

**Ecosystem Services on Forest and Agricultural Lands of Maryland: A Survey of Maryland Tree
Farmers and Agricultural Landowners
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Maryland contains 2.4 million acres of forestland: 75% or 1.8 million acres is family owned. These private forest landowners, numbering an estimated 130,800, own 78 percent of the forestland, with an average size holding of 17 acres; 75 percent of these landowners, however, own less than 10 acres. These private forestlands protect and supply more than two-thirds of Maryland's drinking water.

There are 12,834 agricultural farms in Maryland, covering 2.1 million acres; 1.5 million acres are devoted to crops, with over 62,700 people employed in agriculture. Maryland farms are typically small and farmland is expensive. The average size is 169 acres, making Maryland the state with the 10th smallest average farm acreage. However, the average estimated market value of land and buildings per acre is \$2,911, making Maryland the fifth most expensive state in this category. Maryland farmers are aging, reflecting a national trend. The average age of Maryland farmers is 55.8 years, compared to the U.S. average of 53.3 years. Maryland's farms hold the key to many ecosystem services.

Maryland's forests and farms provide valuable ecosystem services to the State and the Chesapeake Bay region. Ecosystem services produce many natural resources: clean water, clean air, timber, habitat for fisheries, flood control, and the pollination of agricultural plants. These environmental functions are essential to sustaining all life on earth.

Until recently, few studies have explored landowners' knowledge and understanding of the term ecosystem services and whether or not landowners would agree to participate in a payment-for-ecosystem-service (PES) program. The socioeconomic study we propose here explores the extent to which agricultural landowners and tree farmers understand what ecosystem services are. Moreover, we attempt to determine what specific attributes would affect farmer participation in PES programs in Maryland, such as monetary incentives, financial entry points that would draw farmers into a program, who farmers would trust entering into a program contract with, and contract lengths.

In developing the framework for this survey instrument, we have relied on two similar studies: "Payments For Ecosystem Services: A California Rancher Perspective" (Cheatum et al., 2011) and "Ecosystem Services, Markets, and Red Wolf Habitat: Results from a Farm Operator Survey" (Kramer & Jenkins, 2009). These studies will help develop a baseline of information for future PES programs.

This report describes the survey methodology, presents results, and makes policy recommendations relevant to the design of future ecosystem service programs and markets.

RESEARCH OBJECTIVES

To Determine:

- 1) Whether tree farmers and agricultural landowners are knowledgeable about ecosystem services.
- 2) What tree farmers and agricultural landowners think about participation in a PES program.
- 3) How demographics and geographic characteristics affect willingness to participate in a PES program.
- 4) How financial payments, contract length, and the agency administering a PES program affect participation.
- 5) Whether there are significant differences in the survey responses of tree farmers and agricultural landowners.

The survey was developed and sent out for feedback. The revised survey was shared with numerous organizations for feedback prior to pretesting. These organizations are: Maryland Association of Soil

Conservation Districts, Maryland Department of Natural Resources (Maryland Forest Service and Office for a Sustainable Future), Maryland Farm Bureau, Maryland Department of Agriculture, Chesapeake Bay Program Office, Pinchot Institute, Biophilia Foundation, Sustainable Solutions, U.S. Geological Survey, American Forest Foundation, Defenders of Wildlife, U.S. Forest Service, University of Maryland's Agricultural Resource Economics Department, University of Maryland Extension, Maryland Forest Association, Maryland Tree Farm Committee, Maryland Agro-Ecology Center, and Duke University's Nicholas School of the Environment. The survey instrument was refined based on feedback from these institutions.

Our original intent was to perform a telephone survey; however, with the challenges of some families disconnecting home phones in favor of using individual cell phones, our inability to acquire cell phone numbers, and advice from experts in survey methodology, we decided to perform a mail survey.

We obtained the Maryland Tree Farm's mailing list from the American Forest Foundation with the understanding that the list would be used one time, for this research project only. We obtained addresses for over 1,000 Maryland tree farmers. Filters were put in place to identify duplicate names on the same tree farm and multiple tree farms for the same person. Only one owner per tree farm was sent a survey. After eliminating redundant respondents, we selected 878 tree farmers to receive the survey.

