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Managing Demand-Side Water Conservation in the United States: An Audience Segmentation Approach

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Abstract: The availability of fresh water affects public health and living standards around the globe, yet water resources are being rapidly depleted by unsustainable human activities. Strained freshwater resources will perpetuate unless the public is made aware of the severity of water scarcity issues. Audience segmentation, used frequently by environmental communicators to target unreached groups, is a social marketing strategy that segments audiences with shared characteristics to inform the development of effective communication messages. The purpose of this study was to determine characteristics of audience segments based on their level of water conservation behaviors. An online survey of the United States general public captured levels of water conservation behaviors based on how consumers prepare to vote on policy and intent to engage in water conservation behaviors. Cluster analysis resulted in two audience segments: lower water conservation and higher water conservation. Further analysis indicated significant demographic differences between the segments. The lower water segment presented less education, more moderate or conservative political beliefs, and lower family income levels than the higher water segment. Communication messages for the lower water segment should align with these characteristics, including using less scientific verbiage, linking moderate and conservative perspectives with water conservation, and emphasizing economic gain/loss.

Keywords: audience segmentation; communication; water conservation; water-saving technology

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1. Introduction

Public health and living standards around the world are influenced by fresh water availability [1]. Water is perceived by the public and policy makers as abundantly available in many places that are actually water scarce, with water often provided for domestic use at a low cost [2]. However, many parts of the world directly experience water scarcity due to climate change, lack of infrastructure, conflicts, degradation of water quality, and drought [3], requiring immediate solutions. In the United States (U.S.), many consumers are not aware of the severity of water scarcity issues and may fail to take action for a variety of reasons. Therefore, environmental communication initiatives need to be developed that resonate with specific groups of water users [4].

Demand-side approaches including water conservation in the home and supply-side approaches such as water recycling are imperative to ensure water is available in the future in many parts of the U.S. and around the world [5]. Historically, supply-side management (e.g., the creation of new reservoirs, updating water infrastructure, etc.) has been effective in increasing water availability [6]. Managing demand-side water conservation is an important next step to reducing water demand, with scarcity becoming more apparent each year. Water conservation in the home is a simple solution that can be achieved through changing behavior or water-saving technology adoption [6]. Public policy

that supports demand-side water conservation, such as rebates for water conservation technology adoption, has the potential to increase household water conservation adoption. However, awareness of water issues has to occur before education can become integral to increasing public acceptance of water conservation, with adoption currently highly variable among the U.S. public [6].

Recent studies have found U.S. consumers' water conservation behaviors and engagement in water issues are influenced by demographic characteristics. For example, Warner et al. found respondents who lived in urban areas were less engaged in water conservation behaviors than less urban locations [7]. Callison and Holland found Liberals reported "stronger water conscious attitudes and intended behavior change than [. . .] Conservatives" [8] (p. 24). In addition, households with higher incomes were more likely to adopt water-saving technologies than lower income households [8], enabling households with higher incomes to consume less water.

There is a large literature base outside of the U.S. that examines the complexity of demographic characteristics in relation to water conservation behaviors. For example, Fielding et al. examined household water consumption in Queensland, Australia, and found demographic variables accounted for the largest amount of variance in water consumption [9]. In this study, a higher household income predicted increased water consumption. Fan et al. examined the mismatch between perceived and actual water consumption in the rural Wei River Basin and found respondents with higher incomes and education levels tend to underestimate their water consumption [1]. Willis et al. examined the influence of sociodemographic factors on household end use water consumption in the Gold Coast, Australia and found lower sociodemographic profiles consumed less water for end use [10]. Thus, the relationship between demographics and water-use characteristics is complex. Social marketing campaigns may provide one avenue for providing information on the benefits of water conservation to a complex audience [6].

