

Participation in Volunteer-Driven Programs and Their Effects on Homeowners' Landscaping Practices

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Abstract: *Based on responses from a regional survey, Master Gardeners are more likely to report changes in yard landscaping and fertilizer and chemical use practices than are non-participants. Water quality monitoring volunteers are more likely to report changes in uses of fertilizers and other chemicals and in yard irrigation. Water resource protection group participants are more likely to report changes in all types of yard management practices examined. Respondents' demographics, place of residence, environmental attitudes, and news sources are also correlated with reported changes in behavior. We employ these factors to control for systematic factors related to participation on these programs.*

Introduction

Broad citizen involvement in water resource management can ensure public support for water policies, provide additional data about pollution sources and abatement options, and reduce pollution loading to streams and rivers. Extension involves the public in water resource management through volunteer programs, such as Master Naturalist, Watershed Stewards, Water Watch, and Master Gardener, which focus on water pollution sources, pollution prevention, and water conservation.

In the study reported in this article, we examined three types of volunteer programs that include water resources modules: Master Gardener, volunteer water quality monitoring, and water resource protection groups. We also examined how effective volunteer water resource programs are in reaching the general public and whether participation in these volunteer programs induces citizens to make their daily activities more sustainable. The main objective of the study was to analyze participation in such programs and its influence on homeowners' yard management practices in the southern United States.

Methodology

The analysis is based on a public survey conducted by the authors in eight southern states: Alabama, Arkansas, Florida, Louisiana, Mississippi, Oklahoma, Tennessee, and Texas. The survey objectives were to document public awareness, attitudes, and actions toward water resources and to collect baseline data to evaluate current outreach programs and inform future ones.

The survey questionnaire, based on the template used in the Pacific Northwest (Mahler, Simmons, Sorensen, & Miner, 2004), was administered as a mail-out survey. Respondents' participation in volunteer activities was evaluated using the following question:

1. Have you participated in any of the following activities? (Circle all that apply)
 - a. Master Gardener program
 - b. Volunteer water quality monitoring
 - c. Lake, river, bay, wetland, or watershed protection groups

This survey question was formulated broadly to reflect the diverse volunteer programs in the region based on households':

1. Socio-demographics and place of residence
2. Preferred learning opportunities for water resource topics
3. Sources of news

To examine households' decisions related to yard management, the following question was asked:

2. Have you or someone in your household done any of the following as part of an individual or community effort to conserve water or preserve water quality? (Check all that apply)
 - Changed the way your yard is landscaped
 - Changed how often you water your yard
 - Changed your use of pesticides, fertilizers, or other chemicals

Answer choices for question B cover a broad range of actions. For example, "changed the way your yard is landscaped" can potentially refer to vegetation types and placement, mulching, or

changes in mowing practices. Similarly, changes in the frequency of yard watering can mean installation of smart irrigation technologies, irrigation timer adjustments, or changes in hand-watering practices. Finally, changes in the use of pesticides, fertilizers, or other chemicals (referred to as "yard chemical use" below) can imply modification of contracts with professional landscape companies, implementation of integrated pest management techniques, changes in the fertilizer brand, or reduction in fertilizer use. Therefore, due to the broadness of the survey question, the analysis presented in this paper can only explain general changes in households' yard management. This can be considered a first step towards the subsequent analysis of household preferences for specific practices.

Target sample sizes for each state were based on state population, and a random sample of residential mailing addresses was purchased from Survey Sampling International (Fairfield, Connecticut). The survey was administered in the summers of 2008 and 2009. Initial sample sizes and survey response rates are summarized in Table 1. Similar to the surveys implemented in other regions (Mahler, Simmons, Sorensen, & Miner, 2004), more males than females returned the survey, and the survey respondents were slightly older and more educated than the average residents of the state. To analyze the responses to the survey's questions we employed logit regression models (see, e.g., Kennedy, 2008), which is a standard way to model binary choice responses.

