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Coordinated service provision in payment for ecosystem service schemes through adaptive governance

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ABSTRACT

In this paper, we look to the adaptive governance literature for insight into how payment schemes for the provision of ecosystem services might be designed to achieve multiple socially desirable objectives over different spatial scales instead of simply focusing on localised benefits for service providers. Using the principles of adaptive governance, we explore how the concepts of lateral information flows and incentive alignment might shape ecosystem service payment schemes and allow the coordination of ecosystem service priorities across different jurisdictions. We suggest that progressing from purely anthropocentric assessments of payment schemes towards biocentric evaluations may lead to improved design principles. We discuss specific advantages of adaptive governance approaches over traditional centralised governance models related to policy-experimentation at multiple spatial scales, institutional variety and deliberative decision-making processes that establish dialogue between service providers and beneficiaries that promote group learning.

1. Introduction

Payment schemes for the provision of ecosystem services, or PES, have emerged as a potential vehicle for the private provision of a range of ecosystem services, including biodiversity (Engel et al., 2008; Farley and Costanza, 2010; Landell-Mills and Porras, 2002; Muradian et al., 2010). While the ability of such schemes to deliver or potentially deliver economic benefits to communities in developing countries has been shown (Andrew and Masozera, 2012; Grieg-Gran et al., 2005; Landell-Mills and Porras, 2002; Pagiola et al., 2008), it is imperative that this criterion, important though it is, does not dominate PES performance assessment. Economic development is one aspect, but other criteria determining success include non-specific, intangible benefits related to the maintenance of functioning ecosystems throughout the world. Success in this regard depends on systems that are immeasurably complex and yet to be fully understood by science, particularly in terms of the role played by biodiversity (Mace et al., 2012). It follows that PES approaches require a governance structure that is adept at managing complexity, and can adapt to new information and insights.

In this paper, we look to the adaptive governance literature for insight into how PES schemes might be designed to achieve multiple socially desirable objectives over different spatial scales. The process of 'adaptive governance' involves refining or modifying policies and their implementation to better satisfy the wants and needs of constituents, and has been shown to assist with the development of long-term, sustainable policy solutions to highly-complex problems (Cook et al., 2010). We hypothesize that a coordinated but polycentric PES governance framework with environmental targets set at relatively small spatial scales and coordinated at larger scales will produce outcomes that are both important for global ecosystems and the economic development of local communities.

We devote special emphasis to the interaction of ecological and institutional issues, which to date have not featured strongly in the PES literature. Institutions are the prescriptions that societies use to shape all forms of repetitive and structured interactions, including those within neighbourhoods, markets, businesses, and governments at all scales (Ostrom, 1995). Outcomes of PES largely depend on institutions (Chhatre and Agrawal, 2009; Clements et al., 2010; Jack et al., 2008; Muradian et al., 2013), and appropriate institutions, in turn, are determined by and adapted to the relative characteristics of the ecosystems and services in question

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(Farley and Costanza, 2010). Given that significant levels of uncertainty always exist in ecosystem services measurement, monitoring, valuation and management, we should continuously gather and integrate appropriate information with the goal of learning and adaptive governance. Though adaptive management has been proposed a fundamental principle of PES (Farley and Costanza, 2010), to the best of our knowledge, there has been no effort in detailing its design in PES.

2. What payment is appropriate for the provision of ecosystem services?

PES schemes compensate individuals or communities for undertaking actions that increase the provision of ecosystem services such as carbon sequestration and water purification. The terms PES generally refers to market-based instruments used to incentivise the conservation of biodiversity and ecosystem services (Pirard, 2012), but can be specifically defined in multiple ways (Wunder, 2015). In a recent review, Wunder (2015) provided a list of definitions of PES with different emphasises. The most popular of these include a "narrow" definition involving the combination of a user fee with a targeted, conditional subsidy (Wunder, 2005b), and a much "broader" ecological economic definition (Muradian et al., 2010). In the latter, PES is defined as "a transfer of resources between social actors, which aims to create incentives to align individual and/or collective land use decisions with the social interest in the management of natural resources" (Muradian et al., 2010: 1205). Since the narrow definition and its associated conditions excludes the bulk of PES used in practice (Vatn, 2015), we use the broader PES definition in this paper.

