Informing the Design of a Payment for Ecosystem Services Program in Western Panama

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Abstract

Payments for ecosystem services (PES) have emerged as an incentive-based tool to protect and restore ecosystem-service flows, which are being degraded at regional and global scales. This study examines the potential for PES to address conservation and livelihood issues in the buffer-zone of La Amistad Bi-national World Heritage Site in Western Panama, and provides insights for the equitable architecture of such a program.

We conducted a survey of 344 farmers regarding their interest in a set of hypothetical PES programs. Many expressed interest in participating; interest was greatest for the agroforestry and forest conservation scenarios. Using logistic regression analysis, we identified explanatory factors which predict willingness to participate in a PES program. Several factors were related to household socioeconomic status.

We also investigated distributional concerns including how potential PES program design factors related to minimum enrolled area, land tenure, and land characteristics (e.g., slope) might affect eligibility of low-income households. In relation to access, respondents who ranked lower on our constructed socioeconomic scale were less likely to be eligible to enroll in a PES program despite the fact that many are willing to participate.

Our research contributes to a key piece of the PES design puzzle by proactively exploring ways to ensure that landowners across the socioeconomic spectrum (particularly the poor) are able to participate. Understanding trade-offs is important for guiding PES program architecture to achieve rural development and poverty alleviation goals in tandem with conservation outcomes.

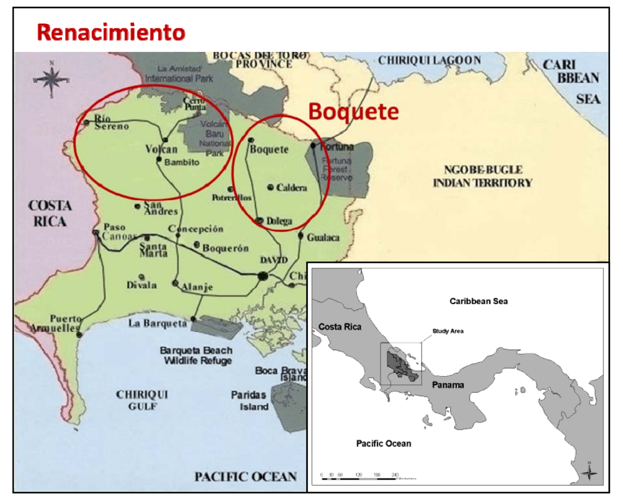
Payment for Ecosystem Services (PES): Potential in Panama

PES Definition: Users (beneficiaries) of ecosystem services pay landowners who supply these services.

Opportunities:
✓Government and NGOs actively discussing PES
✓Carbon, water, biodiversity, land stabilization, and others
✓Neighboring Costa Rica has over a decade of experience with PES

Study Area

Surveys were collected in the districts of Boquete and Renacimiento in Chiriquí province. These are rural agricultural (coffee, fruits, and vegetables) areas. Local challenges include landslides, heavy pesticide use, and poverty. These communities are in the buffer zone of La Amistad World Heritage Site.



Methods

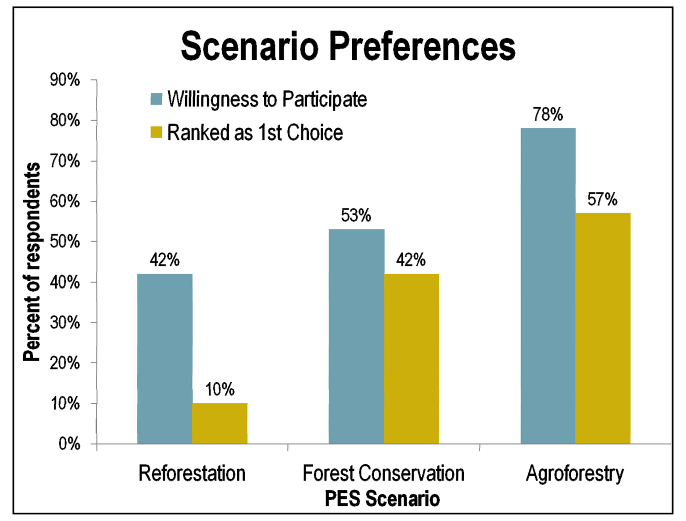
- A community–based participatory research approach resulted in a mixed methods oral door-to-door survey of 344 farmers (92% response rate).
- Farmer Survey PES Scenarios:
  - Forest conservation: conservation of existing forest; the cultivation of crops and the grazing of cattle would be prohibited in this forest.
  - Reforestation: regulated planting of a variety of native trees, with a total minimum density of 70 trees per hectare.
  - Agroforestry: growing trees in combination with managing land for crop or livestock production; landowner would be required to plant native trees (if they do not already exist), but would still get to use this land for growing crops or raising livestock.