Table 1.
Public Survey in Eight Southern States

State	Initial Number of Residential Addresses	Response Rate (%)	Total Number of Responses Received
AL	623	46.7	291
AR	425	60.5	257
FL	1154	45.5	523
LA	600	41.8	251
MS	523	54.3	284
OK	500	52.8	264
TN	712	49.7	354
TX	1275	32.9	419
Total	5189	50.9	2643

Results

Participation in the Volunteer Activities

Overall, 13% of survey respondents indicated participation in at least one of the three volunteer activities. Given that the population in the eight states is 45 million people (25 years old and older, U.S. Census Bureau, 2010), this result suggests that the programs reached approximately 6 million people. This number can even be higher if one considers the influences on volunteers' friends and families.

Approximately 5% of respondents participated in each of the volunteer activities (Table 2). While there was a correlation among the participation in the three activities, it was small (Pearson correlation coefficient for each activity was at or below 0.12), implying that only a few respondents indicated participation in more than one activity.

Table 2.
Reported Participation in the Three Volunteer Activities (Question A)

	Master	Volunteer water	
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State	Gardener program	quality monitoring	Lake, river, bay, wetland, or watershed protection groups
AL	5.5%	5.5%	7.6%
AR	4.7%	3.9%	6.2%
FL	6.1%	5.5%	6.1%
LA	4.8%	4.0%	6.4%
MS	7.4%	5.0%	7.0%
OK	1.9%	3.0%	2.7%
TN	2.0%	3.4%	4.2%
TX	3.8%	4.8%	3.3%
<i>Total</i>	4.6%	4.5%	5.4%

Master Gardener Program

Using logit regression analysis, we identified the factors that were correlated with participation in the Master Gardener program in a statistically significant way (Table 3). Participation in the program was especially high in Alabama, Florida, and Mississippi, and in the medium-size cities (with population between 25,000 and 100,000 residents). Respondents 65 years old or older were more likely to participate in the program. Finally, preferences for specific learning opportunities were also important: those who preferred to learn about water issues through attending a short course or workshop, taking a course for certification or credit, or learning how to conduct water practice assessment were more likely to indicate participation in the program. This result is not surprising given the "hands-on" learning opportunities emphasized by the Master Gardener program.

Table 3.
Factors That Determine Participation in the Volunteer Activities

Variable	Master Gardener program	Volunteer water quality monitoring	Lake, river, bay, wetland, or watershed protection groups
<i>Logit Model Intercept</i>	_ ***	_ ***	_ ***
<i>Residence Characteristics</i>			
AL	+ **		+ **
AR			+ **
FL	+ **		+ **
LA			+ **
MS	+ **		+ **
TN			
TX			
Residence in a city with population			

greater than 100,000 residents			
Residence in a city with population between 25,000 and 100,000 residents	+ **		
Residence outside city limits			+ **
Respondents living in their states for less than 10 years			
<i>Socio-Demographics</i>			
45 – 64 years old		+ **	
65 years old and older	+ **	+ ***	
Female			- **
Some college or college degree			+ ***
Advanced degree			+ ***
<i>If you had the following kinds of learning opportunities to learn more about water issues, which would you be most likely to take advantage of?</i>			
Read printed fact sheets, bulletins, or brochures			+ **
Visit a web site			
Attend a short course or workshop	+ **		
Look at a demonstration or display			
Read a newspaper article or series		- **	
Watch TV coverage			
Watch a video of information			
Take part in a onetime volunteer activity (for example, water monitoring, streamside restoration, or education)			+ ***
Take a course for certification or credit	+ **		+ **
Get trained for a regular volunteer position (for example, as a watershed steward or a water quality monitor)			
Learn how to conduct a home, farm, or workplace water practices assessment	+ ***	+ **	+ ***
Attend a fair or festival		+ **	
<i>c (with c = 0.5 implying no</i>	<i>0.72</i>	<i>0.69</i>	<i>0.75</i>

