident’s willingness to pay for sustainable farming practices;
2. Determine rural, urban, and suburban residents’ willingness to pay for sustainable farming practices; and
3. Determine if willingness to pay for sustainable farming practices varied between rural, urban, and suburban residents.

Methods

The research described here was part of a larger study conducted to determine residents’ perceptions within the nexus between water resource management and agriculture. This study addressed two sections of the survey instrument: residents’ rurality and willingness to pay for sustainable farming practices.

The survey consisted of demographic and Likert-type questions. Three questions were used to identify respondents’ willingness to pay for sustainable farming practices. The questions asked respondents if farmers should save as much water as possible when irrigating crops, if farmers should use as little fertilizer as absolutely necessary, and if farmers should use as little pesticides as absolutely necessary even if it means they have to pay more for the food they purchase. The respondents indicated their associated level of agreement using a five-point Likert-type scale (1 = *Strongly Disagree*; 2 = *Disagree*; 3 = *Neither Agree nor Disagree*; 4 = *Agree*; 5 = *Strongly Agree*). Responses to the three items were averaged to create an overall willingness to pay for sustainable farming practices scale. Reliability was calculated *post hoc* ($\alpha = .78$).

Data were collected from Georgia residents in December 2019 using a researcher-developed online survey instrument via Qualtrics. The population of interest was Georgia residents age 18 or older and representative of the Georgia population based on gender, age, and race/ethnicity. In the state of Georgia, water issues have been contentious for quite some time with policy, pollution, drought, and population changes causing a myriad of concerns (Chaisson, 2012). Georgia is home to a diverse range of water users from generational family farms in rural areas to those living in urban Atlanta. The juxtaposition between rural and urban audiences creates difficulties communicating and educating about water use and water issues, especially for policies that cost the end user more to ensure sustainability. Non-probability opt-in sampling was

used to recruit respondents who were representative of the Georgia population (Baker et al., 2013). Agricultural communication research commonly uses and accepts non-probability sampling techniques (Lamm & Lamm, 2019). In order to ensure validity of the results, post-stratification methods were used *post hoc* (Kalton & Flores-Cervantes, 2003) because non-probability samples are more accurate when they use weighing techniques (Abate, 1998; Twyman, 2008; Vavreck & Rivers, 2008). Throughout the survey, attention filters were included to ensure data quality. Respondents who did not respond to the question as prompted were removed from the study (Lavrakas, 2008).

The survey was reviewed for face and construct validity by a panel of experts in survey design, water conservation, and agricultural economics and practices. Additionally, the survey instrument was pilot tested for content validity with 50 individuals who were representatives of the sample. All scales were found to be reliable measures and data collection continued without adjustments to the scales. Upon distribution, 1,050 responses were collected. After cleaning the data and ensuring accuracy of response, 961 useable responses were obtained. The data was weighted based on geographic location, gender, age and race/ethnicity using the 2010 Census data to ensure it was representative of the population of interest (U.S. Census Bureau, 2010). Of the usable responses obtained, 51.6% were female and 48.4% were male (Table 1). Respondents were predominately white (54.7%), 55 years and older (36.4%), and had a total family income (before taxes) of less than \$59,999 (57.5%). Additionally, the majority of respondents were from suburban (41.8%) and rural (41.8%) areas, with 16.3% of respondents from urban areas. Respondents detailed demographic profile can be viewed in Table 1.

