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Determining when payments are an effective policy approach to ecosystem service provision

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ABSTRACT

There are several policy tools available for the provision of ecosystem services. The economic characteristics of the ecosystem service being provided, such as rivalry and excludability, along with the spatial scale at which benefits accrue can help determine the appropriate policy approach. In this paper we provide a brief introduction to ecosystem services and discuss the policy tools available for providing them along with the dimensions, political feasibility and appropriateness of each tool. Throughout the paper we focus primarily on payments as a mechanism for ecosystem service provision. We present a framework for determining the characteristics of an ecosystem service and when payments are a viable policy tool option based on the characteristics. Additionally, we provide examples of when payments do not provide a socially desirable level of ecosystem benefits. We conclude with a summary of policy recommendations, specifically desirable property rights and payment types based on the particular classification of an ecosystem service. We also discuss the advantages of creating monopsony power to reduce transaction costs, delineating and bundling ecosystem services and utilizing existing intermediaries.

1. Overview

Payments for ecosystem services (PES) have become an increasingly popular approach to dealing with environmental problems around the world. Hundreds of payment agreements have been arranged in both developing and developed nations. Several case studies have been written about their successes, failures, limitations and challenges of implementation (Pagiola et al, 2002). There has been little discussion, however, about how to design a payment program based on the spatial distribution and the economic characteristics, such as rivalry and excludability, of the service being provided. These characteristics influence the number and geographic distribution of the benefits and costs of the service, the feasibility of collective action and the level of transaction costs associated with providing the service (Daly and Farley, 2004; Hein et al., 2006; Turner et al., 2003; Ostrom, 2003). This paper offers a framework for identifying the appropriate policy tools and the necessary conditions for the design of a viable payment program based on a synthesis of existing theory, case studies and empirical findings.

We first provide a brief introduction to ecosystem services. We then discuss the policy tools available for providing them along with the dimensions, political feasibility and appropriateness of each tool. Throughout the paper we focus primarily on payments as a mechanism for ecosystem service provision. We present a framework for determining when payments are a viable policy tool option based on the characteristics of the ecosystem service. Additionally, we provide examples of when payments do not provide a socially efficient level of ecosystem benefits. Finally, we conclude with a summary of policy recommendations, specifically desirable property rights and payment types based on the particular classification of an ecosystem service. We also discuss the advantages of creating monopsony power to reduce transaction costs, delineating and bundling ecosystem services and utilizing existing intermediaries.

2. Introduction to ecosystem services

Ecosystems provide services essential to human survival and well-being. For example, forests supply climate regulation, erosion control and aesthetic beauty; wetlands offer protection from storms and floods; and grasslands supply habitat and genetic resources (Millennium Ecosystem Assessment, MEA, 2005; Costanza et al., 1997; Daily, 1997). Yet most ecosystem services are external to the market system. Not only are these services neglected, current economic incentives encourage rapid degradation of the natural capital, such as forests and wetlands, that provide the services. Natural capital plays dual roles. It can be converted into raw material inputs essential to all economic production, or it can be left intact to provide critical ecosystem services. As most economic output is in the form of market goods and

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most ecosystem services are non-market goods, the market system systematically favors conversion over conservation. In addition, natural capital provides ecosystem services at a given rate over time, over which humans have very little control. In contrast, we can decide how rapidly to convert natural capital to economic output. Therefore, short time horizons also favor conversion over conservation. Most economists and policy makers recognize that it is the responsibility of the government, with support from the civil sector, to provide goods and services that are external to the market (Daly and Farley, 2004). Although many ecosystem services are public goods, the physical structure that provides them is often privately-owned. Policies are needed to encourage private landowners to provide ecosystem services.

3. Policy tools for ecosystem service provision

Governments have a variety of policy tools at their disposal to encourage landowners to internalize the benefits provided by the natural capital on their property. Policy tools are methods employed to form collective action in order to provide a public good (Salamon, 2002). Salzman identifies five types of tools—prescription, penalty, property rights, persuasion and payment (Salzman, 2005). Policy tool choice for ecosystem service provision should depend on the dimensions of the tool, that is, the extent to which the policy is viable in a particular context and effective in achieving a particular level of ecosystem service provision. Policy tool choice should also depend on the characteristics of the ecosystem service being provided such as spatial scale and whether it is a market good or service, public good, common pool resource or a club good.

