A SURVEY: MARYLAND FARMERS & TREE FARMERS ATTITUDES TOWARDS A PAYMENT FOR ECOSYSTEM SERVICES PROGRAM

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Introduction

- Forestland, wetlands and marine resources are increasingly recognized for their ecosystem services. These services include: clean air and water, wildlife habitat, biodiversity, carbon storage and pollinator services.
- Nationwide, there is increased interest in ecosystem services and the development of markets to support payment for ecosystem service (PES) programs.
- Generally, there is an assumption that forest landowners, farmers and the general public understand the term "ecosystem services" and their functions.
- Financial payments could encourage Tree Farmers and farmers to participate in a PES program.
- The purpose of this research study is to identify factors that drive participation in PES programs and to determine the extent to which Tree Farmers and farmers are knowledgeable about ecosystem services.

Objectives

- To determine whether Tree Farmers and farmers are knowledgeable about, or familiar with, ecosystem services.
- To determine attitudes towards participation in a PES program.
- To determine how demographic and geographic characteristics affect willingness to participate in a PES program.
- To determine how financial payments, contract length and the agency administering a PES program affect participation.

Methods

Survey Development

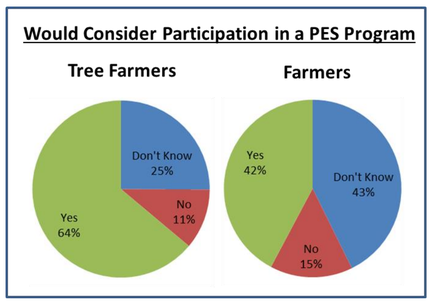
In collaboration with Anna Alberini (an agricultural economist at the University of Maryland) and Richard Pritzlaff, Bob Tjaden developed a survey to help determine how ecosystem services could be marketed to Tree Farmers and farmers in the state of Maryland. The survey was modeled after the study described in "Conservation Programs on Private Land: Eastern North Carolina Survey" which was conducted by Randall Kramer & Aaron Jenkins at Duke University (in cooperation with Defenders of Wildlife).

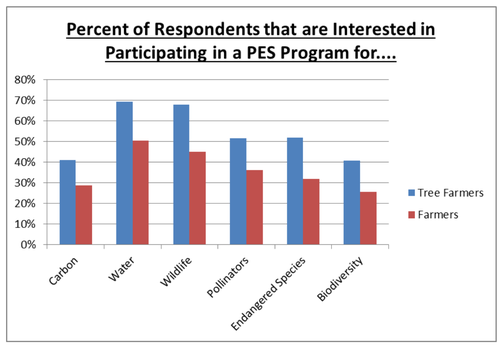
Survey distribution

- Using expert consultants, and several pretesting methods, a mail survey was developed and implemented following Dillman's Tailored Design Method.
- A mail survey was conducted on April 2012. It was sent to 878 Tree Farmers and 1,074 farmers (the total sample size was 1,952).
- The sample was randomly selected at the county level based on the percent of farms per county. The entire population of MD Tree Farmers was surveyed.
- The response rate was 26% (516 completed surveys).
- Larry Harris of Mason-Dixon Polling & Research administered the survey and processed the responses. The survey cost $12,250 to administer.
- Seth Wechsler & Adan L. Martinez-Cruz, graduate students at the University of Maryland, analyzed the data.

Econometric methods

- Contingent Valuation (CV) questions were used to determine whether individuals would be willing to participate in PES programs at different payment levels. A probit regression model was used to analyze the responses. The analysis identified socioeconomic and attitudinal factors that affect participation decisions.
- Conjoint analysis questions provide an alternative means of analyzing participation decisions. The respondents were given choices between programs that varied by: contract length, program administration, and payment level. A conditional logit model was used to analyze these responses.





Model Specifications

Contingent Valuation – Bivariate Probit Model

$$\begin{aligned}&Willingness\ to\ Consider\ Participation\ in\ a\ PES\ Program\ to\ protect\ Wildlife\\&= \gamma_1 + Bid'\beta_{1,1} + Heard'\beta_{1,2} + Income'\beta_{1,3} + Advanced\_Degree\beta_{1,4} + Female\beta_{1,5} + Acres\_Owned\beta_{1,6}\\&+ Years\_Owned\beta_{1,7} + AgProducer\beta_{1,8} + Animal\_Producer\beta_{1,9} + Rec\_User\beta_{1,10} + Perc\_Inc\beta_{1,11} + Central\beta_{1,12}\\&+ Lower\_Shore\beta_{1,13} + Southern\beta_{1,14} + Upper\_Shore\beta_{1,15} + \nu_1\end{aligned}$$