Table 1
Demographics of Respondents (N = 961)

	<i>F</i>	<i>%</i>
Sex		
Male	465	48.4
Female	496	51.6
Age		
18-34 years	277	28.8
35-54 years	334	34.8
55+ years	350	36.4
Race*		
White	526	54.7
Black	322	33.5
Asian	80	8.3
American Indian or Alaska Native	28	2.9
Other	36	3.7
Ethnicity		
Hispanic	129	13.6
Non-Hispanic	821	86.4
Education		

Less than 12 th grade	27	2.8
High school diploma	197	20.5
Some college	232	24.1
2-year college degree	98	10.2
4-year college degree	255	26.5
Graduate or Professional degree	152	15.9
Family Income		
Less than \$19,999	149	15.6
\$20,000 - \$39,999	223	23.3
\$40,000 - \$59,999	178	18.6
\$60,000 - \$79,999	135	14.1
\$80,000 - \$99,999	91	9.5
\$100,000 - \$119,999	65	6.8
\$120,000 or more	116	12.1
Rurality		
Urban	157	16.3
Suburban	402	41.8
Rural	402	41.8

Note: *Respondents were allowed to select more than one race.

Data were analyzed descriptively (frequencies and means) and inferentially (ANOVAs) using SPSS26. Effect sizes are presented as Partial Eta Squared values for the ANOVA analysis. The research was approved by the University of Georgia Institutional Review Board.

Results

Objective 1 – Determine resident’s willingness to pay for sustainable farming practices

The majority of respondents agreed or strongly agreed that farmers should use as little fertilizer (50.7%) and pesticides (64.3%) as absolutely necessary even if it means having to pay more for the food they purchase (Table 2). Very few respondents disagreed or strongly disagreed farmers should conserve as much water as possible (14.6%), use as little fertilizer as absolutely necessary (15.1%), and use as little pesticides as absolutely necessary (10.3%). Additionally, respondent’s overall willingness to pay for more sustainable farming practices, which was the average of the responses of the three items, was fairly high ($M = 3.60$, $SD = 0.88$).

Table 2

Respondent’s willingness to pay for sustainable farming practices (N = 967)

	Strongly Disagree %	Disagree %	Neither Agree nor Disagree %	Agree %	Strongly Agree %

Farmers should use as little pesticides as absolutely necessary even if it means I have to pay more for the food I purchase	3.5	6.8	25.4	31.1	33.2
Farmers should use as little fertilizer as absolutely necessary even if it means I have to pay more for the food I purchase	3.2	11.9	34.1	29.2	21.5
Farmers should save as much water as possible when irrigating crops even if it means I have to pay more for the food I purchase	4.0	10.6	35.7	31.0	18.7

Objective 2 – Determine rural, urban, and suburban residents’ willingness to pay for sustainable farming practices

Less than half of rural (48.0%) and suburban (48.8%) respondents agreed or strongly agreed farmers should save as much water as possible when irrigating crops (Table 3). In contrast, more than half of urban (56.7%) respondents agreed or strongly agreed farmers should save as much water as possible when irrigating crops. Rural (34.6%), urban (33.1%), and suburban (37.8%) respondents were similar in neither agreeing or disagreeing farmers should save as much water as possible when irrigating crops.

Less than half of rural (46.5%) respondents agreed or strongly agreed farmers should use as little fertilizer as absolutely necessary. In contrast, more than half of urban (55.4%) and suburban (53.2) respondents agreed or strongly agreed farmers should use as little fertilizer as absolutely necessary. Again, rural (34.3%), urban (33.1%), and suburban (34.3%) respondents were similar in neither agreeing or disagreeing farmers should use as little fertilizer as absolutely necessary.

More than half of rural (60.2%), urban (69.5%), and suburban (66.4%) residents agreed or strongly agreed farmers should use as little pesticides as absolutely necessary. Rural (26.1%), urban (23.6%), and suburban (25.4%) respondents were similar in neither agreeing or disagreeing farmers should use as little pesticides as absolutely necessary.

