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Evaluating the outcomes of payments for ecosystem services programmes using a capital asset framework

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ABSTRACT

There is a limited understanding of the conditions under which payments for ecosystem services (PES) programmes achieve improvements in ecosystem service (ES) flows, enhance natural resource sustainability or foster sustainable livelihoods. We used a capital asset framework to evaluate PES programmes in terms of their social, environmental, economic and institutional outcomes, focusing on efficiency, effectiveness and equity trade-offs. We found that PES schemes can provide positive conservation and development outcomes with respect to livelihoods, land-use change, household and community incomes, and governance. However, programmes differ with regards to contract agreements, payment modes, and compliance, and have diverse cross-sector institutional arrangements that remain primarily state-structured and external donor-financed. There is a consistent lack of focus on evaluating and fostering human, social and institutional capital. This reflects general inattention to how PES programmes consider the causal links between ES and outcomes. To enhance ES production and PES scheme accessibility and participation, we recommend strengthening the linkages between ES production and land-use practices, boosting private and voluntary sector involvement, encouraging property rights and tenure reform, improving financial viability, and adequately accounting for the distribution of programme costs and benefits among participants.

1. Introduction

The application of market-based incentive (MBI) mechanisms to deal with the challenges of landscape and environmental protection, climate mitigation, wetland restoration and biodiversity conservation is growing (Gómez-Baggethun et al., 2010; Muradian and Rival, 2012; Pirard, 2012). This signals an underlying shift in national and international natural resource use policy (Farley and Costanza, 2010; Pokorny et al., 2012). The emergence of MBIs have been justified on the grounds that they correct market failures, reduce information asymmetry, provide price signals for decision makers, and bridge the conservation funding gap (Gomez-Baggethun and Ruíz-Perez, 2011; Pirard, 2012).

Despite these endorsements concerns remain. For some, MBIs represent a plurality of 'hybrid governance' instruments that conflate conceptually different philosophies and mechanisms (i.e., rewards, incentives, markets), often addressing social–environmental problems not externalities arising from market failures (Muradian and Gómez-Baggethun, 2013; Muradian, 2013). There are also doubts over the ability of MBIs to adequately secure the provision of public goods and common pool resources (Muradian and Rival, 2012; Van Hecken and Bastiaensen, 2010; Kinzig et al., 2011; Lockie, 2013) whilst providing cost-effective policy (Kemkes et al., 2010). Other challenges include potential misapplication of MBIs (Lockie, 2013); the propensity to commoditize nature (Kosoy and Corbera, 2010), which could lead to reductions in ecological complexity and a 'commodity fiction' (Gomez-Baggethun and Ruíz-Perez, 2011; Muradian and Rival, 2012; Robertson, 2012); and the perception that MBIs represent encroaching neo-liberalist interventions (McAfee and Shapiro, 2010; McElwee, 2012; Arsel and Büscher, 2012; McAfee, 2012; Shapiro-Garza, 2013).

Nonetheless, the MBI model has been applied in many developing countries in the form of payment for ecosystem services (PES) programmes (Shelley, 2011; van Noordwijk et al., 2012; Tacconi, 2012; Derissen and Latacz-Lohmann, 2013) as a policy tool intended to address a spectrum of land management challenges (Landen-Mills, 2002; Landell-Mills and Porras 2002; Wunder, 2006; Engel et al., 2008; Bond and Mayers, 2010). PES has been presented as an alternative to traditional command-and-control approaches, which through encouraging more decentralised management has the potential to advance both conservation

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and rural livelihood development goals (Ferraro and Kiss, 2002; van Noordwijk et al., 2007; Agrawal et al., 2008; Pokorny et al., 2012; Muradian and Rival, 2012).

However, the widespread adoption of PES masks important issues (Pirard et al., 2010). The validity and suitability of formulating PES theory on Coasean grounds has been challenged because of the complexity, uncertainty, and asset specificity involved in managing ecosystem services (Farley and Costanza, 2010; Kosoy and Corbera, 2010; Muradian et al., 2010; Vatn, 2010; Muradian, 2013). Some argue that win-win conservation and development outcomes are likely if programmes are well designed (Pokorny et al., 2012; Kinzig et al., 2011), while others regard this as too optimistic given the influence of diverse contingent factors (Redford and Adams, 2009; Muradian et al., 2013). A number of practical obstacles may also hinder PES implementation: scheme design and payment structure (e.g., Engel et al., 2008; Kelsey Jack et al., 2008; Kemkes et al., 2010; Adhikari and Boag, 2012); modes of implementation (e.g., Engel and Palmer, 2008; Zhang and Pagiola, 2011); managing trade-offs arising from the need to balance efficiency, effectiveness and equity (e.g., Borner et al., 2010; Pascual et al., 2010, Narloch et al., 2011); institutional embeddedness and propensity to cooperate (e.g. Muradian et al., 2010; Vatn, 2010); spatial targeting, monitoring, participation, and compliance (e.g. Wünscher et al., 2008; Wendland et al., 2010); the adequacy of property rights (Lockie, 2013); and social and well-being outcomes (e.g. Bulte et al., 2008; Pattanayak et al., 2010; Daw et al., 2011) (Supporting information Table S1).