$$\begin{aligned}&Willingness\ to\ Consider\ Participation\ in\ a\ PES\ Program\ to\ Clean\ Air\ and\ Water\\&= \gamma_2 + Bid'\beta_{2,1} + Heard'\beta_{2,2} + Income'\beta_{2,3} + Advanced\_Degree\beta_{2,4} + Female\beta_{2,5} + Acres\_Owned\beta_{2,6}\\&+ Years\_Owned\beta_{2,7} + AgProducer\beta_{2,8} + Animal\_Producer\beta_{2,9} + Rec\_User\beta_{2,10} + Perc\_Inc\beta_{2,11} + Central\beta_{2,12}\\&+ Lower\_Shore\beta_{2,13} + Southern\beta_{2,14} + Upper\_Shore\beta_{2,15} + \nu_2\end{aligned}$$

Conjoint Choice – Conditional Logit Model

$$\begin{aligned}&Utility\ from\ Participation\ in\ a\ PES\ Program\\&= \mathrm{B}_p Payment_{ij} + \mathrm{B}_c Contract\_Length_{ij} + \mathrm{B}_s State_{ij} + \mathrm{B}_f Federal_{ij} + \mathrm{B}_{st}\left(State_{ij} * Tree\_Farmer_i\right)\\&+ \mathrm{B}_{st}\left(Federal_{ij} * Tree\_Farmer_i\right) + \varepsilon_{ij}\end{aligned}$$

Conjoint Choice Scenarios

Example #1 (please circle your preferred option)

Program Features	Program A	Program B	Neither
Contract length	30 years	15 years	
Program administration	Non-governmental organization	State agency	
Payment level (per acre per year)	$100	$30	

Example #2

Program Features	Program A	Program B	Neither
Contract length	15 years	5 years	
Program administration	Federal agency	Non-governmental Organization	
Payment level (per acre per year)	$70	$30	

Example #3

Program Features	Program A	Program B	Neither
Contract length	15 years	5 years	
Program administration	Non-governmental organization	Federal agency	
Payment level (per acre per year)	$30	$70	

Example #4

Program Features	Program A	Program B	Neither
Contract length	5 years	5 years	
Program administration	State agency	Federal agency	
Payment level (per acre per year)	$100	$30	

Example #5

Program Features	Program A	Program B	Neither
Contract length	15 years	5 years	
Program administration	Federal agency	State agency	
Payment level (per acre per year)	$200	$100	

Contingent Valuation Questions

What is your initial reaction to such a program? (Circle the number that most closely matches your response)

Strongly Oppose				Strongly Favor
1	2	3	4	5

Contingent Valuation question #1
Suppose there was a program that consisted of establishing or preserving habitat for wildlife species such as Bald Eagles, Delmarva Fox Squirrels, or Bog Turtles. The hypothetical program would be administered by a private business or non-governmental organization, have a contract length of 10 years, and would involve a small percentage of your land.
If this program paid you $40/75/150/250 "(only one rate per survey and stratified) per acre per year for 10 years, would you be willing to participate?
Yes No Don't Know (please circle appropriate response)

Contingent Valuation question #2
Suppose there was a program that established new forests to help clean our air and water. This hypothetical program would be administered by a state agency such as MD DNR, have a contract length of 10 years and would involve planting trees on crop, pasture, or fallow land. If this program paid you $40/75/150/250 "(only one rate per survey and stratified) per acre per year for 10 years would you be willing to participate?
Yes No Don't Know (please circle appropriate response)

If you responded NO or DON'T KNOW to the previous question, what are the reasons you would choose not to enroll in a conservation payment program like this? (Please check all that apply)

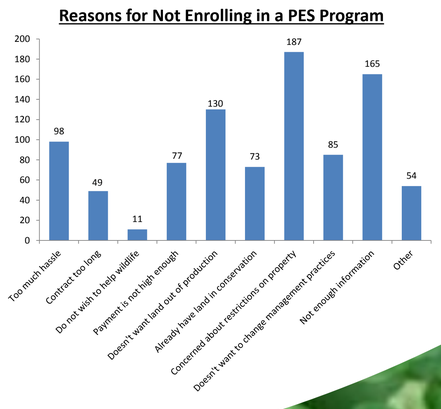
___ Too much paperwork/general hassle
___ Contract length is too long
___ Do not wish to help wildlife population
___ Payment not high enough
___ Do not wish to take any land out of agricultural crop production
___ Already have enough of my land in conservation uses
___ Concern about government restriction on private property
___ Do not want to change the way I manage my land
___ Not enough information