Social marketing is a "distinct marketing discipline" [11] (p. 7) focused on influencing behaviors to benefit health, the environment, communities, and individual finances for positive societal change. Social marketing functions under the premise that improved social welfare occurs when individuals act toward social improvement through behavioral changes, thus "making the world a better place for everyone–not just for investors or foundation executives" [12] (p. 11). Although social marketing has been in existence for approximately 50 years, its application has been focused more on public health [13]. For example, social marketing techniques have proven effective interventions for governmental programs in preventing alcohol-related deaths and reducing drug use [14]. Recent applications to water conservation demonstrate the tools of social marketing (e.g., audience segmentation) are not only highly relevant, but also that they have yet to achieve their full potential as an approach to behavior change in the environmental sector. In the conservation realm, social marketing campaigns were found to be very successful in reducing water consumption when compared to information-only campaigns [15]. For example, Ferraro and Price found simple water conservation messages were less effective than messages that provided social comparisons, especially among households that were in a high water consumer group [16]. In addition, social marketing strategies have been recommended in the state of Florida to encourage behavioral change with residential landscape water conservation [17]. Social marketing campaigns that are audience-centric consider the mindset from which the consumer is coming and respond to this knowledge in the creation and implementation of their strategic planning [12].

Social marketing campaigns must have well-developed strategic plans in place in order to achieve desired outcomes for sustainable behavior change [18]. For example, a strategic social marketing effort for reducing private vehicle use in an Australian community was found to be effective and sustainable, with behavior change significantly influenced by sociodemographic and built environment variables [19]. Thus, using the principles of social marketing to segment audiences based on their water level use and demographic

differences may provide an avenue for developing communication messages that resonate and create change with consumers' water use.

Conceptual Framework: Audience Segmentation

Audience segmentation is a cornerstone of the social marketing discipline used to identify, evaluate, and prioritize subsets of populations who are most likely to adopt desired, beneficial behaviors and influence change [11]. Utilizing a mass communication approach disregards the nuance and variety within a target audience, but audience segmentation suggests subsets within the audience will "clump together in strategically meaningful ways" [12] (p. 105). Audiences can be segmented by psychographic characteristics that identify shared "activities, interests, and opinions" [20] (pp. 219–220) of publics. Psychographics can also be combined with demographic information (e.g., age, sex, education, household income, race, and political ideology) to segment audiences and create effective communication campaigns [20,21]. Social marketing places a particular emphasis on defining segments, identifying target behaviors, developing appropriately tailored messaging for each segment, and ensuring campaign resources are prioritized according to the segment's ability to impact the problem and the campaign's ability to influence their actions [12]. For example, audience segmentation has been used to divide U.S. adults into specific groups considering their beliefs and attitudes regarding climate change [21]. These segments have since been used to recommend strategies for climate change communication, with each segment based on information processing efforts, argument tendencies, and communication preferences [22].

Segmentation has been utilized in water communication to identify groups according to their views on tap water in the Netherlands, revealing, among others, a group of "quality and health concerned" (p. 4) consumers who need extensive information from water companies [23]. When it comes to water conservation, researchers have used audience segmentation to identify behaviors of high water users to recommend the development of educational programs that resonate with consumers. Huang et al. identified the "engagement, attitudes, and interests in water conservation behaviors" (p. 63) of Florida high water users compared to the general public [24]. In their study, high water users were found to be older, with higher incomes and education levels, than the general public, more likely to engage in negative water use behaviors, and less likely to participate in water conservation behaviors at the expense of their landscapes [24].

Warner et al. segmented Florida landscape irrigation users using both situational and cross-sectional audience segmentation to propose a behavior change strategy for irrigation users [25]. Three clusters of water users were identified as the "water considerate majority", "water savvy conservationists", and "unconcerned water users" [25] (p. 245). The demographic characteristics among audience segments exhibited no significant differences, revealing diversity existed within each group and the notable distinctions related primarily to water conservation behaviors. The researchers recommended that water conservation programming target the subgroup of irrigation users who were already water-conscious but had capacity to improve their water conservation practices [25]. Warner et al. subsequently conducted a study at a national level using the established subgroups and reported similar results, again concluding the water-considerate majority held the greatest potential to adopt new water habits [4].

Ibrahim et al. used the theory of interpersonal behavior to segment water users in a United Arab Emirates university community [26]. Findings revealed a gap between the positive attitude and excessive water behaviors of careless water users that could be used in informing strategic communication with the population subset [26]. In water conservation segmentation studies, results varied as to the significance of demographic characteristics among those concerned with water use and their resulting behaviors, e.g., [4,24–26]. Thus, further studies are needed to better define the demographic characteristics that should be used to inform communication strategies, leading to water conservation behavior adoption.