Results and Discussion

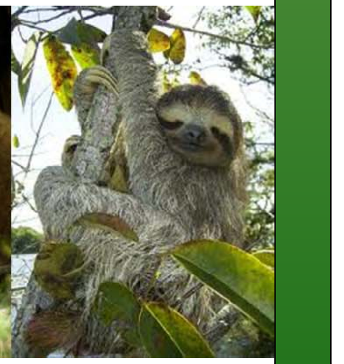
Farm Size	Small (< 5 ha) 45%	Medium (5 – 30 ha) 37%	Large (> 30 ha) 18%
Land Tenure	Land Title 81%	Property Rights 17%	Don't Know 3%

Q1: Is PES the right tool for the site-specific situation and if so what type of PES program focus (forest conservation, reforestation, agroforestry) is most attractive to landowners?



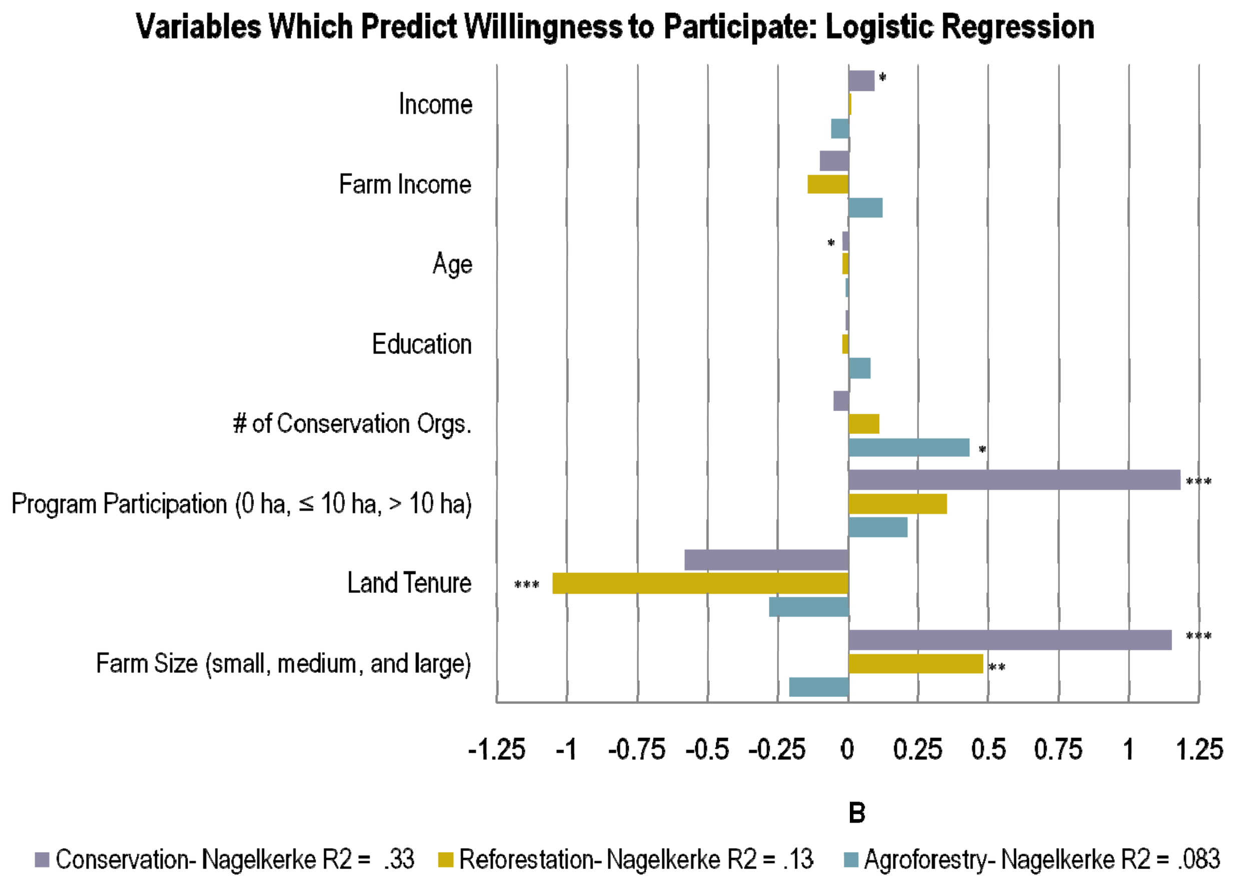
- All three scenarios were well received
- Agroforestry was the most popular
- Forest Conservation requires that they have existing forest
- Reforestation requires more upfront investment



Results and Discussion (continued)

Q2: Which household characteristics determine willingness to participate in a PES program?



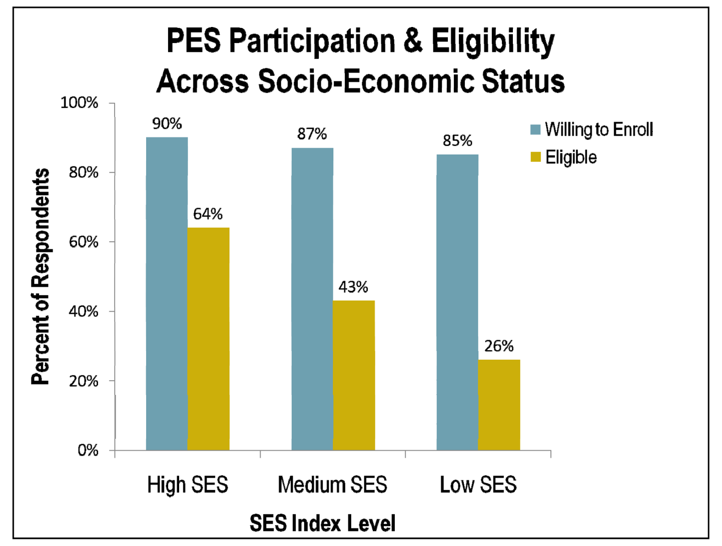
*$p \le .05$, **$p \le .01$, ***$p \le .001$