Insofar as agricultural landowners are concerned, the U.S. Department of Agriculture's (USDA) National Agricultural Statistics Service (NASS) reports there are 12,834 farms in Maryland. We obtained the names and addresses of agricultural landowners (with farms larger than 100 acres) from the Maryland Department of Planning's property view database. This database of agricultural landowners who own 100 acres or more was filtered to delete farms that also contained forestland. This was done so there would be little or no potential of a landowner receiving a survey as a tree farmer and an agricultural landowner. The filtered database was stratified by percentage of farmland by county for a total of 1,108 farms.

On April 2, 2012, Bob Tjaden, project PI, sent an introductory letter to 1,108 agricultural landowners and 878 tree farmers. On March 26, one week prior to the survey mailing, Len Wrabel, chairman of the Maryland Tree Program, also sent a validation letter to tree farmers. We were not able to obtain a validation letter from the Maryland Farm Bureau (due to time restrictions); however, the Farm Bureau did include a notice in their monthly newsletter encouraging their members to participate in the survey.

The surveys were mailed April 2 along with a letter explaining the survey process and providing respondents with an opportunity to complete the survey by hand or online. All respondents received a prepaid, self-addressed envelope for returning the paper version of the survey. We mailed follow-up postcards to all possible respondents on April 5 and then again on April 9. Surveys were to be completed by April 15. The survey consisted of 33 questions.

Of the 1,986 surveys mailed, there were 536 responses; 516 of these responses were fully completed. This is a response rate of 28 percent (536/1952). Only 47 (9%) of respondents completed the survey on-line. The distribution of returned completed surveys reasonably approximated the original stratified survey mailings by counties. Thus, we believe that the responses represent a reasonable approximation of Maryland's agricultural landowners and tree farmers.

Summary information from the 516 completed surveys is reported in Table 1. The majority of respondents are male (81%) and the average age is 66.8 years. Over 50% of respondents have a college education. Notably, 41% report an annual household income of more than \$100,000. However, only 15% claimed that the majority of their income comes from their land. Tree farmers represented 56% of the completed surveys.

Table 1. Demographics

	Tree Farmer	Acres Owned	% Income from Land	Gender	Age	Education	Ownership Structure	Household Income
Question #	2	3	7	29	30	31	32	33

Statistic	56%	204	15%	81% Male	66.8	51% College +	81% Private	41% > \$100K
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When asked, “Have you heard the term ecosystem services before this survey?” 57% responded they had not, while 43% indicated they had (see Figure 1). Of those respondents who had heard the term ecosystem services, 56% were tree farmers and 44% were agricultural landowners (see Figure 2).

Two questions (Questions 11 and 13) were used to test respondents’ knowledge about ecosystem services. In Question 11, respondents were asked to rate their familiarity with numerous terms on a scale of 1 to 5 (see Figure 3). The average degree of familiarity with the term ecosystem services was rather low, 2.09. Respondents were even less familiar with the term payment for ecosystem services (their average degree of familiarity was 1.62 out of 5). A difference in means test was used to determine whether the results of Question 11 were different for tree farmers and agricultural landowners. Responses indicated 73% of the agricultural landowners and 63% of the tree farmers were not familiar with the “ecosystem service” term (Figure 4). Difference in means tests indicated that these means were statistically different from one another.

Question 13 asked respondents who had heard the term ecosystem services to describe what the term meant to them. Respondents indicated that the term was most frequently associated with the preservation of wildlife habitat and the purification of air and water (see Figure 5).