Safeguarding water resources requires increasing consumers' likelihood to conserve water [27]. Thus, social scientists are exploring factors that influence water conservation behaviors and engagement [27]. A large number of studies examining the relationship between water use and demographic factors are based outside of North America, e.g., [1,9,10,26,28] or are state/city-specific, e.g., [4,6,24,25], indicating research is needed that encompasses the complex political climate and culture of the broader U.S. This study addresses the gap in the literature by exploring characteristics of different groups of water users in the U.S. and is guided by the following research objectives:

(1) Identify distinct clusters of U.S. consumers based on their level of water conservation behaviors;
(2) Describe demographic characteristics of U.S. consumers based on their membership in a distinct cluster.

2. Materials and Methods

The quantitative survey instrument used for this study was part of a larger research endeavor to investigate public perceptions of water resource protection and climate change so that environmental communication efforts can be tailored to specific needs. The target population was U.S. residents 18 years of age or older.

2.1. Instrument Development

Data were collected using demographic and Likert-type scale questions. Two scales were used to determine respondents' water conservation behavior level: self-reported intent to engage in water conservation behaviors in the future and how respondents prepared to vote on a policy that impacts water. Self-reported intent to engage in water conservation behaviors in the future was measured by asking respondents to indicate how likely they were to engage in 18 specific water conservation behaviors. The scale was researcher-adapted from Owens and Lamm [29]. Specifically, respondents were asked to indicate how likely or unlikely they were to engage in a particular water conservation behavior in the future using a five-point Likert-type scale (1 = Very Unlikely; 2 = Unlikely; 3 = Undecided; 4 = Likely; 5 = Very Likely). If the behavior did not apply to a respondent, they were allowed to indicate Not Applicable. For example, if someone was asked if they would avoid purchasing fertilizer if their landscape quality would decrease but they do not have an outdoor landscape, they would likely select Not Applicable. The statements included how likely individuals were to: donate to an organization that protects water, join a water conservation organization, buy a specialty license plate that supports water protection efforts, only run the washing machine and dish washer when it is full, keep a timer in the bathroom to help them take a shorter shower, only water their lawn in the morning or evening, reduce the number of times a week they water their lawn, sweep patios and sidewalks instead of hosing them down, volunteer for a stream clean up or wetland restoration event, vote for candidates who support water conservation, reduce use of fertilizer and pesticides if their landscape quality would decrease, responsibly dispose of hazardous materials, avoid purchasing plants that require a lot of water, reduce their use of natural resources, and support water restrictions used by their local government in the future. Scale reliability was calculated post hoc ($\alpha = 0.92$). The mean score of the responses to the 18 items was used to create an overall scale for self-reported intent to engage in water conservation behaviors in the future. Respondents who selected Not Applicable to a statement received a mean score based on the number of statements answered rather than the entire set.

How respondents prepared to vote on a policy that impacts water was measured by asking respondents to indicate their level of agreement or disagreement with five statements. Respondents indicated their level of agreement or disagreement using a five-point Likert-type scale (1 = Strongly Disagree; 2 = Disagree; 3 = Neither Agree nor Disagree; 4 = Agree; 5 = Strongly Agree). Preparedness to vote statements included if respondents would seek factual information from multiple sources, seek to fully understand the policy,

consider both the positive and negative implication that could result, discuss their opinion with others, and ask others what their opinions are when preparing to vote on a policy that impacts water. Scale reliability was calculated post hoc ($\alpha = 0.90$). The mean score of the responses to the five items was used to create an overall scale for how respondents prepared to vote on a policy that impacts water.

The instrument was reviewed for face and construct validity by a panel of experts in survey design, natural resource management, educational research, and water conservation prior to pilot testing. The research design was then approved by the University of [State] Institutional Review Board (IRB #00001893) and pilot tested ($n = 50$) with individuals who were representative of the sample. All scales were deemed reliable ($\alpha > 0.70$) [30]. The instrument was not changed following the pilot test, given the accuracy of the measurement scales.

