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Payments for Ecosystem Services as a Potential Conservation Tool to Mitigate Deforestation in the Brazilian Amazon

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ABSTRACT

Payments for ecosystem services (PES) are market-based approaches used to incentivize conservation-related activities. This paper draws on an argument put forth in a recent New York Times article to assess the effectiveness of PES schemes to mitigate deforestation in the Brazilian Amazon. The authors examine the economic and social factors associated with PES schemes, available alternatives including penalties and persuasion and implementation challenges. The authors conclude that the feasibility of PES schemes is context-specific and prior to implementation in the Brazilian Amazon, a number of factors should be considered. Stakeholder participation, scales of the various drivers of deforestation and property rights issues are among the most important. This paper offers recommendations for further research to better understand the impact of PES schemes on the local livelihoods and human well-being.

Keywords: PES, biodiversity, conservation, Brazilian Amazon

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Payments for Ecosystem Services as a Potential Conservation Tool to Mitigate Deforestation in the Brazilian Amazon

Introduction

A recent New York Times article explored a case study in which farmers were paid to halt deforestation in the Brazilian Amazon (Rosenthal, 2009). The author presented payments for ecosystem services (PES) as a potential conservation tool to mitigate impacts on natural and social resources. This case illustrated several of the current challenges and possible solutions to the complex problems associated with impacts on the diverse ecological systems existing in Brazil. For decades, the Brazilian government has promoted development and deforestation by authorizing permits for conversion of rainforest into agricultural lands. These changes to the landscape are driven by a variety of factors, including increased monetary value of deforestation, and market demand for cattle, timber, and soybean crops (Fearnside, 2005, 2001). This is problematic, because clearing of the land has resulted in ecological (e.g., deforestation, climate change) and social (e.g., economic progress, perverse incentives) impacts.

Causes for deforestation are found on multiple scales rooted in global, regional and local drivers for goods and services. Two forces are at work: 1) Large, international businesses are pushing for expansion and growth; and 2) Bottom-up local communities are striving for food sovereignty and a stop to expansion (García-López, 2010). These two conflicting forces are at odds and complicate the deforestation situation in Brazil. Paying farmers to protect forests through PES does not address the larger global demand for soybean production.

Payments for ecosystem services are a potential conservation tool that has received increased attention to change the behavior of service providers by incentivizing conservation. For the purposes of this paper, PES is defined as a "voluntary, conditional agreement between at least one 'seller' and one 'buyer' over a well-defined environmental service – or a land use presumed to provide that service" (Wunder, 2007, p. 48). In a PES system, beneficiaries of environmental services pay providers for using practices that promote conservation of ecological processes (Sierra & Russman, 2006; Wunder, 2007). There are typically four different types of environmental services that are sold: protection of biodiversity, carbon storage and sequestration, protection of watersheds, and protection of landscape aesthetic beauty (Wunder, 2007).

Background

Various PES systems have been developed in an attempt to provide monetary alternatives to deforestation. This dialogue was spurred from a climate bill passed by the House of Representatives in the United States, which presented the option that first world countries would pay and/or compensate third world countries to protect forested landscapes (Rosenthal, 2009). This approach would allow for more even structuring of responsibility for protecting resources across local, regional and international populations. This would also prevent local populations from collecting potential monetary benefits of deforestation to pursue agriculture.

Several challenges are brought to the fore in considering whether PES is an appropriate or efficient tool for conservation. In developing nations, PES is seen as a mechanism to promote the protection of the environment (i.e., conserving ecological processes, mitigating

climate change, and decreasing biodiversity loss) and alleviate poverty (Wunder, 2007). Proponents of PES argue that it has the potential to generate conservation funding and improve the livelihoods of service providers. Critics argue that PES schemes can alter culturally-based conservation values, restrict land development aspirations, and un-link conservation and development goals (Wunder, 2007). More specifically, there has been concern raised over the possibility of PES in Brazil acting as a "cash cow," and/or allowing tree plantation owners to receive payments while providing little biodiversity or contiguous, primary forest benefits (Rosenthal, 2009). Other criticisms are centered on issues such as property rights, lack of effective enforcement, sustainable funding, and proper regulations tied to PES programs.

Another consideration regarding the feasibility of PES schemes relates to the complexity surrounding the range of actors and multiple scales of drivers. A range of global, regional and local demands put pressures on the production of goods and services. For instance, forces from international business and development conflict with local communities seeking food sovereignty (García-López, 2010). The various scales of demand create a complex market that presents small and large landowners with potentially different opportunity costs, transactions costs and scales of additionality.

Brazil has a number of PES-like systems in place. For example, Aliança da Terra monitors "good environmental practices" of participating members' properties and uses satellites to track land changes. This is a member certification group that attempts to work with and sell goods to large international corporations, like McDonald's. Places such as the Woods Hole Research Center are using such techniques to determine appropriate payment for land. Another initiative similar to PES is the Reducing Emissions from Deforestation and Forest

Degradation (REDD) program, which provides tradable carbon credits to countries with intact forests (Angelsen, 2008; Daniels et al., 2010). A final example of a PES-like scheme is a program that re-distributes federal taxes for stewardship of protected areas. Commonly referred to as "ICMS Ecológico," this effort funnels tax money from the federal government to state municipalities, which in turn pay local landowners to protect ecosystem services (Vogel, 1997; Verissimo et al., 2002).