Policy tools exhibit varying levels of coerciveness, visibility, directness and automaticity (see Table 1) (Salamon, 2002). Salamon defines coercion as the extent to which a tool restricts behavior as opposed to merely encouraging or discouraging it. Coercive policies usually have a low level of political support (Salamon, 2002, p 26). Because many ecosystem services are provided by privately-owned natural capital, coercive policies may be politically difficult to implement and may only be necessary under circumstances in which an entire ecosystem is threatened and immediate action is required. However, policy tools that exhibit high levels of visibility, that is, the costs and benefits of the policy are easily detected by both the providers and beneficiaries, may be more politically feasible. Direct policies are those for which the authorizing, financing or inaugurating entity is highly involved in the delivery of the service. Automaticity is the extent to which existing institutional structures are used to carry out a program. A policy tool with a high level of automaticity usually has lower transaction and implementation costs.

Table 1
Policy tools and degree of each dimension.

Policy tool/dimension	Coerciveness	Visibility	Automaticity	Directness
Prescription				
Regulation[1]	High	Low	Low	Medium
Penalty				
Taxes[2]	Medium	Medium	High	Medium
Property rights				
Land use moratorium[3]	High	Low	Low	High
Tradable permits[2]	Medium	Medium	Medium	Medium
Payments				
Tax	Low	Medium	High	Medium
Expenditures[4]	Medium	High	High	Low
Grants[5]	Low	Medium	Low	Medium
Easements[3]	Low	High	Low	High
Direct payments[3]				
Public information[6]	Low	Medium	Low	Low to High

Note: From (Salamon, 2002) [1]Peter J. May; [2]Joseph C. Cordes; [3]Authors' classification; [4]Christopher Howard; [5]David R. Beam and Timothy J. Conlan; [6]Janet A. Weiss.

Table 1 delineates the dimensions of policy tools available for ecosystem service provision. For example, tax expenditures exhibit low levels of coerciveness because exemptions, deductions or tax credits are rewarded for voluntary behavior or participation in a program. Tradable permits are moderately automatic because institutions that facilitate trading need to be established but once the system is set up it creates automatic incentives for participating. Because costs and benefits of land use moratoria are not easily observable or measurable, they are classified as having a low level of visibility.

All five policy tool types are mechanisms available for providing ecosystem services on private property. Whether a policy tool is efficient, equitable, effective, manageable or politically feasible depends on its dimension classification (Salamon, 2002). These evaluation criteria vary in importance depending on public goals. If an ecosystem is highly threatened and deemed a priority area, effectiveness may be a higher priority than efficiency or political feasibility. In contrast, if the marginal cost of damage is low, efficiency and equity may be a higher priority.

Policy tools that are effective and politically feasible for encouraging industry to limit demand for ecosystem services may not be viable for reducing demand and increasing supply by private landowners due to differences in property rights. Typically, the government curbs emissions through policy tools such as taxation and regulation. When industry pollutes the atmosphere, for example, it is executing a privilege, not a property right — industry does not "own" the waste absorption capacity that reduces pollution. The government can revoke this privilege and claim waste absorption capacity for the public, essentially establishing public property rights, by instituting a "polluter pays" principle or by regulating the amount of emissions allowed (Bromley, 1993). However, a landowner is not obligated to relinquish ownership of trees on his property to provide climate regulation in the same way an industry polluter can be coerced to reduce pollution to provide clean air. In fact, they frequently have the explicit right to fell the trees and sell the timber for profit.

Prescriptive policies for the provision of ecosystem services on private property such as regulating land use or development are highly coercive and usually require extensive management and oversight. Automaticity is low making them politically infeasible and costly to implement. Coercive policies, however, are highly effective when enforced and may be necessary when marginal damage to an ecosystem is high.

Penalties, or taxes and charges, are highly automatic and are an efficient mechanism for eliciting land management practices that provide ecosystem services. However, they may not be viewed as equitable because the landowner would essentially be required to pay for the provision of ecosystem services for the benefit of the entire public. Taxes are also moderately coercive and therefore elicit only moderate political support. Cap-and-trade policies, or tradable permits, essentially establish property rights for the public for an ecosystem service and allow suppliers to buy and trade the right to use it. Permits are moderately coercive and entail higher initial transaction costs than other policy tool options because they require a trading system to be established.

The alteration of property rights, such as a moratorium on land use, is highly coercive and usually politically infeasible. Like regulation, it is highly effective and is only necessary when an ecosystem is classified as a high priority area. For example, in 2002 the U.S. Supreme Court upheld a moratorium on development, without compensation to landowners, by the Tahoe Regional Planning Agency that was instituted to protect the pristine beauty of the Lake Tahoe basin (Turnbull, 2004). Prescription and penalty are, in effect, revocations of property rights because they require that a landowner relinquish or alter land practices or development without compensation.

In contrast to altering property rights, disbursing public information about ecosystem services in an effort to change landowner