2.2. Data Collection

The instrument was used to collect data from U.S. residents using an online survey platform, Qualtrics, in September 2020. Respondents were recruited using non-probability opt-in sampling [31]. Public opinion research commonly uses non-probability opt-in sampling to make population estimates and have been found to be equal to, and sometimes better than, probability sampling [31]. Respondents were compensated by Qualtrics according to their standard protocols. The sampling technique does have limitations associated with access to the internet and individuals inclined to opt in to incentivized panels, introducing sampling bias. To ensure the sample collected was representative of the population of interest, a priori quotas were established prior to data collection based on gender, age, race/ethnicity, and geographic location described in the 2010 Census [32]. In addition, post hoc weighting techniques were applied to the dataset using the 2010 Census data to ensure further analysis adequately represented the population of interest [31].

2.3. Demographics

A total of 1049 U.S. residents completed the survey [33]. Over half of respondents were White (72.4%), had at least a two-year college degree (59.2%), and a total family income (before taxes) of less than USD 149,999 (85.4%; see Table 1).

Table 1. Demographics of respondents prior to weighting ($N = 1049$).

Respondents' Demographics	*N*	%
Sex		
Male	525	50.0
Female	524	50.0
Age		
18–34 years	353	33.7
35–54 years	349	33.3
55+ years	347	33.1
Race *		
White	759	72.4
Black	148	14.1
Asian	102	9.7
American Indian or Alaska Native	33	3.1
Other	22	2.1
Ethnicity		
Hispanic	99	9.4
Non-Hispanic	950	90.6

Table 1. *Cont.*

Respondents' Demographics	*N*	%
Education		
Less than 12th grade	22	2.1
High school diploma	202	19.3
Some college	204	19.4
2-year college degree	109	10.4
4-year college degree	272	25.9
Graduate or Professional degree	240	22.9
Family Income		
Less than USD 24,999	185	17.6
USD 25,000–49,999	240	22.9
USD 50,000–74,999	215	20.5
USD 75,000–149,999	256	24.4
USD 150,000–249,999	101	9.6
USD 250,000 or more	52	5.0
Political Ideology		
Very Liberal	146	13.9
Liberal	206	19.6
Moderate	384	36.6
Conservative	188	17.9
Very Conservative	125	11.9

Note: * Respondents were allowed to select more than one race; therefore, the percentages do not equal 100%.

2.4. Data Analysis

Hierarchical and K-means cluster analysis was used to identify distinct groups of U.S. consumers based on their level of water conservation behavior. Previous studies have used cluster analysis to determine audience segments in social sciences [25,34]. Cluster analyses are data reduction techniques that take large data sets and organize responses into smaller, maximally dissimilar groups, also known as clusters, based on respondents' response pattern [34–37]. In theory, similar individuals in a study population are represented by the segments of clusters [31].

A cluster analysis using two input variables, intent to engage in water conservation behaviors and preparedness to vote on a policy that impacts water, was run on 1049 cases via SPSS 26 [33] (Chicago, IL, USA). The correlation between intent to engage in water conservation behaviors and preparedness to vote on a policy that impacts water ($r = 0.60$, $p < 0.05$) was below 0.80 and, thus, deemed acceptable based on the literature [38]. No outliers were removed from the dataset. Variables were not centered, modified, or standardized prior to analysis as they were all measured on the same scale and equally distributed.

First, a hierarchical cluster analysis was conducted using Ward's method specifying Squared Euclidean Distance to determine the number of subgroups that would achieve maximum dissimilarity between resulting subgroups [37]. Ward's method is commonly used when the number of clusters needs to be determined [35]. An appropriate number of subgroups was determined based on a cutoff value of 15 and the largest distance between clusters (vertical lines) in the dendrogram [37] (Figure 1). K-means clustering, which allows the researcher to select the appropriate number of clusters for the analysis, was conducted using Ward's method to partition the dataset into appropriate subgroups, e.g., [25,35]. The maximum iterations were adjusted from 10 to 99 to avoid any issues with early convergence in the solution. Convergence was achieved in 12 iterations. After individual cases were assigned to the two clusters, analysis of variance (ANOVA) was used to determine the magnitude of difference between the variables of interest and cluster membership. Chi-square analyses were used to determine significant differences between the cluster groups' categorical demographics (e.g., age, sex, education, family income, and political ideology).