The remainder of this paper explores the mechanisms of PES schemes, alternative approaches to PES, considerations for implementing PES, recommendations for the Brazilian case study mentioned above, and lessons learned from the process of answering the following research questions:

1. Is PES an appropriate course of action to mitigate deforestation in the Brazilian Amazon?
2. What are the alternatives to PES and under what conditions should these alternatives be adopted?

Mechanisms of PES

There are multiple economic and social factors that influence the feasibility, implementation and impact of PES systems. Opportunity costs play an important role in determining service provider participation; service providers' land use decisions about accepting a form of PES are influenced by the forgone benefits of putting land to other uses. Additionally, the difference between services obtained from a PES scheme versus without the PES scheme, is also a determining factor in the implementation and efficiency of PES (Wunder, 2007; Daniels et al., 2010). If, for example, a service provider maintained a natural landscape

on his/her property regardless of a PES scheme, no additionality would be achieved and therefore, PES would not be an efficient mechanism to mitigate deforestation. Other important factors to consider are transaction costs, or the costs to establish and operate a PES scheme including forming contracts, negotiating with land users, and monitoring of performance (Wunder, 2007). Clearly defining stakeholders and conservation services, understanding how people value nature and manage resources, and socio-economic monitoring are social factors integral to PES implementation (Milne & Niesten, 2009). Land users should have well-defined property rights such that they can exclude others from exploiting resources. Land rights need not be *de jure*, rather, the focus should be on *de facto* rights that are recognized by others.

Perverse incentives and leakage are possible outcomes of PES programs. One possibility for considering and avoiding such hazards would be implementing PES programs in areas of high threat (Wendland, 2009). This idea could provide an incentive for service providers to degrade their land in order to receive payment through a PES program (Haltia & Keipi, 1997). Furthermore, although PES schemes seek to change behavior of service providers through a market-based approach, there is no guarantee that PES will stop movement of landscape degradation to other areas. In other words, leakage could potentially occur and thus, undermine a PES system.

Alternative Approaches

PES schemes exist within a suite of policy options available to protect ecosystem services (Salzman, 2005). These various conservation tools are not mutually exclusive, in that they can be used in concert with PES schemes and other broader development approaches. For

example, command-and-control regulations directly address resource protection by restricting activities or penalizing non-compliers (Pierre, 2000). Contrary to the voluntary and flexible nature of PES, command-and-control measures take a "heavy handed" approach by imposing mechanisms such as deforestation moratoriums and/or fines against people who violate prohibitions. Penalties and sanctions are two related alternatives that can be used to encourage pro-environmental behaviors by enforcing taxes and fees that discourage undesirable behaviors. In extreme cases, jail time could be mandated for people who knowingly violate regulations.

Persuasion is an alternative approach that is distinguishable from payment schemes and command-and-control measures, while also beneficial when used in combination with other options. This measure relies on normative behavior and education of local populations. The ultimate goal in persuasive techniques is self-regulation fostered by morals and ethics regarding pro-environmental behavior. It should be noted that education might not be an efficient alternative to adopt for individuals already familiar with local environmental circumstances. In the case that locals have an interest in improving conditions and building ties to the land, education might not be as effective as addressing external drivers that influence landscape change.

Considerations for Implementing PES

Do markets currently exist in places of deforestation in the Brazilian Amazon? If so, how well are these markets set up? If not, how much effort would it take to establish a market? These questions should be seriously considered prior to deciding whether a PES scheme is an

appropriate mechanism for combating deforestation (Daniels et al., 2010). On one hand, markets are considered to be efficient, in that they allow ecosystem services to be provided at the lowest possible cost, and they are flexible, in that prices for goods and services are allowed to fluctuate based on supply and demand (Heal, 2000). All of these considerations speak highly of a market-based approach to conservation; however, one flip side is the tremendous cost and time required to set up a market. All payment schemes rest on the assumption that markets are already in place to capture values and regulate the provision of goods and services. This is a critical consideration, because there need to be places and institutions to govern where and how goods are bought and sold. Without these or related conditions already established, a PES scheme might not be easily implemented.

Does land fall within the private, public or common property resource management spheres? Clearly defined property rights are a pre-condition for establishing a PES system. This is crucial to the success of PES, because privatizing resources enables the government, local landowners, and intermediaries to regulate access to resources existing within a defined space (Ruhl et al., 2007). In other words, property rights should be clearly defined because the landowner plays a critical role of excluding use and extraction, and protecting the services that exist on his/her property. The providers and beneficiaries involved with payments, as well as the land connected to particular shareholders, must be identified *a priori*.

