



A locally designed payment scheme for agricultural landscape services

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ABSTRACT

Traditional nationwide agri-environmental policy measures are not always efficient to ensure the provision of environmental services that would match peoples' preferences. This study suggests a landscape value trade (LVT) scheme to be locally implemented so as to ensure the supply of agricultural landscape attributes demanded by local citizens. The feasibility of LVT, a 'user-financed' payment for environmental services (PES) scheme, is analysed in a local case from the southern part of Finland. We examine the disposition of both landowners (sellers) as well as residents (buyers). Of the landowners 43% were hesitant towards LVT, and for improvement of most of the attributes they demanded compensation exceeding their expenses. To examine the preferences of buyers for certain landscape attributes and also the existence of heterogeneity, we employed a random parameters logit (RPL) model with interactions. Buyers' preferences were found to be spatially heterogeneous, and transaction costs are therefore expected to significantly determine the performance of LVT. However, a LVT plan that would incorporate the most significant landscape attributes, i.e. the presence of grazing animals, water buffer zone management in a natural state and the renovation of production buildings, was evaluated to be feasible to put into practice, while the aggregate benefits were almost twice as high as the anticipated costs.

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Introduction

Scenic values of the agricultural landscape are positive externalities of agriculture (Ready et al., 1997; Morey et al., 2008; Fleischer and Tsur, 2000; Raffaelli et al., 2004), and as such the markets will tend to adjust the scenic quality lower than the socially optimal level. Given the public good character, non-excludability and non-rivalry, of the agricultural landscape, the financial incentives to improve the agricultural landscape are weak simply because the owners or land managers cannot benefit from actual exchange. Even in the case of undersupply of the good, compensation for providing positive externalities may also be insufficient due to the high transaction costs that accompany the use of resources to organize the market (Bromley, 1991; Challen, 2000 in Coggan et al., 2010; Vatn et al., 2002). Hence, it is highly likely that markets will fail to provide agricultural landscape amenities.

To ensure the provision of the public good, agri-environmental schemes (AES) have been implemented. They are expected to endorse farmland conservation and address, among others, the protection and maintenance of landscape values (Primdahl et al., 2010). Nevertheless, there are cases where AES have failed to develop socially efficient policy measures for the services attached

to certain environmental needs, such as the agricultural landscape (Hasund, 2013; v. Haaren and Bathke, 2008). The agricultural landscape is quite heterogeneous, and a 'one size fits all' solution would be inefficient considering that environmental values vary among landscape types and attributes (Hasund, 2013). AES measures do not always adapt to the local conditions, since certain landscape elements that might be in the interest of local people are often excluded from them. In Finland, although landscape management is included in the general protection scheme of agri-environmental policy over a nationwide range (Kaljonen, 2006), the current AES measures do not guarantee the production of public goods such as recreational opportunities in agricultural landscapes (Pouta and Ovaskainen, 2006). Moreover, AES measures support active farmers in maintaining agricultural landscapes, but the growing population of landowners who do not actively cultivate are not covered, even though their management decisions still have an effect on the landscape (Pouta et al., 2012).

Given the market failure and also the policy gaps that may result from traditional AES implementation, market-based incentives that refer to *payments for the provision of ecosystem or environmental services* (PES) have been suggested as a viable approach (Engel et al., 2008; Pagiola and Platais, 2007). In principal, PES argues that the problem of undersupply of public goods could, under certain conditions, be overcome through private negotiations between affected parties (Coase, 1960). Wunder (2005) defined PES as "a voluntary transaction where a well-defined environmental service (ES) is being 'bought' by a minimum of one service buyer from a

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minimum of one service provider if and only if the service provider secures service provision." Although PES is usually implemented to conserve natural resources (e.g. forests), it can also be used to "preserve, restore or establish any land use that generates external benefits, including agricultural land uses" (Engel et al., 2008). Previous case studies concerning PES schemes for agricultural landscape services are rather rare in the literature, and they usually comprise an ex-post valuation of a PES scheme and a review of the relevant implementation (see Hackl et al., 2007; Dobbs and Pretty, 2008).