B = unstandardized logistic regression coefficient (i.e., the log odds) of variables which predict willingness to participate in the three PES scenarios from in this study.
Nagelkerke R^2 = approximates the variance which can be predicted by the model (predictive power).

- Significant explanatory factors with a *positive relationship* for one or more scenarios were farm size, participation in other conservation programs, the number of conservation organizations with which the farmer has worked, and total income.
- Significant explanatory factors with a *negative relationship* were land tenure and age.

Q3: What is the socio-economic landscape and how might decisions about program design elements affect the ability of households to participate (especially low-income households)?

Households across the socioeconomic status (SES) spectrum expressed interest in participating in a PES program (no statistical difference). However, using representative eligibility requirements, respondents with high SES are more likely to be eligible for program enrollment than those with low SES.



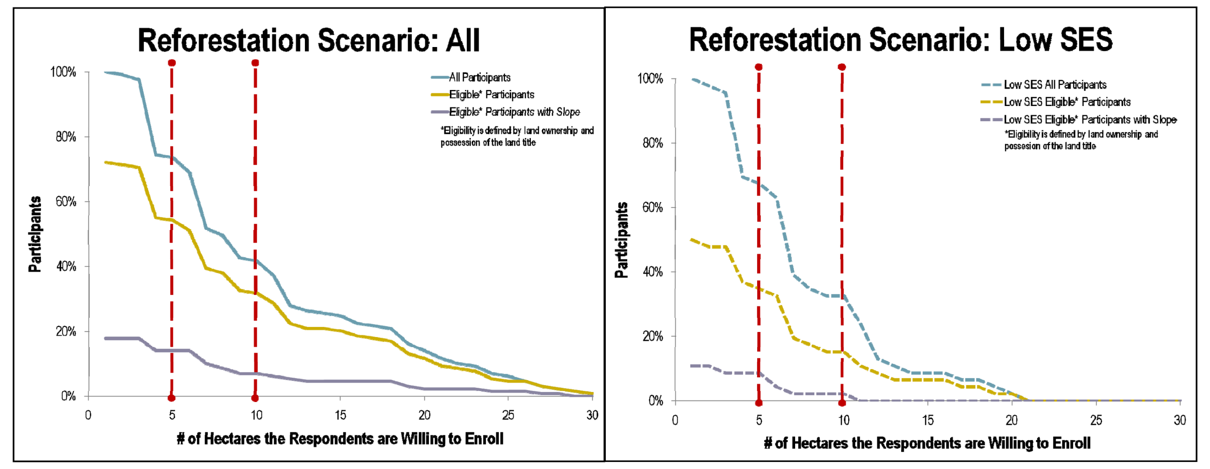
Socio-economic status (SES): We constructed an index using indicators selected based upon the literature and the context of the study region (education, income, plumbing, fuel, and electricity)

Potential Eligibility: We created a measure of potential eligibility based on likely criteria guided by existing programs including tenure (have title to land), ownership (own land), and farm size (own more than 5 hectares). Respondents who answered yes to all three were counted as eligible.

Results and Discussion (continued)

Potential Participation Curves for Reforestation: the percentage of people willing and able to enroll a given number of hectares under various targeting and eligibility criteria up to 30 hectares where the curves level off considerably. The dashed red lines represent a potential 5 ha minimum enrollment requirement and the 10 ha cut-off, used in Costa Rica.

All vs. Low Socio-Economic Status (SES): the graphs below show results for all potential participants and for all potential participants with low SES.



- Most respondents who expressed willingness to enroll offered to enroll at least one ha (98% of all those who were willing to participate and 96% of those in the low SES category).
- Requiring land title and ownership drops those willing and able to enroll one hectare 27% overall and 50% for those in the low SES group.
- Only 7% of low SES respondents expressed willingness to enroll 10 hectares compared to 21% overall.
- Allowing smaller land enrollment would have implications for many potential participants, especially in the low SES category. Low SES respondents are also more severely impacted by land title and ownership requirements

Conclusions and Next Steps

This study provides information on PES interest, capacity, and preferences. In addition, our findings highlight distributional concerns including how potential PES program design factors related to minimum enrolled area, land tenure, and land characteristics (e.g., slope) might affect eligibility of low-income households, an increasingly important target of PES programs, particularly in developing countries. Through analyses such as these, PES programs designers can be informed about the expected overlap or competition between program goals (e.g., eligibility requirements and pro-poor participation). Next our research team plans to investigate ecosystem service demand and potential buyers in the region.

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