

Natural wealth

Dr Robert Tjaden is conducting research designed to test the receptiveness of private landowners in Maryland US, to receiving payments for producing public goods from ecosystem services



To begin, can you summarise your primary research interests and goals?

My overall research interests are in environmental policy relating to forest management and tax policy, ecosystem services and social attitudes towards environmental and natural resource management. My goal is to assist in the development of reasonable policies to help forest industry, forest landowners and agricultural producers of Maryland be profitable and sustainable while still protecting or enhancing the valuable resources of Chesapeake Bay. Currently, I determine information to assist policy formulation for a Payment for Ecosystem Services (PES) programme in Maryland.

What are the main motivations behind this project?

There has been much discussion, both locally and nationally, about ecosystem services and programmes designed to pay landowners for the production of these services. More specifically, there have been discussions to include PES in the new Farm Bill and many states, including Maryland, are trying to establish a nutrient trading programme. It is assumed landowners understand the topic of ecosystem services and will participate in payment programmes. Those assumptions were not based on any scientific evidence, hence this project.

Can you explain what you mean by 'ecosystem services'?

Our world produces many natural resources that provide the foundation for all life on Earth – clean water, the air we breathe and pollination of crops, for example. These services are, by and large, provided by forest and agricultural lands. With the majority in private ownership, it is imperative that they are managed to enhance their ecosystem services and that incentives, public and private, are in place to encourage their owners to do so.

How do you go about trying to put an accurate economic value on ecosystem services?

This is the big question! There is no easy answer or approach. The problem is that most of these services are public goods produced on private

lands with no established markets. Thus it is difficult to determine their value. However there are techniques, such as asking people their willingness to pay for these services or estimating their replacement value, just to name a few.

Why did you choose to pursue a socioeconomic approach?

The valuation of ecosystem services is a social, economic and environmental issue. It transcends many disciplines and is a very complex topic. This suggests a socioeconomic approach.

Within the study of ecosystem services, there are several socioeconomic approaches to assist with determining value and willingness to participate in programmes. Some of these are contingent valuation (CV) or conjoint choice-type surveys. The CV survey asks the person to make a choice contingent on a given dollar value, whereas the conjoint choice-type survey asks similar questions, but requires the person to make choices based on several different but similar scenarios. It forces the person to make a single selection or choice based on several factors, such as contract length and payment rate.

What types of activities would PES be used for?

Activities could include management practices put in place to establish, maintain or enhance: habitats for threatened



or endangered wildlife species and/or pollinators; forest land for water quality and quantity; forest land to sequester carbon; wetlands for flood control, water quality and wildlife habitats; and riparian buffers to shade streams, decrease water temperatures and encourage trout or salmon fisheries.

Would PES implementation pose any challenges?

Yes, there would be challenges, such as: who pays for the services and where does the money come from? If a landowner is to be paid for a service, what is payment based upon, is there a standard rate or is it based upon land/habitat richness? Are the payments taxable, and how will these land management practices be monitored or verified? We have ideas about how such challenges could be managed.

Could you outline some of your key findings?

Our basic finding is a lack of understanding of and familiarity with the concept of ecosystem services; the most important factor in rejecting participation in a PES programme is lack of information, which suggests that educational programmes are needed. Other key findings include: Tree Farmers are more likely than agricultural landowners to participate in a PES programme; shorter contract lengths are preferred; higher payments increase participation; farmers prefer programmes administered by NGOs, while Tree Farmers prefer state and federal administration; compared to agricultural landowners. Tree Farmers with a higher percentage of off-farm income are more willing to participate; and it is difficult to encourage participation in agricultural landowners with a strong bias against conservation projects.

What do you hope to achieve next?

I shall present my findings to key policy makers and organisations, with the goal of influencing the development of a PES program in Maryland. I shall also apply for additional funds to survey Maryland citizens to determine their willingness to pay for ecosystem services and test for different payment systems.