<i>predictive power in the model, and $c = 1$ implying absolute predictive power)</i>			
<i>Likelihood Ratio Test (degrees of freedom = 28)</i>	70.49***	49.41***	98.22***
** Statistically significant at the 95% confidence level			
*** Statistically significant at the 90% confidence level			

Volunteer Water Quality Monitoring Activities

Similar to the results discussed above, participation in volunteer water quality monitoring activities was higher among older respondents (those 45 years old or older). In addition, those who preferred to learn about water issues via studying how to conduct a home, farm, or workplace water practices assessment or via attending a fair or festival were more likely to indicate participation in such proactive activity as volunteer monitoring groups. In contrast, those who preferred to learn about water issues passively—by reading newspapers—were less likely indicate participation in volunteer monitoring.

Lake, River, Bay, Wetland, or Watershed Protection Groups

Participation in lake, river, bay, wetland, or watershed protection groups (referred to as "water resource protection groups" below) was especially high in five states: Alabama, Arkansas, Florida, Louisiana, and Mississippi (Table 3). Respondents living outside the city limits were more likely to indicate participation in protection groups, which may reflect the direct connection between the state of water resources and human well-being in rural areas. However, given that the population in cities is much larger compared to rural areas, the total number of participants was higher among those living inside city limits.

Participation rate was higher among respondents with at least some college education and lower among female respondents. Finally, those who reported participation in the protection groups also preferred to learn about water resources through printed fact sheets, bulletins, or brochures; one-time volunteer activities; certification or credit courses; or by understanding how to conduct home, farm, or workplace water practice assessment.

Changes in Yard Management Practices

The overwhelming majority (70%) of respondents implemented at least one of the yard management practices to conserve water or preserve water quality. This result implies high awareness of the public in general about water resource issues and the public's willingness to modify their own behavior to protect water resources. The majority of respondents (60%) indicated that their households had changed the frequency of yard watering (Table 4). Changes in yard chemical use were made by 30%, and changes in yard landscaping by 23% of respondents. The implementation of these three practices was correlated; however, this correlation was relatively small (Pearson's correlation coefficient for each activity was at or below 0.25), implying that relatively few respondents implemented two or more actions.

