



## Juggling multiple dimensions in a complex socio-ecosystem: The issue of targeting in payments for ecosystem services



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### ABSTRACT

Proponents of payments for ecosystem services (PES) schemes advocate targeting payments to geographical areas that can: (a) maintain or enhance ecosystem services, (b) permit economically efficient arrangements and (c) address poverty objectives. The location of these efficient, effective and equitable (or triple-win) solutions is viewed as the 'holy grail' of PES and is often sought in isolation to broader socio-economic pressures, political relationships, or local cultural conditions. While the plethora of PES design perspectives often follow the concepts of efficiency and effectiveness, they seldom relate to pluralistic value systems and may disparage local self-determination for influencing the form and terms of negotiation. This paper critically analyses the assumptions underpinning the design of PES schemes which seek to optimise or target efficient, effective and poverty objectives. Using a case study for a proposed PES initiative in the Kathmandu Valley of Nepal, we employ spatial analysis to geographically visualise the discrepancy between the location for a typology of targeted objectives and actual preferences which support local perceptions of natural resource use and conservation. The case study highlights the inequity inherent in targeting payments under a neoliberal framing. Instead, spatially differentiating incentives according to socially determined priorities and collective management is suggested.

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### Introduction

Market-oriented instruments for environmental protection seek to efficiently modify the behaviour of land-users to correspond with the needs and values of paying beneficiaries who can compensate the former for the foregone benefits of land-use change (Wunder, 2005; Engel et al., 2008). One such instrument which has sparked widespread enthusiasm from researchers, government agencies, development banks, and donors in the last decade is 'payments for ecosystem services' (PES). It has been argued that PES and other market-like environmental policies subjugate nature and diverse social relationships as being inferior to rational self-interest and simplistic yet mythical cause-and-effect relationships (Kosoy and Corbera, 2010). Such policies rooted in neoclassical economics essentially reinforce the notion that human society is not only distinct from nature, but also that human value systems

are fixed and are not shaped by social influences (Sagoff, 1998). Despite these criticisms, the quest for the optimum PES scheme according to economic, ecological and poverty alleviation objectives remains a seemingly obvious and unwavering priority for PES practitioners (Kroeger, 2013).

The optimisation of PES is increasingly being aligned with several key features of neoliberal economic policy, as identified by Castree (2008), namely: *privatization* (e.g. once private property rights are established, social actors can voluntarily negotiate and incentivize each other to influence behaviour given complete information and minimal costs of negotiation); *marketisation* (e.g. trading ecosystem services in markets where monetary compensation is considered the dominant exchange value), and *market-supporting policies* and organisations designed to develop the necessary *institutional apparatus* that facilitate the application of PES through a market lens. Despite reference to these considerations, very few operating PES schemes exhibit characteristics of sheer market arrangements, such as conditionally-dependent payments and voluntary participation (Muradian et al., 2010; McAfee, 2012). Regardless of these ecological and socio-economic assumptions, the conceptually attractive objectives of *cost-efficiency*, *environmental*

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*effectiveness* (measured as ‘additionality’ defined as the perceived ecological service benefits in relation to what would have been provided without the payments) and the combination, *cost-effectiveness* (ecological service value provided per money spent), have been identified in optimizing ecosystem service provision through PES payments under the pretence of a ‘market-based’ arrangement (Wünscher et al., 2006; Chen et al., 2010). Further studies have included poverty alleviation or social *equity* as another targeting goal and have sought to identify locations tagged as having the ‘gold standard’, by targeting service providers and their lands according to low opportunity cost, high potential additionality and managed by poorer households (Gauvin et al., 2010; Jack et al., 2009; Alix-Garcia et al., 2008).

A wealth of studies have emerged attempting to map ecosystem services according to areas of potential supply and demand across varying spatial and temporal scales (Naidoo et al., 2008; Nelson et al., 2009; Daily et al., 2009; Zhang and Pagiola, 2011; Bagstad et al., 2013). The popularity of visualising ecosystem services has resulted in a number of decision-support toolkits of differing degrees of sophistication to generate spatial information on the extent or magnitude of ecosystem service delivery potential or defined metrics quantifying particular services (Potschin and Haines-Young, 2011). Identifying “hotspots” of ecosystem services valued by certain social groups has been suggested to facilitate the prioritisation or targeting of policy efforts to improve the delivery of services and avoid untargeted expenditure of scarce resources. Indeed, both local and global-scale efforts have been made to map the spatial concordance of areas that produce ecosystem services to the values held by beneficiaries of these services (Newburn et al., 2005; Naidoo and Iwamura, 2007; Naidoo et al., 2008; Crossman and Bryan, 2009).