Ecosystem services are often themselves not fully defined (Muradian et al., 2010), in turn making it difficult to discern their economic values. The efficiency gains attributable to PES are consequently unclear as the links between the prices paid to service providers and the amount of benefit society accrues as a result of their provision are ambiguous (Ferraro, 2011). The basic tenants of the PES approach to conservation are appealing: land users, who tend to be poorly motivated to protect natural capital on land they manage can be encouraged to do so through payments from ecosystem service buyers that at least cover the opportunity costs of more environmentally-sound land use (Engel et al., 2008; Pagiola et al., 2002; Van Hecken and Bastiaensen, 2010; Wunder, 2005a). The problem is that social benefits of an ecosystem service are so complex and multi-faceted it is impossible to know when the payment is appropriate. If it is too low the service(s) will be underprovided, and vice versa, but neither providers nor the buyers have sufficient information about ecosystem values to negotiate.

Providers may know what price they need to cover reflecting production costs and a desirable profit margin to invest in their communities, but they are unable to ascertain how this compares to the welfare human society (i.e. buyers in aggregate) gains from maintaining functioning ecosystems, preserving spectacular wild landscapes and species at broader spatial scales. Hence, designers of PES schemes cannot be sure if providers are being given the right incentives to supply a socially-desirable amount of an ecosystem service.

Instead of determining the payment amount on the ecosystem services delivered (i.e. output-based) and how much the buyer has benefited (i.e. benefit-based), most PES programs have applied an input or cost approach where the amount of payment is based on the input or cost of the provider's adoption of particular land uses or management activities (Liu et al., 2010). However, meeting opportunity cost is not necessarily a precondition to incentivize potential ecosystem services providers. Economic incentives may even 'crowd-out' local rules and social norms, affecting "intrinsic motivations" for environmental protection behaviour (Clements et al., 2010). Economic assessment and ecosystem services valuation should therefore be seen as tools to guide PES, not as preconditions to taking action (TEEB, 2010). Although promising initiatives like the Global Environmental Facility Ecomarket project in Costa Rica have been established involving means-tested direct payments for global ecosystem services (Pagiola, 2008), they are not tethered to environmental objectives at larger spatial scales (Huberman, 2009). This raises the possibility of perverse outcomes considering actions of local land managers are not necessarily consistent with long term species or ecosystem health across regions or the globe (Van Hecken and Bastiaensen, 2010).

Problems in linking payments with outcomes in PES are not isolated to developing countries. Developed nations too will undoubtedly see an increasing number of similar schemes related to local ecosystem conservation continue to emerge over time. Here, the demand for ecosystem services from the public sector (e.g. departments of conservation, agriculture and rural affairs) and private offsets (i.e. businesses legally obliged to offset environmentally harmful production activities) are potentially large. Philanthropic trusts and non-government conservation organizations could also play prominent future roles in terms of purchasing credits for biodiversity issues they see as being most relevant to their cause, although the absence of reliable values for biodiversity at every level (i.e. genetic, species and ecosystem) make it virtually impossible for them to determine an optimal biodiversity credit portfolio that would produce the largest net return (Mace et al., 2012).

3. Adaptive approaches to governance of PES schemes

3.1. What is adaptive governance?

Governance broadly describes the processes by which society's resources are deployed to achieve collective goals (Folke et al., 2005). Acknowledging that these goals are sometimes difficult to define and achieve, *adaptive* governance refers to the systematic adjustment of governance processes using lessons learned from prior policy outcomes (Gregory et al., 2006). It relies on the creation of structures that facilitate policy experimentation and the acquisition of qualitative and quantitative information about the systems being governed.

Notions of adaptive governance structures have emerged from both ecological systems theory and institutional theory. On the systems side, the notion of adaptive management emerged from critical thinking on science-based 'centralized expert management' practices that gave too little attention to the complexity and uncertainty of ecosystem processes (Holling, 1978). A proposed alternative process for the governance of natural resources consisted of a series of experiments intended to improve both the management of resources and the managers' understanding of them as ecosystem components (Lee, 1999). This suggestion eventually led to a more general theory of system dynamics and regime phases in ecological systems and interdependent social-ecological systems (Folke et al., 2004; Gunderson and Holling, 2002; Holling and Meffe, 1996; Olsson et al., 2004; Walker et al., 2006).

On the institutional side, examinations of institutional arrangements for intensively managed irrigation and forest resources began to delve into the social dynamics of natural resource management (Ostrom et al., 1992). This work on self-governing institutions explicitly challenges the presumption that the 'tragedy of the commons' is best resolved through externally imposed expert management (Hatfield-Dodds, 2006). Examples of locally-