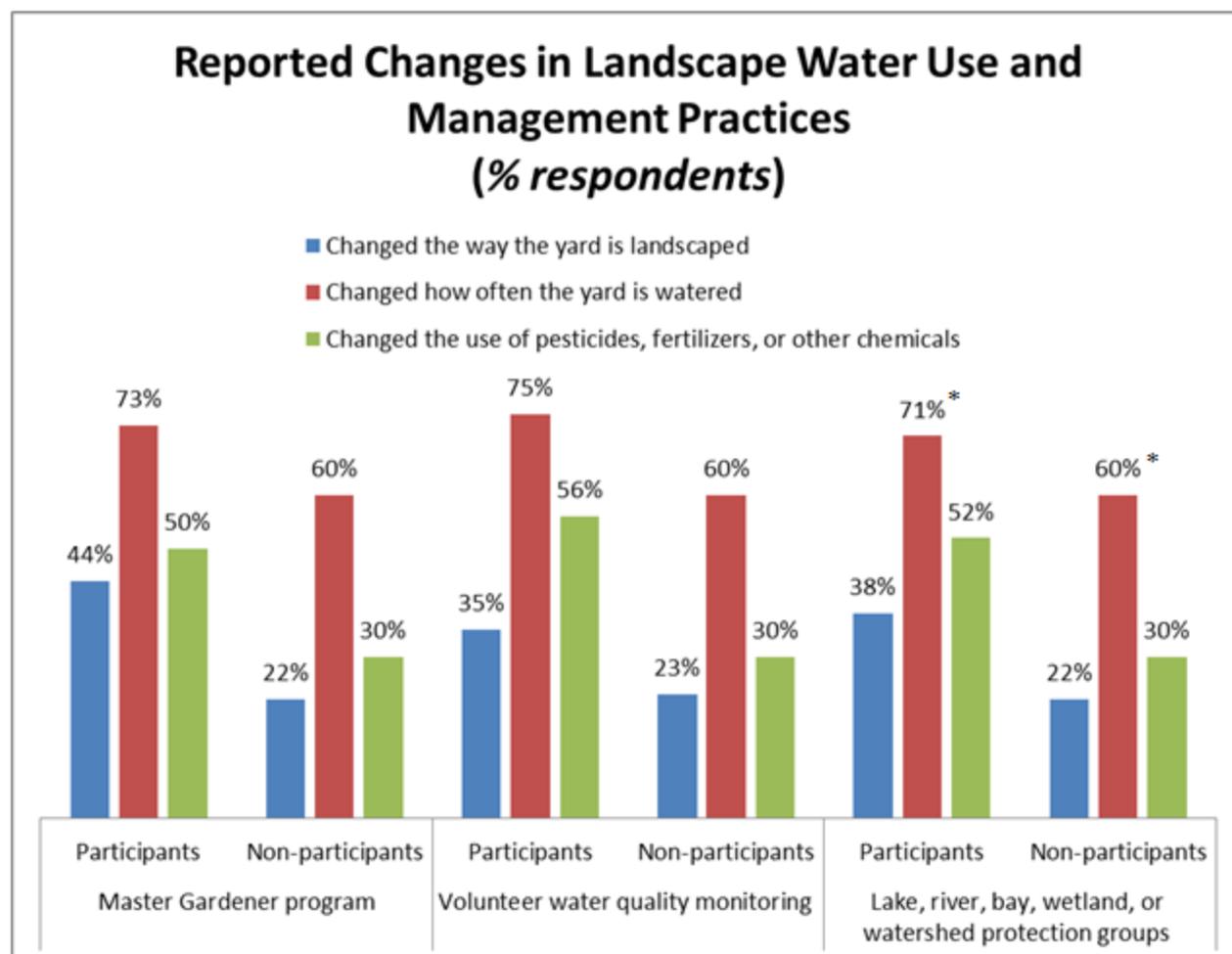
Table 4.
Reported Changes in Landscape Water Use and Management Practices
(Question B)

State	Changed the way the yard is landscaped	Changed how often the yard is watered	Changed the use of pesticides, fertilizers, or other chemicals
AL	20.6%	63.6%	28.2%
AR	18.3%	49.8%	20.2%

FL	31.6%	70.4%	33.8%
LA	17.1%	44.6%	28.3%
MS	18.7%	49.3%	31.3%
OK	19.3%	54.6%	28.8%
TN	19.5%	54.5%	30.8%
TX	26.0%	72.1%	32.9%
Total	22.6%	59.5%	30.0%

Participation in the three volunteer activities is positively correlated with reported changes in yard management practices and with the participants significantly more likely to report the changes (Figure 1). The only exception is the participation in water resource protection groups that increased the likelihood of reporting changes in yard landscaping and yard chemical use practices but not the frequency of yard watering.

Figure 1.
Participation in the Volunteer Programs and Changes in Landscape Water Use and Water Management Practices (Question B)



* The difference is not statistically significant.

The reported changes in households' practices differed among the states: more respondents from Florida and Texas indicated changes in yard landscaping and watering frequency (which may be associated with more stringent policies implemented in these states). Respondents living in large cities (with population greater than 100,000 residents) were more likely to indicate

changes in the frequency of yard watering, while those living outside city limits were less likely to indicate so (Table 5). This result may be linked to watering restriction ordinances implemented by municipalities in the region.

Older respondents were less likely, while respondents with advanced degrees were more likely, to indicate changes in the way their yards were landscaped (which may be related to the higher income or greater technical knowledge of more educated respondents). Female respondents were more likely to indicate changes in yard chemical use.