Figure 1

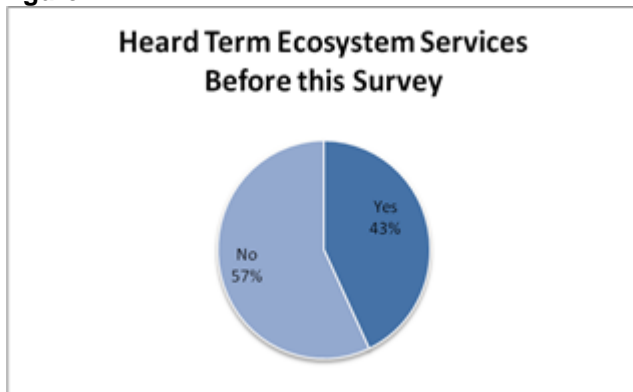


Figure 2

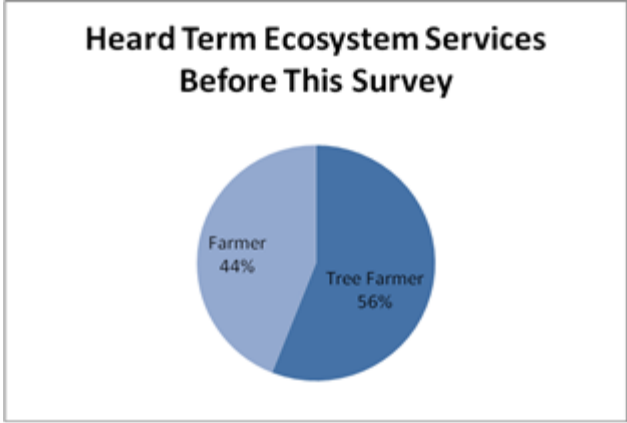


Figure 3

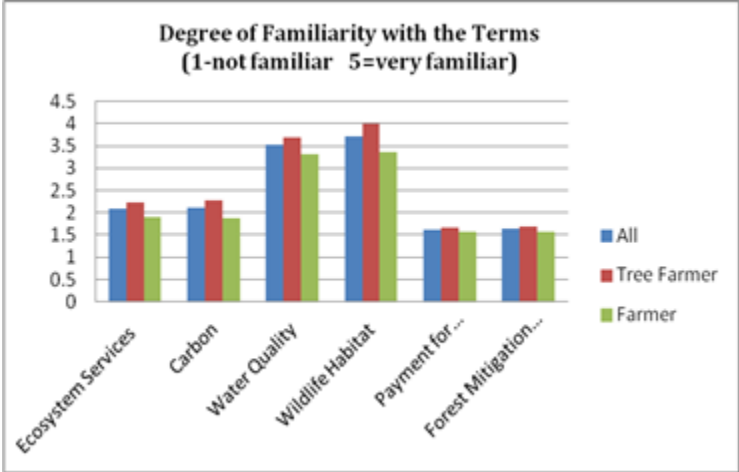


Figure 4

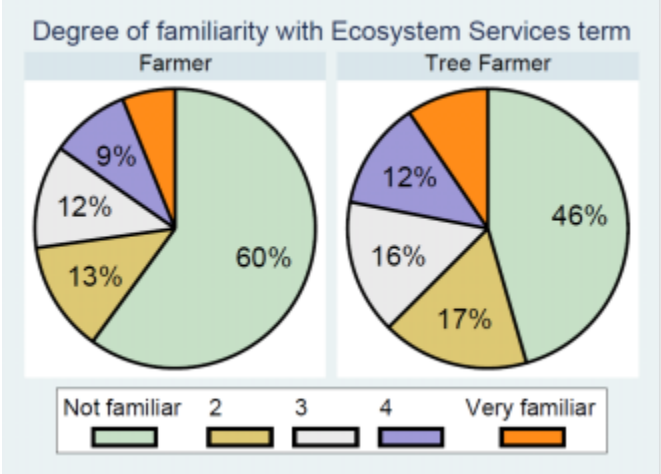
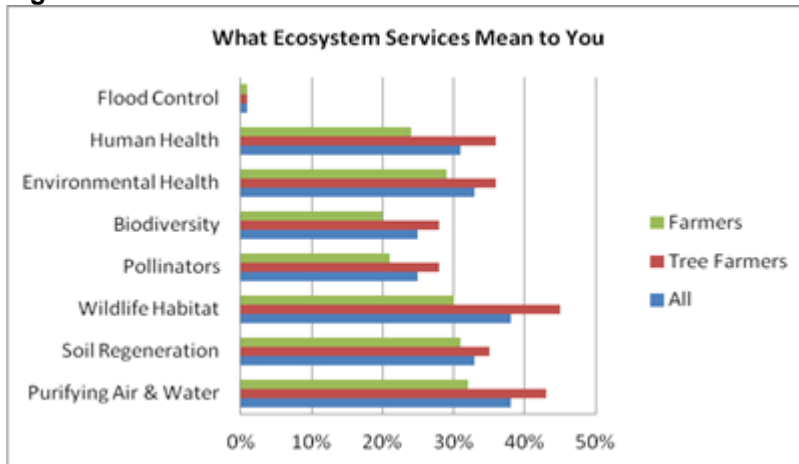


