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Socio-Demographic Characteristics and Concerns about Water Quality Issues of Master Gardener Program Volunteers[1]

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Introduction

To respond to residents' informational needs, the Cooperative Extension Service offers a variety of volunteer training and certification programs. Who participates in such programs? What types of audiences are being reached? Do such programs increase knowledge and change behavior of the volunteers? In this article, we attempt to answer these questions by summarizing existing studies and using responses to a regional public survey, and by focusing on the Master Gardener program and surface water quality issues as examples.

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What is the master gardener program?

The Master Gardener program is an adult outreach program administered by county Cooperative Extension offices. It provides interested citizens with training on horticultural topics. In return, the volunteers assist Extension agents in educating the public about gardening and plants, including answering horticultural questions received from local residents (Bobbitt 1997; Strong 2010). Like other land-grant university Extension outreach programs, the Master Gardener program has evolved and adapted to meet the changing informational needs of the public. Although the primary focus for the program is still the diagnosis of plant problems, other modules about volunteerism, youth education, and environmental sustainability, including water resource topics, have been added to the Master Gardener training curricula (Bobbitt 1997; Chalker-Scott and Tinnemore 2009; USDA 2009).

Master Gardener certification typically includes completion of training and a specified amount of volunteer work. The length of training varies from county to county and can last from 40 (LSU 2013) to more than 70 hours (UF undated). The core of the Master Gardener training (including science-based manuals) is usually developed by a statewide leadership team and is supplemented by additional topics to meet local needs (Peronto and Murphy 2009). Training classes are most often taught once a week over a period of 2–3 months (LSU 2013; UF undated; Robert Westerfield, personal communications). Training methods include lectures and group activities, as well as hands-on activities and demonstration projects (Peronto and Murphy 2009). Master Gardener programs in some states set specific requirements for class attendance (e.g., at least 80% attendance of the training classes is required in Louisiana) and passing an examination at the end of the training (LSU 2013). Most of the counties in the southern United States that offer Master Gardener programs charge a registration fee ($75–$275) that covers training materials, the certificate, small tokens of appreciation (such as tote bags or notebooks), and sometimes the overhead costs (LSU 2013; Beth Babbit, personal communications; Jayla Fry, personal communications). In some programs, the fee may be reduced by volunteer hours worked.

Once the training is completed, Master Gardeners assist local Extension agents by providing volunteer hours for teaching outreach programs, developing outreach materials, providing one-on-one phone and in-person consultations, delivering public presentations, implementing community gardening projects, and assisting in horticultural research and youth organization and school projects (Peronto and Murphy 2009; Strong and Harder 2010). The minimum number of volunteer hours required for new Master Gardener varies between 40 and 75 hours (UF undated; Lelia Scott Kelly, personal communications). Furthermore, to remain a Master Gardener, volunteers are required to complete annual continuing education programs (6–12 hours) and provide 20–35 volunteer hours per year (LSU 2013; UF undated; Lelia Scott Kelly, personal communications).

Overall, the Master Gardener program is an adult environmental education program based on principles of lifelong active learning, and understanding and applying research-based information. The program provides non-threatening peer education to friends and neighbors. It may have the potential to reach underserved populations (such as low-income communities) and, using the context of gardening, the program can introduce environmental issues of sustainable living (Chalker-Scott and Tinnemore 2009). Over the years, the program has grown significantly; for instance, in 2009, almost 95,000 Master Gardeners in 50 US states and the District of Columbia provided 5.2 million volunteer hours valued at $101.4 million (USDA 2009).

Who are the volunteers of the master gardener program? Results from existing studies

Smith (1994) identified the following related determinants of participation in any voluntary association:

1. social background (e.g., age, gender, and employment status)
2. contextual factors (e.g., size of the community or the economic status of the neighborhood)
3. psychological variables (e.g., emotional stability)
4. social participation (e.g., neighborhood activities)
5. situational variables (e.g., having friends in the organization)
6. attitudinal variables (e.g., attitudes toward volunteer group interests or toward the reward for participation and civic duties)

With respect to *social background*, existing studies have demonstrated that Master Gardeners are more likely to be white, female, middle or older aged, married, relatively

wealthy long-time residents of their communities with some college education or college degree (Bonneau et al. 2009; Borisova et al. 2012; Rohs, Stibling, and Westerfield 2002; Rohs and Westerfield 1996; Schrock et al. 1999, 2000b; Strong and Harder 2010; Wilson and Newman 2011; Wolford, Cox, and Culp 2001). These volunteer characteristics are generally similar to the characteristics of volunteers for other programs (Braker et al. 2000; Smith 1994).