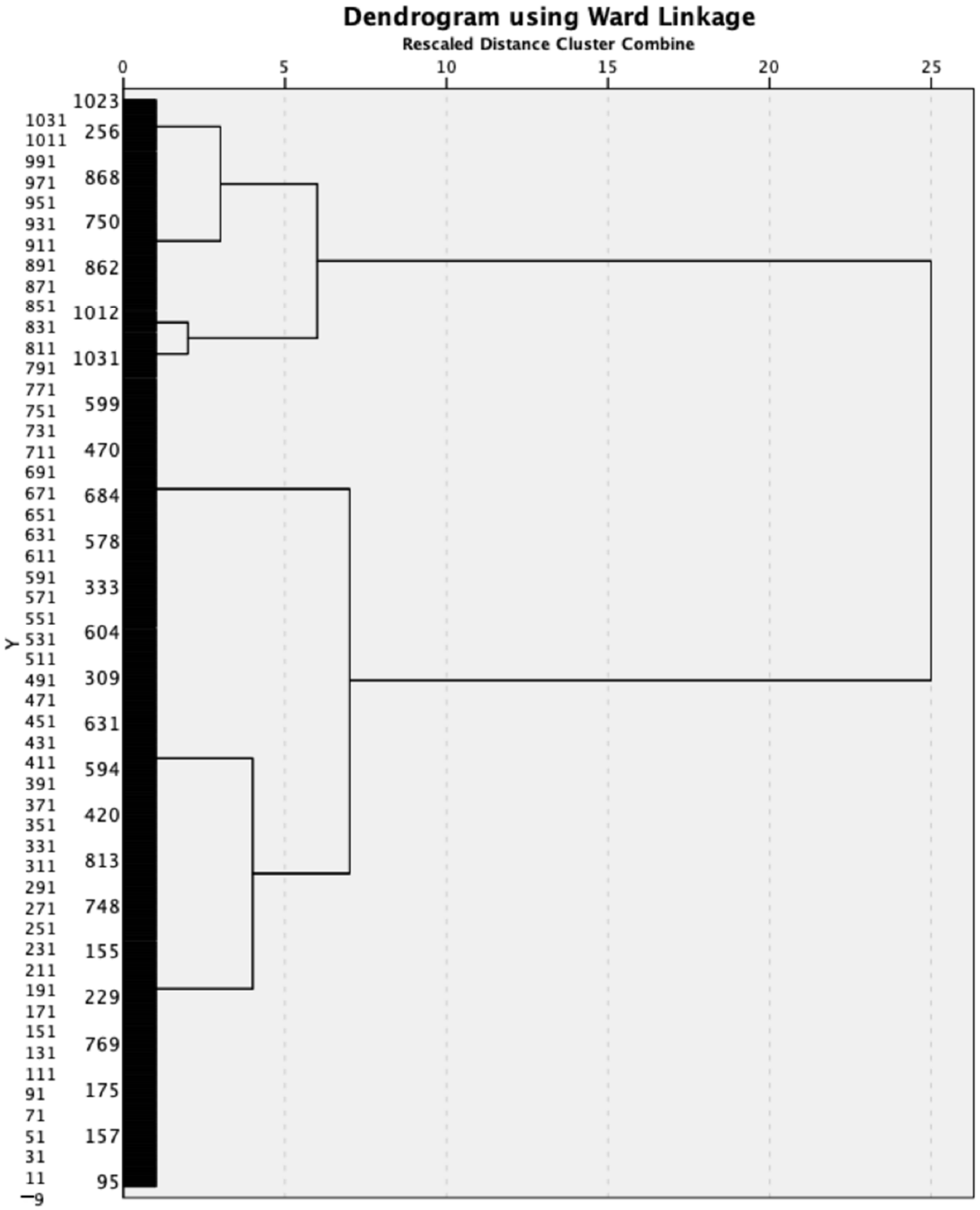

Figure 1. Dendrogram output using Ward Linkage to determine number of clusters.

2.5. Limitations

Using non-probability opt-in sampling must be acknowledged as a limitation. Although public opinion research often uses non-probability opt-in sampling [31], the sample may have bias, as not all types of individuals have access to the internet and not all types of individuals will answer surveys [32]. Moreover, the survey focused on water and respondents may have felt pressured to conform to their perceived norm about water conservation [39].