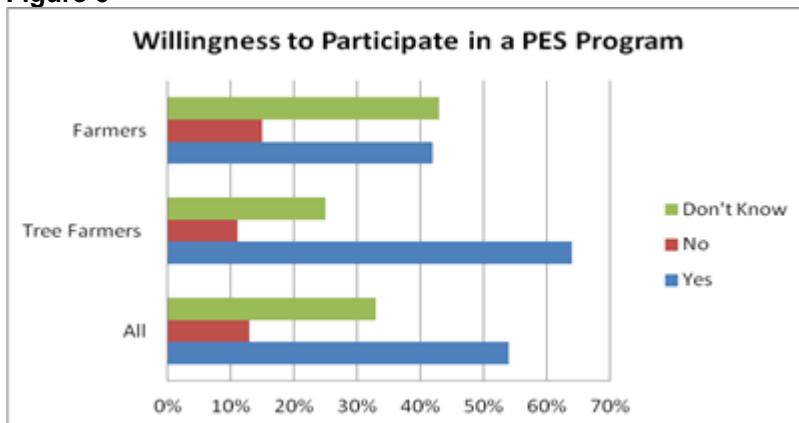
Figure 5



Question 14 asked whether respondents would consider participating in a PES program. Generally speaking, respondents seemed willing to consider participation. The majority of respondents would consider participation (54%), while only 13% would not (Figure 6). Approximately, one-third of respondents were unsure what they thought about participating in PES programs.

Notably, there seemed to be major differences between tree farmer and agricultural landowners. Sixty-four percent of tree farmers were willing to consider participation in PES programs, while only 42% of agricultural landowners were willing to consider participation (see Figure 6). This suggests that there may be fundamental differences between tree farmers and agricultural landowners. These differences may be ideological or stem from misinformation. Further work is needed to determine whether educating agricultural landowners about ecosystem services could increase their willingness to consider participation in PES programs.

Figure 6



The findings indicated the following:

- 1) Less than 50% of respondents are familiar with the term ecosystem services.
- 2) The most important reason to reject participation in a PES program is lack of information. This suggests that educational programs could increase knowledge about ecosystem services and acceptance of PES programs.

- 3) Tree farmers appear more willing than agricultural farmers to participate in PES programs.
- 4) Tree farmers with a higher percentage of off-farm income are more likely than other respondents to participate in PES programs.
- 5) There is not strong support for the hypothesis that location influences participation in PES programs (despite limited evidence suggesting that agricultural landowners in the Upper Shore region are slightly more willing to participate).
- 6) Respondents prefer shorter contract lengths (possibly because respondents are risk averse).
- 7) Payments appear to increase participation in PES programs.
- 8) Agricultural landowners prefer PES programs administered by NGOs, while tree farmers prefer programs administered by the state or federal government.
- 9) Evidence suggests that having “heard” or being “familiar with” the term ecosystem services increases the probability of participation in PES programs. This suggests that education on the topic may increase the probability of participation

Tree Farmers and agricultural producers tend to have slightly different preferences. Tree farmers tend to prefer having state agencies administer PES programs, while agricultural landowners prefer having NGOs administer these programs. One explanation of this difference is that Maryland’s tree farmers have access to many state-run programs that were designed to facilitate planting and forest management. By contrast, agricultural landowners have had a tenuous relationship with both state and federal agencies over the course of the past several years. Our results demonstrate that PES programs should be tailored to specific audiences. In short, one size does not fit all.

For copies of the final report, please contact Bob Tjaden at rtjaden@umd.edu or the entire report can be viewed at <http://enst.umd.edu/people/faculty/bob-tjaden>