Sustaining natural capital

A pertinent study conducted by researchers at the **University of Maryland** seeks to inform policy on the means and logistics of investment in the ecosystem services produced by privately-owned forests and farms

IT IS GENERALLY recognised that ecosystems are Earth's ecological support system, sustaining life by purifying air and water, and exchanging carbon dioxide between the land, oceans and atmosphere. It is widely known that they produce timber products, provide habitats for wildlife and maintain biodiversity, and the aesthetics of Nature are highly prized. However, it is less well known that ecosystems carry out many other essential processes that are crucial to human health and survival: they moderate weather extremes, mitigate the impact of droughts and floods, protect riverbanks and coastlines from erosion, control pests, produce food and the raw materials for fuel and animal feed, decompose waste and produce fundamental nutrients for soils and plants. They also promote species – they produce the pollinators that ensure future generations of plants.

The contribution of ecosystem services to people's livelihoods and national economies means that increasingly attempts are being made to place a monetary value on their worth. A service can be evaluated through the damage, cost avoidance and replacement cost method. For example, after the Mississippi valley's natural flood protection was destroyed in 1993 through wetland drainage and channel alterations, subsequent floods resulted in property damage estimated at US \$12 billion.

Farming and forestry hold the key to ecosystem diversity by maintaining critical 'green space'. In Maryland, one of the most densely populated states in the US, the majority of its' landbase is devoted to agriculture and forestry. There

are 2.4 million acres of forest and 2.1 million acres of farmland, of which 1.5 million acres are devoted to crops. These holdings are predominately in private ownership, but provide valuable ecosystem services to the Maryland and Chesapeake Bay area. For example, the privately-owned forests supply more than 66 per cent of the drinking water for the state. As a result, it is essential that the lands are managed so that ecosystem services are maintained and, ultimately, enhanced.

PAYMENT FOR ECOSYSTEM SERVICES

At the College of Agriculture and Natural Resources at the University of Maryland, Professor Robert Tjaden, an Extension Specialist, is coming to the end of a project that has sought to assess the level of knowledge and understanding of Maryland farm and forest landowners about ecosystem services, particularly with respect to their willingness to participate in a Payment for Ecosystem Service (PES) programme. The project also sought to discover whether there were any conditions that might serve as incentives for them to participate in such a programme. In addition, Tjaden's study extended to how demographics and geography, and different levels of payments, durations of contracts and sources of programme administration might affect their willingness to participate, and also whether Tree Farmers differed in their views from agricultural landowners.

Tjaden began the study by conducting a survey modelled on two similar surveys that had been carried out in other states, using Dillman's

INTELLIGENCE

ECOSYSTEM SERVICES ON FOREST AND AGRICULTURAL LANDS OF MARYLAND: A SURVEY OF MARYLAND TREE FARMERS AND AGRICULTURAL LANDOWNERS

OBJECTIVES

To determine:

- Whether Tree Farmers and agricultural landowners are knowledgeable about ecosystem services
- How Tree Farmers and agricultural landowners feel about participation in a Payment for Ecosystem Services (PES) programme
- How demographics and geographic characteristics affect willingness to participate in a PES programme
- How financial payments, contract length and agency administering a PES programme affect participation
- Whether there are significant differences in the survey responses of Tree Farmers and agricultural farmers

KEY COLLABORATORS

Adan Martinez-Cruz; Seth Wechsler, University of Maryland, Department of Agricultural Resource Economics

Richard Pritzlaff, Biophilia Foundation

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CONTACT

Dr Robert Tjaden
Principal Investigator

University of Maryland
College of Agriculture & Natural Resources
Department of Environmental
Science & Technology
1433 Animal Science/Agricultural
Engineering Building
College Park, Maryland 20742-2315
USA