Data were collected during a politically contentious time period in the U.S. [40], possibly altering respondents' political viewpoints in the short term. For example, a partisan divide in the U.S. public was caused by the 2020 Presidential Election, with the Republican incumbent having the largest partisan gap in approval rating known from polling

data [41]. In addition, the death of George Floyd, a Black man who was killed in police custody in Minneapolis, sparked protests around the country [42]. The U.S. public was divided in their opinions of what caused the protests, with 45% of Republicans and 84% of Democrats believing the protests were due to deep-rooted mistreatment of Black people in the country [42].

Another limitation was that data were collected during the coronavirus pandemic, which may have influenced how respondents participated in the survey. For example, the coronavirus pandemic caused many public spaces, such as libraries and internet cafes, to temporarily close and only residents with internet access had the ability to participate in the online survey [43,44]. In addition, the coronavirus pandemic increased consumers' engagement with nature (i.e., visiting parks, identifying plants and animals) throughout the U.S. [45], which may have impacted how respondents perceived the importance of water resources during data collection.

3. Results

Two distinct audience segments emerged through the cluster analysis (see Table 2). The audience segments (identified as clusters in the analysis) were distinctively different in both their intent to engage in water conservation behaviors ($F = 788.86$, $p < 0.001$, $\eta^2 = 0.430$) and preparedness to vote on a policy that impacts water scales ($F = 1128.33$, $p < 0.001$, $\eta^2 = 0.519$). Subsequently, names were selected to represent the identified audience segments: lower water conservation behavior ($n = 269$) and higher water conservation behavior ($n = 780$). The lower water conservation behavior segment was, on average, between unlikely and undecided about engaging in water conservation behaviors in the future ($M = 2.73$, $SD = 0.74$) and, on average, between disagreed and neither agreed nor disagreed that they were prepared to vote on a policy that impacts water ($M = 2.77$, $SD = 0.82$). The higher water conservation behavior segment was, on average, between undecided and likely to engage in water conservation behaviors in the future ($M = 3.90$, $SD = 0.52$) and, on average, above agreed that they were prepared to vote on a policy that impacts water ($M = 4.15$, $SD = 0.47$).

Table 2. Respondents' level of water conservation behavior based on demographic characteristics.

Respondents' Demographics	Audience Segment 1 Lower Water Conservation *n* = 269%	Audience Segment 2 Higher Water Conservation *n* = 780%	X^2
Age			4.29
18–34 years	38.7	31.9	
35–54 years	29.7	34.5	
55+ years	31.6	33.6	
Sex			1.16
Male	47.2	51.0	
Female	52.7	49.0	
Education			58.26 *
Less than 12th grade	4.1	1.4	
High school diploma	29.0	15.9	
Some college	23.8	17.9	
2-year college degree	8.9	10.9	
4-year college degree	24.9	26.3	
Graduate or Professional degree	9.3	27.6	
Family Income			37.53 *
Less than USD 24,999	26.4	14.6	
USD 25,000–49,999	24.5	22.3	
USD 50,000–74,999	21.6	20.1	
USD 75,000–149,999	21.9	25.3	
USD 150,000–249,999	3.3	11.8	
USD 250,000 or more	2.2	5.9	

Table 2. *Cont.*

Respondents' Demographics	Audience Segment 1 Lower Water Conservation *n* = 269%	Audience Segment 2 Higher Water Conservation *n* = 780%	X^2
Political Ideology			24.80 *
Very Liberal	7.4	16.2	
Liberal	14.5	21.4	
Moderate	44.6	33.8	
Conservative	21.6	16.7	
Very Conservative	11.9	11.9	

Note: * $p < 0.001$.