What, then, do these theoretical and practical debates mean for future PES prospects? Given that PES adoption will continue (Bond and Mayers, 2010), it is necessary to jointly assess both environmental and social effects to ensure long-term PES validation and effectiveness (Kelsey Jack et al., 2008; Farley and Costanza, 2010; Brouwer et al., 2011). To this end, we conducted a systematic review of the measured environmental and socio-economic outcomes of PES programmes. Systematic reviews are used widely in medical (Popay, 2006) and ecological sciences (Sutherland et al., 2004; Pullin et al., 2009) to gather evidence and generalise findings. We structured our review using a capital asset framework (CAF). The CAF originated as a rural livelihood assessment tool emphasising the interactions between individual- and community-level assets, and how collective action could be used to maintain various assets and resource flows to nurture local empowerment and foster development (Carney, 1998; Bebbington, 1999; Rudd, 2000; Green and Haines, 2008). The CAF connects socio-ecological context, institutional structure, the effects of changes in capital asset and their resource flows, and options for economic or political interventions based on actors' or societal values (Rudd, 2004). It has been used in diverse situations to analyse the transformative ability of assets to support rural livelihoods and reduce poverty in the Andes (Bebbington, 1999), assess poverty alleviation opportunities of a compensation-reward scheme for ecosystem services (van Noordwijk et al., 2007), identify barriers to the adoption of agricultural greenhouse gas mitigation measures in rural communities (Dulal et al., 2010), and appraise capacity-building requirements for tourism development in gateway communities bordering protected areas (Bennett et al., 2012).

We assessed the extent to which PES programmes represent effective environmental management tools based on their effects on social, environmental, financial and institutional capital assets. Our goal was to provide a means of appraising PES studies (and the programmes they describe) in a manner that enables improvements in scheme design, application and implementation. We systematically collated, consolidated and analysed PES literature describing specific programmes and the 'measured outcomes' of those programmes. We also collated observed barriers to PES uptake and the potential opportunities for enhancing PES programme success. Our approach builds on work by Wunder et al. (2008), Daniels et al. (2010) and Pattanayak et al. (2010) but, by adopting a CAF approach, introduces a new means by which PES programme management interventions can be systematically appraised.

2. Materials and methods

Following various guidelines for systematic and related reviews (e.g., Petticrew and Egan, 2006; Cooper, 2010; Centre for Evidence-Based Conservation, 2013) our sequential four step process to the systematic review (Fig. 1) proceeded from evidence gathering to critical analysis.

2.1. Step 1 – search strategy

Relevant studies were located via three sources: scientific databases; internet searches and websites; and journal special issues. Databases we searched included: ISI Web of Knowledge (all databases); Science Direct (SciVerse); Scirus; and OvidSP (see Supporting information Table S2 for search details). Internet searches were performed using Google (Supporting information Table S3). Searches used combinations of keywords and the first 50 hits retrieved were checked for relevance (Davis and Pullin, 2006; Bowler et al., 2010). We searched websites of specific organisations with known MBI expertise and involvement (e.g., FAO, World Bank, Global Environment Facility, WWF, Conservation International, Ecosystem marketplace, Watershed Markets, Katoomba group, World Agroforestry Centre and Centre for International Forestry Research). Journal special issues focusing on PES included three from Ecological Economics (65 (4), 69 (7), 69(11)), and one each from Journal of Sustainable Forestry (28 (3–5)) and Environmental Conservation (38 (4)). We restricted our source documents to those written in English but made efforts to locate English translations of non-English documents whenever possible. All document types were accepted (e.g., articles, conference papers, theses, chapters and reports as long as the provenance of the texts could be verified).

2.2. Steps 2 and 3 – document screening

The preliminary screening process focused on article title and abstract relevance, and used a standardised protocol applied to all documents to generate a first cut of 'relevant' articles (Supporting information Table S4). A second, more detailed, screening was applied to those documents to obtain the final sample frame; we considered article type, theoretical content, and empirical evidence, and used a standardised protocol (Supporting information Table S5) in conjunction with additional study inclusion and exclusion criteria (Table 1).

2.3. Step 4 – critical analysis

Following Wunder et al. (2008), Pattanayak et al. (2010), and Daniels et al. (2010), we pursued three appraisal avenues to assemble our collection of studies: study appraisal (i.e., detailing the principal methodological characteristics of each study); PES programme evaluation (i.e., the application of the CAF to assess programme outcomes); and PES programme deconstruction (i.e., dissecting the operational, institutional, and financial arrangements of the specific projects identified within the collection of studies) (Fig. 2). For each aspect, standardised coding protocols were employed to extract relevant information systematically and