Existing studies fairly consistently report that gaining knowledge and expressing altruistic and humanitarian values are among the *top reasons for joining Master Gardener programs* (Finch 1997; Simonson and Pals 1990; Wilson and Newman 2011). For example, in Missouri, Schrock et al. (2000a, b) found that the new learning experiences (such as "learning more about horticulture / gardening" and "learning horticulture through hands on experiences") were ranked as the top benefits by Master Gardener volunteers (Schrock et al. 2000b: 628). Benefits related to personal altruism and humanitarian concern (such as "feeling that it is important to help others" and "genuine concern about home gardens") were also ranked highly (Schrock et al. 2000b: 628).

For *the topics of greatest interest*, Moravec (2006) found that Master Gardeners in Colorado were most interested in learning plant diagnostic skills. A new listing among the secondary priorities was sustainable landscaping. Specifically, 51 percent indicated a high interest in water conservation (only 16% had no interest in this topic). Furthermore, among various plant types, Master Gardeners were most interested in learning about perennials and native plants. Overall, these results imply respondents' interest in both home landscaping and environmental stewardship (Moravec 2006).

Previous studies have also identified *changes in attitudes and behaviors* of Master Gardener program participants related to yard management. Peronto and Murphy (2009), for example, surveyed participants of the 2006 Maine Master Gardener training program and determined that half a year after their Master Gardener training, survey respondents had adopted the following practices: composting (76%), cultural pest management (69%), preventing soil erosion (59%), and extending the growing season (59%). Moreover, 17 percent of the respondents had indicated shifts in their views about their roles as environmental stewards, stating that they learned "the importance of taking care of the land and the environment." Similarly, Sadof et al. (2004) and Meyer et al. (2010) reported changes in pesticide application behaviors and the use of integrated pest management practices among Master Gardeners in 11 north-central US states, and specifically in Indiana and Illinois. Borisova et al. (2012) showed that in the southern United States, those who participated in Master Gardener programs were more likely, compared to non-participants, to report changes in landscaping and watering practices, and the use of pesticides, fertilizers, and other chemicals.

What did we learn about master gardeners from a regional public survey?

A National Water Needs Assessment Survey was conducted in the southern United States in 2008–2010 (Figure 1). Details of the development and administration of the survey are presented in Mahler et al. (2013). In this article, we focused on 2,643 responses to the survey from eight southern US states (Alabama, Arkansas, Florida, Louisiana, Mississippi, Oklahoma, Tennessee, and Texas).

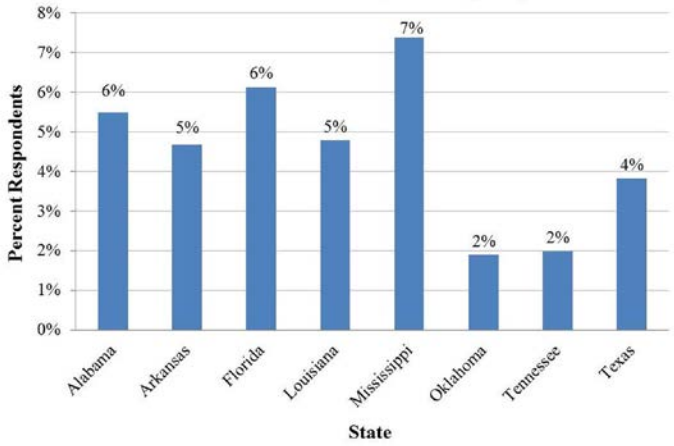

Figure 1. Percentage of respondents who reported participation in the Master Gardener program.

Overall, five percent of the respondents reported that they had participated in the Master Gardener program. Self-reported participation among the survey respondents ranged from seven percent in Mississippi to less than two percent each in Oklahoma and Tennessee.

Table 1 presents the socio-demographic characteristics of all the survey respondents and the characteristics of the respondents who had participated in the Master Gardener program specifically. Similar to previous studies, we found that in comparison with an average survey respondent, Master Gardeners were older and more likely to have an advanced college or other professional degree.

The majority of the survey respondents as a group were males. Of the respondents who reported participating in the Master Gardener program, the proportion of female respondents was slightly higher (40%) than in the sample of respondents as a whole (36%). This result implies that females are slightly more likely to participate in Master Gardener program than are males, which is consistent with previous studies. Finally, among the Master Gardeners, there were slightly higher proportions of those who live in communities of 25,000–100,000 people and those who reside inside city limits, implying that the Master Gardener programs have a stronger presence in medium-sized urban areas than in rural areas or large urban centers (Table 1).