In this study, we develop a tool to geospatially visualise the interactions between targeted objectives which exposes the political embeddedness of various PES distribution strategies. The spatially explicit nature of the tool also serves to reveal the absurdity of seeking ‘gold standards’ in the face of substantial epistemological and ontological complexity. We argue that targeted payments lacking local cultural meanings, attention to the situational context of poverty, or an analysis of existing political relationships influencing natural resource management will at best fail to result in long-term positive outcomes and at worst reinforce the cycle of poverty and environmental degradation.

In the following section, we outline the objectives of the paper and critically review recent studies which have applied spatial analysis to map ecosystem services and others which leverage upon such techniques to improve PES targeting. Section three describes the case study and the methodology in addressing the above research objectives. Sections four and five offer results of the analysis and a discussion of what these results suggest for improving PES arrangements. A conclusion is then given proposing further research that adopts a collective-action framing for PES as incentive-based negotiations for socio-ecological stewardship.

## Objectives and background

While PES targeting cannot derive from a purely technical process, we argue there is value in making ethical and political ramifications explicit in the allocation of PES payments. We propose a PES targeting matrix that incorporates the various objectives in different combinations that PES proponents seek to enhance in the negotiation of incentives for ecological stewardship. In this manner, not only are trade-offs between the allocation of payments identified, but the implications of each PES design scenario become open for critical inquiry in relation to local informal

institutions, power relations between actors and inequities of resource access.

### *PES targeting matrix*

The development of the matrix employs geospatial techniques to visually illustrate how each targeted PES design scenario identifies unambiguously which households in geographic space would benefit from a given targeting scenario. Such a representation can reveal the extent to which targeting scenarios align with local norms, cultural and informal relationships, or local decision-making institutions and hence the legitimacy of the design. An empirical case study of a proposed PES scheme in the Kathmandu Valley of Nepal is examined using the PES targeting matrix in order to identify geographical locations where payments align with objectives prioritised by PES proponents. These include economic efficiency, environmental effectiveness (e.g. PES ‘additionality’), cost-effectiveness, and equity. The latter is measured across two dimensions considering: (a) poverty using income distribution as a measure of welfare and, (b) poverty in relative terms based on perceived well-being. The interactions of each objective are presented within the matrix in order to illustrate the range of potential payment design scenarios, allow critical judgement on each objective in relation to others according to the preferences of involved social actors, and to determine the extent to which each scenario aligns with or deviates from local understandings of payment distribution preference. Moreover, to reveal the inherently political nature of choosing a particular design scenario, the distributional ramifications of using the presumably ‘objective’ parameter of ‘opportunity cost’ is critically analysed. While previous studies have recognized the mismatch between externally defined political goals and local legitimacy in PES (Corbera et al., 2007; Pascual et al., 2010; Vatn, 2010; Van Hecken et al., 2012; Fisher, 2013; Zander et al., 2013) this study is the first to adopt an explicitly spatial argument to illustrate this point.

Specifically, this paper contains the following research objectives:

1. Introduce a targeting matrix to spatially visualise the trade-offs between targeting designs prioritising economic efficiency, ecological effectiveness (i.e. additionality) and poverty alleviation.
2. Reveal the distributional consequences of using opportunity cost as a benchmark for cost-efficiency or cost-effectiveness targeting by considering livelihood constraints between more and less wealthy households identified as potential service providers.
3. Identify the diverse social, economic and environmental preferences of both upstream and downstream social actors.
4. Compare the payment design and distributional preferences of identified service providers with the full set of spatially defined targeting strategies reflecting the objectives of PES proponents.
5. In the light of these results, this paper discusses the extent to which informal institutions and asymmetries of power between social actor groups determine the degree of self-determination and legitimacy of a particular PES targeting scenario.

The targeting matrix serves to illustrate the point that optimising PES payments according to neoliberal economic is more likely to divide rather than align ecological and social interests. At the heart, lies the inherent injustice of imposing a single value metric to reflect changes in social welfare. Indeed, there is a real risk that optimising payments serves to reward those individuals who are ironically least allied with the social interest, specifically those with greater bargaining power and resources to dictate patterns of land-use management to serve their own conceptualizations of nature’s benefits.

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