T +1 301 405 1179
E rtjaden@umd.edu

ROBERT TJADEN has a BSc in Forest/Wildlife Management from University of Maine at Orono, Master's in Forest Economics and Management from Duke University and PhD in Environmental Policy from University of Maryland. He is currently an Extension Specialist and Professor at the University of Maryland, Department of Environmental Science & Technology, where he has worked for 23 years. Previously he worked for the Delaware Department of Agriculture for 12 years as a forester and Delaware Forest Service Director.

tailored design method. The survey was tested on a representative sample of recipients before being mailed to 1,986 landowners who had been previously screened to ensure applicability and to obviate duplication. 536 surveys were completed and returned, representing 28 per cent of the survey population, of which 516 were usable. Although online facilities for completing the survey were made available, only nine per cent were completed online.

The survey contained 33 questions that would take between 10 and 15 minutes to answer, organised into three sections: land use background, ecosystem services and personal background.

A MODEL FOR MARYLAND

"This research establishes the framework for a PES programme in Maryland, based on landowner characteristics," asserts Tjaden. His analysis found most farmers are risk and change averse. More than half the survey population had no knowledge of ecosystem services, though Tree Farmers in particular were likely to participate in a PES Program. Recipients who had heard of ecosystem services were increasingly inclined to participate if more detailed information was provided – concerns about government restrictions on property and taking land out of production were factors that would predispose farmers to rule out participation, but lack of information was the main disincentive.

Geographical location had minimal influence, but farm type was important. Tree Farmers were more open than agricultural landowners to involvement in a PES programme and those with higher percentage of off-farm income were more likely to participate. However, agricultural landowners with high earnings from their land were less open to the idea. The prospect of payment had a positive impact on participation in programmes intended to protect wildlife habitats, but not on those for clean air and water, though water quality was one of the services in which there was most interest. Overall, shorter term contracts were preferable – on average, payments would have to rise by \$2 per acre per year for each additional contract year beyond a baseline 10-year period.

Agricultural landowners and Tree Farmers differed in acceptance of the nature of the agency that would oversee any PES programme: the agricultural landowners preferred nongovernmental (NGO) administration, while Tree Farmers preferred programmes administered by state or federal government,

possibly because of prior experience of many state-run programmes designed to facilitate tree planting and land management. However, on average, administration by a private company would incur an additional \$27 per acre per year rather than a state/federal agency.

To help sustain ecosystem services, landowners and the public need to have deeper understanding of their environmental and financial value; Tjaden suggests that education would further acceptance of a PES programme. However, the future of ecosystem services is uncertain because of a fundamental barrier: public perception that they are free. Whether the citizens of Maryland would be prepared to pay to preserve the services that they currently receive might inhibit future investment: "The public do not currently have to pay. Why should they pay for something that already exists?" Tjaden states.

However, it is entirely possible that funding could be generated from private capital or public money from user fees and those payments should be tax exempt, since the landowner would be taking on the risk of managing land for a public good. It is also essential that a third party would be required to monitor practices and services, verify and certify them. There is also a good case for establishing markets that encourage land management to enhance ecosystem service provision.

In terms of PES, it is clear that one size does not fit all. Each implementation should be tailored to its specific audience, with payment based upon a number of dedicated acres, service provided and quality of land. Contract lengths should also be set up on a sliding scale with higher payments for longer contracts – though some services such as biodiversity or carbon sequestration would require them to have longer contracts. Contracts should also be based on the complexity of the service provided and incorporate payments for multiple services, though criteria would need to be established for fish and other wildlife habitats in particular, and the minimum amount of land required per service would need to be calculated on a sliding scale, based on its quality and quantity.

Tjaden considers that some aspects of his work could ultimately be extrapolated to other states, perhaps even other countries, and has documented suggestions for improvements to the survey and analysis design for future reference. Contributing to the collective effort to reduce species decline and protect biodiversity, such efforts show the determination held by scientists the world over.

This research establishes the framework for a payment for ecosystem services programme in Maryland, based on landowner characteristics