Finally, sources of news were also correlated with reported changes in yard management practices. Those who normally get the news from radio or public television were more likely to indicate changes in yard landscaping and chemical use. Respondents getting the news from magazines and newsletters or local television were more likely to report changes in the use of pesticides, fertilizers, or other chemicals. Audiences of different news media outlets vary by their views. For example, public broadcasting and magazines attract more liberals (Gentzkow & Shapiro, 2010), who traditionally have pro-environmental attitudes.

Table 5.
Factors That Change in Yard Watering and Management Practices

Variable	Changes in the way respondents' yards are landscaped	Changes in how often respondents water their yards	Changes in the use of pesticides, fertilizers, or other chemicals
<i>Intercept</i>	_ ^{***}		_ ^{***}
<i>Volunteer Activities</i>			
Participation in Master Gardener Program	+ ^{***}	+ ^{**}	+ ^{***}
Participation in volunteer monitoring groups	+ ^{**}	+ ^{***}	+ ^{***}
Participation in water resource protection groups	+ ^{***}		+ ^{***}
<i>Residence Characteristics</i>			
AL		+ ^{**}	
AR			_ ^{**}
FL	+ ^{***}	+ ^{***}	
LA		_ ^{**}	
MS			
TN			
TX	+ ^{**}	+ ^{***}	
Residence in a city with population greater than 100,000 residents		+ ^{**}	
Residence in a city with			

population between 25,000 and 100,000 residents			
Residence outside city limits		- **	
Respondents living in their states for less than 10 years			
Socio-Demographics			
45 - 64 years old			
65 years old or older	- **		
Female			+ ***
Some college or college degree			
Advanced degree	+ **		
Sources of News			
Normally get news from local newspapers			
Normally get news from major newspapers			
Normally get news from radio	+ **		
Normally get news from internet			
Normally get news from local television			+ **
Normally get news from national television			
Normally get news from cable television			
Normally get news from public television	+ ***		+ **
Normally get news from magazines and newsletter			+ ***
<i>c (with c = 0.5 implying no predictive power in the model, and c = 1 implying absolute predictive power)</i>	0.66	0.66	0.64
<i>Likelihood Ratio Test (degrees of freedom = 28)</i>	145.15***	169.19***	137.02***

** Statistically significant at 95% confidence level

*** Statistically significant at 90% confidence level

Conclusion

One in eight survey respondents (13%) indicated participation in Master Gardener, volunteer monitoring, or water resource protection groups, implying the broad reach of these programs. Not surprisingly, these structured volunteer activities are more likely to attract "active learners," those who prefer to take a course or learn how to conduct home, farm, or workplace water practice assessment. To further increase these programs' reach, special Web-based modules can be developed for those who prefer other methods of learning. Furthermore, given that the participants of Master Gardener and volunteer monitoring groups tend to be older, additional activities can be developed for younger audiences.

The overwhelming majority (almost 70%) of respondents changed the frequency of yard watering; the use of pesticide, fertilizers, and other chemicals; or the way their yard is landscaped to conserve water or preserve water quality. This result indicates the public's awareness about water resource issues in the region and their willingness to take actions to protect water resources. In addition to this general trend, participation in Master Gardener, volunteer monitoring, and water resource protection groups significantly increased the likelihood of respondents reporting changes in their yard management practices to protect water resources. Among those who participated in these volunteer activities, 85% implemented at least one of the yard management practices listed in the survey.

Can these estimated impacts on yard management practice be interpreted as being caused by participation in the programs analyzed? For this to be the case, we would need to assume that the control variables available to us (demographics, place of residence, etc.) fully control for systematic factors related to participation and yard management practice. Because this assumption may be a strong one, we refrain from taking a strong stand about the causal interpretation of the estimated impacts. However, we believe they represent one of the best available indicators of the importance of these programs. Thus, the significant impact of volunteer activities on citizens' behavior found in the study reported here should be considered when making decisions about alternative water management strategies.

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