Significant differences were identified between the two audience segments when segment demographics were analyzed. The education level ($X^2 = 58.26$, $p < 0.001$) of the lower water conservation behavior segment was less than the education level of the higher water conservation behavior segment. Specifically, over half of the lower water conservation behavior segment had some college education or less (56.9%), whereas the majority of the higher water conservation behavior segment had at least a 2-year college degree (64.8%). The total family income ($X^2 = 37.53$, $p < 0.001$) of the lower water conservation behavior segment was less than the total family income of the higher water conservation behavior segment. Specifically, half of the lower water conservation behavior segment had a family income USD 49,999 or less (50.9%), whereas the majority of the higher water conservation behavior segment had a family income USD 50,000 or greater (63.1%). The political ideology ($X^2 = 24.80$, $p < 0.001$) of the lower water conservation behavior segment was mostly Moderate, Conservative, or Very Conservative (78.1%), whereas the political ideology of the higher water conservation behavior segment was mostly Moderate, Liberal, or Very Liberal (71.4%).

4. Discussion and Conclusions

The demand for fresh water will not decrease if consumers remain unaware of the severity of water scarcity around the globe [4,6]. Therefore, providing water conservation information and engagement opportunities that effectively engage and resonate with complex consumers in water issues and policy, based on target audiences' distinct needs, is imperative to the future of water security. This study added to the literature by determining characteristics of audience segments based on their level of water conservation behavior so that water protection communication efforts can be tailored to specific audiences in the U.S. To the authors' knowledge, no other studies have used intent to engage in water conservation behaviors and preparedness to vote on a policy that impacts water to conduct a cluster analysis; thus, the results of this study may align with previous research but cannot be directly compared.

Two distinct audience segments emerged from the analysis: lower water conservation behavior and higher water conservation behavior. The audience segments that emerged from the cluster analysis were similar to Maibach et al. who also found distinct audiences of respondents based on multiple measures of climate change engagement [21]. The results of both studies indicated that pro-environmental tendencies tend to align with each other as clusters were formed that exhibit higher environmental tendencies versus lower environmental tendencies. However, Maibach et al. identified six segments of climate engagement clusters that were represented along a continuum rather than a binary, higher-versus-lower engagement that was identified in this study. Having a larger number of segments may provide more detailed information about segments of the population, allowing for the greatest return on investment in communication campaigns. It is possible that the larger number of segments may also be attributed to the multiple measures used to identify climate change engagement. However, creating targeted messages for an extensive number of groups may be difficult when working with organizations who may not be

interested in or capable of segmented messaging strategies [21]. Regardless, segmenting and targeting distinct audiences to inform water communication may promote adaption as compared to non-targeted approaches [21].

The findings indicated 74.4% of the population sample were likely to engage in water resource protection behaviors, which aligns with Warner et al. who found nearly 70% of irrigation users in Florida are fairly water conscious [25]. This high number is surprising, however, considering previous studies have found adoption of demand-side water conservation is highly variable [6]. Warner et al. attributed the high percentage of fairly conscious irrigation users in Florida to their frequent drought conditions and urgent outreach programs throughout the state. It is possible that communication messages and outreach programs are beginning to resonate with consumers throughout the U.S. as the changing climate influences drought conditions in many regions. The severity of current water scarcity issues has also recently been publicized in the media. In 2018, for example, people around the globe were made aware the City of Cape Town, South Africa, was within months of turning off public water supplies due to extreme drought [46]. Reoccurring drought conditions in the state of California have been described as being "on par with the worst dry spells of the last millennium" [47].

There are several limitations that must be acknowledged prior to interpretation of the results, including the use of self-reported water conservation behaviors. Numerous studies have found a discrepancy regarding perceived water consumption and actual water consumption [1,28], which may account for the surprising percentage of the sample population that were highly engaged in water conservation behaviors. Future studies should determine how the U.S. public perceives their water consumption versus their actual water consumption in order to address disparities across levels of water use and demographic groups [1]. Moreover, this study only encompasses two outlets of water conservation behavior, even though behavior change can include anything from increasing personal knowledge to helping at volunteer events [8]. This study also considered mean likelihood of engaging in a group of household water conservation behaviors and mean voter preparation activities. A survey instrument that included additional nuances in water conservation behavior, such as personal experiences with water scarcity, may result in more complex segments and add to the depth of the findings presented here [8]. Similarly, a study that considers individual conservation activities or classes of similar practices rather than the mean of the conservation activities may identify more targeted groups with interesting patterns of behavior. For example, groups could be separated based on their indoor water use and outdoor water use, possibly resulting in a high indoor conservation and high outdoor conservation group and a low indoor conservation and low outdoor conservation group. It should be noted that the study results reported here are preliminary and should be treated as a starting point to explore conservation messages that promote water conservation among the specific audience segments.