Which Attributes of Conservation Programs do Farmers Prefer (Conjoint Analysis, Questions 17-22)
Regression Results, Conditional Logit Model

Variable	Specification 1		Specification 2	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Status Quo	-0.63 ***	-0.15 ***	-0.46 **	-0.10 ***
Bid	0.01 ***	0.002 ***	-0.001	-0.0002
Contract length (years)	-0.02 **	-0.01 ***	-0.051 **	-0.01 ***
State	0.27 *	0.06 *	-0.99 **	-0.21 ***
Federal	-0.12	-0.03	-1.48 ***	-0.31 ***
Tree cross State			0.69 **	0.69 ***
Tree cross Federal			0.50 *	0.50 ***
Central cross Federal			0.75 *	0.75 **
Upper Shore cross Bid			0.01 *	0.01 **
Full Time Farmer cross Contract			0.03 *	0.03 **
Full Time Farmer cross State			0.56 **	0.57 ***
Consider cross Bid			0.01 ***	0.01 ***
Consider cross State			0.86 ***	0.86 ***
Consider cross Federal			0.93 ***	0.94 ***
Female cross State			0.71 **	0.72 ***
Observations	3720		3720	
Pseudo R2	0.04		0.15	

Are farmers willing to participate in conservation programs intended to preserve wildlife and/or air quality?
Regression Results, Bivariate Probit Regression (with and without Tree Farmer Interactions

	Wildlife Prog. (Q26)	Air Quality Prog. (Q27)	
Variable	Coefficients	Coefficients	Marginal Effects
Bid	0.003 ***	0.001	0.0005 *
Heard	0.32 **	0.39 **	0.12 ***
Income	0.01	0.25	0.05
Advanced Degree	0.26	0.14	0.06
Female	-0.34 *	-0.14	-0.06
Acres Owned	0.0002	0.0001	0.00003
Years Owned	-0.01	-0.003	-0.001
Agricultural Producer	-0.09	0.10	0.01
Animal Producer	-0.01	0.07	0.01
Recreational Use	-0.13	-0.08	-0.03
Percent Income	-0.003	-0.007 **	-0.002 **
Central Region	0.09	0.30	0.07
Lower Shore Region	-0.15	-0.35	-0.09
Southern Region	-0.05	-0.13	-0.03
Upper Shore Region	0.56 **	-0.12	0.03
Tree Farmer	0.48 ***	0.66 ***	0.19 ***
Constant	-0.69 **	-1.12 ***	
	All		
Rho	0.93 ***		
Observations	326		
Psuedo R2	0.40		



Results

Descriptive Statistics

- 81% male, 56% Tree Farmers, 42% had formerly participated in conservation programs, 51% have college degrees. On average, the farmers are 66 yrs old, own 204 acres, have 30 yrs. of tenure, and earn an average of 15% of their annual income from their land.

Conjoint Choice experiments

- Respondents tend to prefer the status quo (i.e. a producer's first reaction is to reject participation in a PES program).
- Higher payments increase the probability of participation.
- While there are not many regional differences, farmers in Upper Shore region are more reactive to monetary compensation.
- Longer contract lengths decrease the probability of participation (perhaps because of uncertainty about future crop prices or because the majority of Maryland's farmers are older, and thus have shorter planning horizons).
- Farmers prefer PES programs administered by NGOs, while Tree Farmers prefer programs administered by the state or federal government.

Contingent Valuation

- Tree Farmers appear more likely to participate in a PES program than farmers.
- As the percentage of income earned from farming increases, the probability of participating in a PES program decreases.
- Payment levels have a positive and significant impact on participation in programs intended to protect wildlife, but not on participation in programs intended to clean the air and water.
- Being located in the Upper Shore region appears to increase participation rates (especially for farmers).

Conclusions

- Less than 50% of respondents are familiar with the term ecosystem services. 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.
- Tree Farmers appear more willing than farmers to participate in PES programs.
- Tree Farmers with a higher percentage of off-farm income are more likely to participate in PES programs.
- Location does not influence participation in PES programs. However, there is some evidence that farmers in the Upper Shore region are more willing to participate.
- Respondents are risk adverse. Thus, they prefer shorter contracts.
- Payments appear to increase participation in PES programs
- Farmers prefer PES programs administered by NGOs, while Tree Farmers prefer programs administered by the state or federal government.

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