We also examined the answers to the survey questions related to surface water quality (Table 2). Overall, Master Gardeners were less likely to answer "I do not know" to the question about surface water quality in the local area, indicating greater confidence in their knowledge of the state of water resources. Overall, 14 percent of survey respondents had *no opinion* about surface water quality, while among Master Gardeners, 10 percent had *no opinion* on the issue (the difference was statistically significant with $p = 0.10$, chi-square test).

Among the top three pollution sources affecting surface water quality in respondents' states were the following: industry (39%), agriculture–crops (27%), and stormwater runoff (25%). According to the Pearson chi-squared tests results, Master Gardeners were significantly more likely to identify runoff from home landscapes, septic systems, and agriculture–crops among the top surface water pollution sources in their states (the difference was statistically significant with $p = 0.10$ or less, chi-square test). This result indicates higher awareness about agricultural and urban non-point (i.e., diffuse) water pollution sources among Master Gardeners. Indeed, nonpoint pollution is reported to be the leading cause of water quality problems (USEPA 2012). Better knowledge about nonpoint water pollution sources indicates a higher likelihood of Master Gardeners taking actions to prevent or reduce nonpoint source water quality impacts.

Conclusions

Evidence from a regional public survey shows that in comparison with all survey respondents, Master Gardeners are slightly more likely to be female and middle or older aged, and to hold advanced degrees. These results are consistent with existing studies. We also found that Master Gardeners are more likely to reside in mid-size urban areas (25,000–100,000 residents).

Existing studies report that gaining knowledge is among the top reasons for joining Master Gardener programs. Our regional survey results indicate that Master Gardeners are less likely to respond that they *do not know* what the surface water quality is in their area and that they are more likely to be concerned about urban nonpoint source pollution sources (such as runoff from residential landscapes and septic systems) than the rest of the survey respondents. Based on the analysis of survey responses, Master Gardener training helps raise awareness of water quality issues among volunteers (even though water quality is not the primary focus of this horticultural training program).

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Table 1. Socio-demographic characteristics collected in the National Needs Survey in eight southern US states

Variable Type	Variable	All respondents (%)	Master Gardeners only (%)
Social background: age	20–34 years old	6%	4%
	35–44 years old	12%	7%
	45–64 years old	44%	47%
	65 years old and older	38%	42%
Social background: sex	Male	64%	60%
	Female	36%	40%
Social background: education	Less than high school / some high school	6%	8%
	High school graduate	19%	16%
	Some college or vocational training	31%	27%
	College graduate	24%	24%
	Advanced college or other professional degree	20%	25%
Social background: duration of residence in the state	All my life	44%	43%
	More than 10 years, but not all my life	44%	43%
	5–9 years	7%	7%
	Less than 5 years	5%	7%
Contextual factor: community size	More than 100,000 people	31%	30%
	25,000–100,000 people	27%	36%
	7,000–25,000 people	19%	18%
	3,500–7,000 people	10%	10%
	Less than 3,500 people	12%	6%
Contextual factor: residence inside / outside city limits	Residence inside city limits	59%	64%
	Resident outside city limits, not engaged in farming	34%	29%
	Engagement in farming	6%	7%

Table 2. Water quality survey questions examined in the current study

Survey question (% responses, % non-Master Gardeners, % Master Gardeners)	All respondents (%)	Master Gardeners only (%)
In your opinion, what is the quality of surface waters (rivers, streams, lakes, channels, and wetlands) where you live?		
Good	44%	47%
Fair	26%	22%
Poor	13%	20%
No opinion / don't know	14%	10%
Missing or erroneous answer	3%	1%
In your opinion, which of the following are most responsible for the existing pollution problems in rivers and lakes in your state? (Check up to **3** answers)*		
Forestry (wood harvesting)	6%	6%
Agriculture – crops	27%	35%
Agriculture – animals	19%	18%
Erosion from roads and/or construction, repair	22%	18%
Industry	39%	35%
Military bases	2%	2%
Septic systems	21%	30%
Runoff from home landscapes	15%	25%
Stormwater runoff	25%	26%
Landfills	17%	17%
Wastewater treatment plants	16%	15%
New suburban development	23%	24%
Oil wells and mining	11%	8%

* Note: 273 respondents selected more than three answers and therefore were removed from the analysis for this question.