Despite these limitations, the study offers several implications for practice and future research. The lower water conservation segment had less education, held more moderate or conservative political ideologies, and had lower family incomes than the higher water conservation segment. These results, specifically family income level, are in contrast with previous literature on water conservation behavior based outside of North America, e.g., [1,9,10] or that are state/city-specific, e.g., [6,24]. For example, Huang et al. identified Florida high water users as those with more education and higher income levels [24]. However, 44.3% of respondents to Huang et al. were older than 60, whereas one-in-three respondents in the present study were 55 and older [24]. The age differences may have affected the income and education levels [9].

Respondents in the lower water conservation segment held more Moderate or Conservative political ideologies, which aligns with literature suggesting that environmental issues such as water are viewed through a political lens [8]. Environmental communicators should review local precinct voting records to determine messaging strategies for their target audience's political ideology [8]. Regardless of political ideology, communi-

cation messages should focus on shared values related to water conservation behaviors rather than citing scientists or data about water scarcity, which rarely leads to positive outcomes [8]. In addition, communicators may benefit from conducting water programs at community centers that do not use political jargon, as it may cause messages to be ignored if they do not align with a political viewpoint. Discussing pro-environmental behavior that directly benefits members of the community rather than data about water scarcity may encourage more moderate or conservative political ideologies to engage in water conservation. In addition, discussion among community members about water conservation may increase subjective norms in the community, which has been found to positively predict environmental behavior [25].

Respondents in the lower water conservation segment had lower family incomes than the respondents in the higher water conservation segment. Targeting return-on-investment messaging at the lower water conservation segment may promote pro-environmental behavior as previous studies have found communication about behavior change approaches that result in return on investment for consumers are imperative in today's society [25,48]. Considering adoption of water saving appliances has been shown to reduce residential water demand [6], future studies may benefit from exploring if communication messages focused on the reduced water bills that these technologies provide rather than the percentage of water saved encourages adoption among the lower water conservation segment. It may be possible that the lower water conservation segment does not have the capacity to conserve water due to unknown barriers. Future studies should also conduct focus groups with members of the lower water conservation segment to determine barriers to adopting water conservation behaviors and technologies they may encounter. Perhaps members of the higher water conservation segment should be engaged with policy implementation for water-saving technologies, such as governmental rebates, so that technology is easier to implement for all consumers. Moreover, environmental communicators should target members of the higher water conservation segment who have the capacity to conserve water because they may be more likely to improve their existing practices compared to individuals in the lower water conservation segment.

Though preliminary, the results of this study may provide a fresh lens through which to examine the existing water conservation audience segmentation literature and expand upon it. Previous research has shown segmented groups unconcerned with water use prefer visiting a website or watching TV coverage to gain education about water topics [4]. Websites can reach a targeted audience more efficiently than TV coverage. Thus, future social marketing research may consider developing websites that incorporate preferences of the lower water conservation segment identified in this study to examine the effects of specific website features in promoting water conservation. For example, to explore the influence of using everyday language and eliminating scientific jargon, future research would benefit from testing its effectiveness among people of all education levels on an interactive website to determine if such messaging increased intent to engage in water conservation behaviors. Additionally, international studies have shown varying levels of trust in institutions—such as companies, scientists, media, and government—to provide water quality information, and those levels of trust differ significantly by consumer gender, age, and education [23]. Future studies may provide further insight into these findings by exploring how those in the lower water conservation segment perceive the credibility of a scientific source to determine which institution would serve as the most effective channel in providing messaging to the lower water conservation segment.

As the culture and political atmosphere of the U.S. continue to shift, it is important environmental communicators can appropriately target consumers with water resource protection messages. The preliminary results of this study add to the literature base by providing environmental communicators with the opportunity to better understand their audience, and the demographic characteristics that segment water users in the U.S. In addition, this information should inform future research and policy makers of the complexity of demographic characteristics when targeting consumers' water conservation

behaviors. Perhaps many consumers are already knowledgeable about water conservation and messages that focus on shared values related to water conservation are needed.

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