It is critical to consider how a community perceives private property rights to allow functional markets to emerge (Hardin, 1978; Ostrom, 2005). A cohesively organized group of people governed by rules and regulations needs to be in place for the successful implementation of PES. The social capital generated within a community would help to

encourage participation in conservation efforts and foster a vested interest in the success of a program (Agrawal, 2001; Shoreman & Haenn, 2009). In this sense, locally-organized PES schemes, as opposed to regulations enforced from far away, would become more sustainable. Additionally, if the members of a community are not involved in enforcement, and without intermediary institutions to distribute payments and maintain legitimacy, a locally sanctioned program would be unsuccessful.

Sustainable funding is another requirement for PES. Funding, although difficult to come by, would help forge long-term relationships and meaningful contracts with local communities and their funding agencies (Milne & Niesten, 2009). Many PES schemes are established using voluntary programs or donations; however, this approach is not sustainable, because it is subject to the whims of people's preferences and general economic climates (Blackman & Woodward, 2009). An endowment for a PES program is an option for funding because it would create a constant stream of money for the program. Although this solution would meet funding criteria, endowments require a large amount of capital at the onset of the project, which is not always an option for many organizations (Struhsaker et al., 2005). Mandatory systems in which people are required to pay would be another dependable route to take for securing financial support. Examples of mandatory funding include fees associated with water or taxes imposed on gasoline. This would require money to be funneled through intermediaries that would connect the federal government to local populations.

All PES schemes are centered on the premise that adequate enforcement be secured (Salzman, 2005). Institutions, intermediaries and monitoring programs within the enforcement realm bring credibility to the process of buying and selling goods, because this demonstrates

the direct link between people and resources via ecosystem services. This provides an opportunity to elevate and integrate PES into global markets. Enforcement also verifies that payments are, in fact, moving through a system involving companies and/or local landowners. The importance of enforcement is demonstrated by many developing countries, where the illegality of deforestation is meaningless, because there is no enforcement. To make a PES scheme operational, enforcement measures such as intermediary institutions that can act on behalf of local people are needed to facilitate the provision of money from organizations to landowners.

Recommendations

The recommendations presented in this paper are based on a variety of challenges facing PES schemes as a conservation tool to mitigate deforestation in the Brazilian Amazon. The most important considerations for the successful implementation of PES are clearly defined property rights; establishing PES providers, beneficiaries and intermediaries; securing sustainable funding, ensuring adequate enforcement; and identifying the existence of a market or alternatively, pre-market conditions. If any of these measures are ignored, mitigating deforestation would be difficult, if not impossible.

Direct payments are not always a viable option in exchange for the protection of land. In the Brazilian Amazon in particular, the feasibility of PES is highly contextualized. Places that have institutional rules and the general capacity to foster markets might be best suited for PES schemes (Agrawal, 2001). In this light, many places in the Brazilian Amazon might not need markets per se, because there are PES-like schemes (e.g., ICMS) and forms of institutional

knowledge already in place established through organizations such as farmer collectives or cooperatives that could pave the way for a PES. On the other hand, in less developed areas such as the Brazilian frontier, there may not be institutions present to govern where and how things are bought and sold, nor pre-market conditions. Therefore, it would be unrealistic and inefficient to establish markets, and therefore, PES schemes in these places.

Lessons Learned

Multiple lessons have been learned in our exploration of PES systems. First and foremost, payments for ecosystem services are only one of many market-based approaches used to mitigate biodiversity loss. As highlighted by Rosenthal (2009), the Brazilian Amazon has been targeted for implementation of PES schemes to reduce deforestation. We used the intricacies of the policies, institutions and scales of power as well as the diversity of communities within the Brazilian Amazon to illustrate that one broad PES scheme for the entire region would not function effectively. This finding aligns with past research that has suggested plurality in the process by which community-based conservation efforts are integrated into environmental outcomes (Shoreman & Haenn, 2009; Lemos & Agrawal, 2006). Property rights, in particular, are an issue that we feel will influence the effectiveness and feasibility of PES schemes (Ostrom, 2005). The terms under which local communities settle land should also be of concern, because in some instances these unwritten laws have promoted environmental degradation. Thus, we have argued that property rights should be clearly defined and evaluated before implementation and that policies surrounding PES schemes should incorporate property delineation. Additional lessons learned include the importance of the global drivers of deforestation, and the various alternatives to PES schemes, such as those

mentioned above. We have learned that both of these issues must be addressed to effectively form possible solutions to the problem of deforestation in Brazil. We have presented these approaches to help integrate non-market values of goods and services into conservation programs.

One of the often-cited goals of PES schemes is to improve the livelihoods of program participants; however, we have found that much of the current literature does not address the impact of PES on livelihoods. We have aimed to fill this gap by offering insights into the potential effects of market-based systems on local populations and speculating whether PES would be an appropriate conservation tool for mitigation and adaptation to impacts from deforestation in the Brazilian Amazon. This essay aims to help determine if market-based approaches are the best mechanism to achieve the dual goals of biodiversity conservation and human well-being among local populations.

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