

Design of Payments for Environmental Services: state of the art and problem statement

Special session: "Building an effective scheme for protected areas: aligning insights from different disciplines"

Protected areas play a valuable role in maintaining ecosystems, their biodiversity, and the services they provide. One way to manage these protected areas in order to secure the provision of these services is through the use of payment mechanisms, like PES schemes. Though these schemes are more and more frequently implemented, their design is still a challenging task. As part of the special session entitled "Building an effective scheme for protected areas: aligning insights from different disciplines", this presentation will provide a review of the state of the art of the design of payments schemes for the provision of ecosystem services. After a synthesis of the main challenges, we will identify the recent advances and remaining problems to be encountered in the design of schemes both environmental-effective and cost-effective.

According to Wunder (2005), a Payment for Environmental Services (PES) is: "a voluntary transaction where a well-defined ES (or a land-use likely to secure that service) is being 'bought' by a (minimum one) ES buyer from a (minimum one) ES provider if and only if the ES provider secures ES provision (conditionality)."

The main challenges of efficient PES design that will be addressed in the presentation are the following. The voluntary nature of these schemes implies that the providers of ES self-select into the scheme. The costs and provision of ES being heterogeneous between providers, the scheme must be designed in order to attract the "right" landowners, *ie* these that will provide the desired ES (environmental-effectiveness) at the lowest cost (cost-effectiveness). In order to achieve this goal under information asymmetry between the buyer(s) of the service and the provider(s) the contract must be carefully designed, with special attention given to the choice and definition of the environmental commitments (*eg* outcome based or actions based), the contract allocation mode (*eg* the use of auctions or not) and the payments (*eg* the level of payment, the use of flat rate or discriminative payment). The analysis of agri-environmental schemes (AES) in Europe has shown that the contract length and flexibility as well as the importance of transaction costs also have important consequences on its ability to attract landowners. These elements have important impacts on schemes' effectiveness and efficiency, and require interdisciplinary work to figure out the link between land management options and environmental outcomes (Bryan *et al.*, 2013; Reed *et al.*, 2014).

Since the special issue of Ecological Economics setting the challenges of PES design in 2008¹, an important literature has emerged reporting case studies from around the world and bringing news insights. The presentation will review if and how these case studies answer these challenges. In particular, the recent literature has focuses on the following main issues: spatial coordination in PES,

¹ Ecological Economics Volume 65, Issue 4, Pages 663-852 (1 May 2008), Payments for Environmental Services in Developing and Developed Countries.

paying for outcomes rather than actions (Hanley and White, 2014), behavioural factors affecting schemes' implementation, and the additionality of PES schemes and how to measure this.

A particular focus will be given on the growing literature on behavioural factors affecting PES efficiency; and on the issue of spatial coordination. Clot and Stanton (2014) for example, show on the basis of behavioural experiments that farmers who exhibit present-biased preferences are more likely to participate in PES schemes, which has implications for the timing of payments to ES providers. In the context of a PES scheme subsidising farmers for afforestation in China, Chen *et al.* (2009) show that individual decision to re-enrol can be positively influenced by the information that the neighbourhood is also intending to re-enrol, affecting the durability of the scheme. Neighbourhood effects have also been revealed in the initial uptake of PES (Van der Horst, 2011), and have to be considered in the design of PES schemes. For example, Kuhfuss *et al.* (2014) show that the introduction of a bonus, which payment is conditioned to a minimum level of participation, can highly increase farmers' uptake of an AES. Finally, spatial coordination of participants can be determinant for the scheme's effectiveness when the provision of ES depends on the spatial configuration of ecosystems, and therefore on spatial distribution of participants to PES schemes (Cong *et al.*, 2014, Banerjee *et al.*, 2014). Some of the developments in the literature concerning PES design have tackled this issue (Prager *et al.*, 2012.), and propose a better spatial targeting of schemes (Wendland *et al.*, 2010), the use of agglomeration bonus (Parkhurst *et al.*, 2002), or spatially-connected auctions (Reeson *et al.*, 2011).

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