Table 3
Comparison of respondent’s willingness to pay for specific sustainable farming practices (N = 967)

	Strongly Disagree %	Disagree %	Neither Agree nor Disagree %	Agree %	Strongly Agree %
Farmers should use as little pesticides as absolutely necessary even if it means I have to pay more for the food I purchase					
Rural	5.2	8.5	26.1	28.1	32.1

	Urban	1.3	5.7	23.6	33.8	35.7
	Suburban	2.7	5.5	25.4	33.1	33.3
Farmers should use as little fertilizer as absolutely necessary even if it means I have to pay more for the food I purchase						
	Rural	5.2	13.9	34.3	25.6	20.9
	Urban	1.9	9.6	33.1	29.9	25.5
	Suburban	1.7	10.7	34.3	32.6	20.6
Farmers should save as much water as possible when irrigating crops even if it means I have to pay more for the food I purchase						
	Rural	6.2	11.1	34.6	28.6	19.4
	Urban	3.2	7.0	33.1	33.1	23.6
	Suburban	2.0	11.4	37.8	32.6	16.2

Note: Rural ($n = 402$), Urban ($n = 157$), and Suburban ($n = 402$).

Objective 3 – Determine if willingness to pay for sustainable farming practices varies between rural, urban, and suburban residents

An ANOVA was used to determine if the difference in overall willingness to pay for sustainable farming practices between rural, urban, and suburban residents was statistically significant. The results (Table 4) indicated there was a statistically significant difference on respondents' willingness to pay for more sustainable farming practices based on where individuals reside ($F = 4.68$, $p = .01$).

Table 4

Differences in respondent's willingness to pay for sustainable farming practices

	<i>df</i>	<i>F</i>	<i>p</i>	n_p^2
Willingness to Pay for Sustainable Practices	2	4.68	.01	.01

Note. * $p < .05$

The specific differences between the three groups were explored further *post hoc* using a Bonferroni test (Table 5). The test revealed urban respondents were more willing to pay for sustainable farming practices than rural respondents. There were no significant differences between rural and suburban or urban and suburban respondents.

Table 5

Bonferroni test results of the differences in willingness to pay for sustainable farming practices among rural, suburban, and urban residents

(I) Classification	(J) Classification	ΔM (I-J)	<i>SE</i>	<i>p</i>
Rural	Suburban	-.13	.06	.12

	Urban	-.24*	.08	.01
Suburban	Rural	.13	.06	.12
	Urban	-.11	.08	.54
Urban	Rural	.24*	.08	.01
	Suburban	.11	.08	.54

Note. * $p < .05$

Conclusion, Implications, and Recommendations

Sustainable farming practices offer numerous advantages when it comes to water resource protection (Crowder & Reganold, 2015; Reimer et al., 2012); however, there are financial barriers that must be addressed for successful implementation (Aschemann-Witzel & Zielke, 2015; Tyndall & Roesch-McNally, 2014). This study identified residents' willingness to pay for sustainable farming practices that benefit water resource protection. One limitation was the number of respondents in the urban group ($n = 157$) compared to the rural ($n = 402$) and suburban ($n = 402$) group. Unequal sample size may lead to variances among samples, influencing ANOVA results (Rusticus & Lovato, 2014). Additionally, the observed ANOVA effect size ($n_p^2 = .01$) in this study was deemed small (Cohen, 1988) and may indicate a weak relationship between urban, rural, and suburban groups. Thus, the small effect size should be considered a limitation when interpreting and implementing the results. However, small effect sizes have been found to sometimes have noteworthy consequences and may be more appropriate to serve as benchmarks for future research (Rosnow & Rosenthal, 1989). Furthermore, although respondents indicated their current rurality and amount of time living in the State of Georgia, it is unknown if their rurality is fluid or not. It is important to acknowledge whether an individual identifies with their selected rurality as an additional potential limitation. Lastly, the study was specific to residents of Georgia, and may not be generalizable to the residents of the entire U.S. or abroad due to Georgia's unique range of water users. Future studies should be conducted to determine if rurality influences residents' willingness to pay for sustainable farming practices that benefit water resource protection throughout the U.S. and abroad.

Overall, the findings indicated a statistically significant difference on respondents' willingness to pay for more sustainable farming practices based on where individuals reside. The findings are similar to Clark et al. (2017) and Schäufele and Hamm (2017) who found socio-demographic factors and attributes contribute to an individual's willingness to pay for agricultural products. In addition, the results found urban respondents were more willing to pay for sustainable farming practices than rural respondents. Thus, similar to previous studies (Kim & Weiler, 2013; Warner et al., 2017), the findings imply there is a need to educate and communicate with residents of differing rurality with tailored outreach programs or communication channels.

Although barriers to educating and communicating with residents on the importance of water resource protection are inevitable, agricultural communicators should tailor messages to urban residents differently than rural residents to better communication efforts. For example, agricultural communicators who work predominately in rural areas may need to communicate more about the baseline importance of water resources and why residents need to protect these resources as compared to urban residents. A qualitative study with rural residents may provide additional insight into the communication efforts needed to remove barriers (Sutton & Austin,

2015). Although the results of the study indicated the rural resident group is the least willing to pay for sustainable farming practices, very few residents disagreed or strongly disagreed farmers should save as much water as possible, use as little pesticides as possible, and use as little fertilizer as possible, suggesting agricultural communication may benefit the subgroup.

Urban residents are the most willing to pay for sustainable farming practices. Thus, urban residents may benefit from communication that builds on an environmentally cognizant mindset, such as encouraging residents to engage in volunteer opportunities that benefit water resource protection and are supplemented with education (Warner et al., 2017). However, the results of the study indicated urban residents are already willing to pay for sustainable farming practices and agricultural communicator resources may be used more effectively on rural and suburban residents.

Suburban residents are in between urban and rural residents in their willingness to pay for sustainable farming practices, namely about farmers saving as much water as possible when irrigating crops. Thus, suburban residents may benefit the greatest from both education opportunities and volunteer opportunities. Future studies should identify if there are additional subgroups of suburban residents in order to provide the most effective communication efforts for these residents. The education and communication recommendations are similar to the Kim and Weiler (2013) study on fossil collecting behaviors of park visitors that suggested communication for high environmental attitude tourist segments must “promote and reinforce existing pro-environmental attitudes and behaviors” while low environmental attitude tourist segments need baseline communication “as a vehicle for shifting attitudes and behaviors” (p. 610).

There were numerous responses of neither agree or disagree across all respondents which may be a result of the respondents needing additional information before reaching a decision and holding an opinion. While a strong indicator that all residents should receive informational messages, additional findings indicated communication strategies should be tailored for each group. Moreover, urban, rural, and suburban residents were similar in that over half of the respondents agreed or strongly agreed farmers should use as little pesticides as absolutely necessary. The support to use few pesticides may be influenced by the widely known negative effect of pesticides on human health and the environment and little knowledge of the effects when they are correctly applied (Nicolopoulou-Stamati et al., 2016). While urban, rural, and suburban residents need tailored communication messages, the tailored messages will benefit by focusing on the importance of farmers using as little water as possible and reducing fertilizer use as compared to reducing pesticide use since this is already widely supported.

Audience segmentation guided this study and provided insight into subgroups that may benefit from tailored outreach programs and communication channels (Warner et al., 2017). Audience segmentation targets specific audiences with shared characteristics and ultimately focuses on the needs of the homogeneous group, enabling effective communication and education strategies (Andreasen, 2006; Kotler & Roberto, 1989). Similar to findings of previous studies (Hine et al., 2014; Kim & Weiler, 2013; Warner et al., 2017), agricultural communicators must strategize their efforts to promote water resource protection in the most effective manner, and audience segmentation will benefit this effort when it is targeted at specific aspects of the issue.

Considering the growing population and the need for ongoing climate awareness, the importance of water resource protection cannot be avoided. Sustainable farming practices are one way to help protect water resources but consumers must be knowledgeable of the importance of these practices in order to accept them and be willing to pay more for agricultural products.

Research focused on effective agricultural communication strategies for sustainable farming practices has the potential to benefit water resource protection. However, audiences may have differing communication and education needs that must be addressed in order to use agricultural communication resources most effectively.

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