In our case study we considered the application of a new PES instrument, a voluntary landscape value trade (LVT) scheme to improve the social efficiency of the provision of agricultural landscape attributes on a very local scale.

Considering the perspective of both buyers (residents) and sellers (landowners), we outlined the demand for and supply of landscape attributes. Our aim was to reveal the level of acceptance of the LVT scheme among landowners, as well as their level of willingness to participate and cooperate in improving certain landscape attributes. Next, based on a choice experiment (CE), we estimated the local-scale benefits derived by residents. The contribution of certain landscape attributes to residents' utility provided the guidelines for designing the LVT scheme. We investigated the presence of heterogeneity in preferences in a random parameters logit (RPL) model and interpreted its reflection in the transaction costs of the scheme. We accounted for both the welfare benefits and the anticipated costs of a landscape management scenario so as to conclude on the feasibility and the prerequisites of the scheme. Our conclusions on the feasibility of the LVT scheme, and on the shortcomings that should be taken into consideration, contribute to designing local landscape management schemes.

Past PES examples

PES examples that have been applied not only in developing but also in developed countries are ample in the literature and provide sufficient knowledge and experience to be applicable in future cases. Primarily, PES schemes vary in accordance with the *type of good/service provision* as well as the *actors* (buyers and sellers) involved. According to the type of buyer, i.e. private or public, a PES scheme may respectively be regarded 'user-financed' or 'government-financed'. Another alternative would be that an NGO acts as the buyer of the ES. Secondly, PES schemes are differentiated according with the *type of payment* (fixed or flexible), the *financing arrangement* (customer-charged or tax-based) (Ravnborg et al., 2007) and the *benefits or costs of the targeting approach* (Babcock et al., 1997).

'User-financed' PES programmes are expected to be more efficient than 'government-financed' ones if the conditions of the Coase theorem are met, i.e. property rights are clearly defined and transaction costs are low (Coase, 1960). However, if these conditions are not met (Engel et al., 2008) there will be incentives for free-riding behaviour. For example, if the number of beneficiaries increases, the mechanism's effectiveness may be jeopardized by high transaction costs and free-riding behaviour. The transaction costs are also increased by the heterogeneity of preferences among interested actors (Hackl et al., 2007). To mitigate free-riding incentives, the welfare benefits that buyers enjoy from the provision of the public good must be sufficiently large (Engel et al., 2008). Findings from experimental as well as real-world studies reveal factors such as group size, the contribution of others and pro-social behaviour (Frey and Meier, 2004) that are related to free riding. Free riding increases with group size (Olson, 1965), although Haan and Kooreman (2002) argue that the group size effect may be ambiguous. Frey and Meier (2004) define the idea of conditionality in people's behaviour, according with people contribute more to a public good when others contribute more, and

the moral judgments of potential free riders strongly depend on the behaviour of other (Cubitt et al., 2011). Uncertainty regarding the contributions of others exacerbates free riding (Sandler et al., 1986), while people's awareness of others' contributions increases with repetition or the continuation of payment for the public good provision, resulting in a strong learning effect that may encourage free riding intentions (Haan and Kooreman, 2002).

Local user-financed PES schemes are likely to be efficiently targeted, "as the actors with the most information about the value of the service are directly involved, have a clear incentive to ensure that the mechanism is functioning well, have an opportunity to examine whether the service is being delivered, and have the ability to re-negotiate (or terminate) the agreement if needed" (Pagiola and Platais, 2007 in Engel et al., 2008, p. 666) The argumentation holds if the scheme is directly and easily communicated to a small group of participants, and free riding can be eliminated due to the strong social ties among individuals, but also due to the social pressure that a local community may impose on individuals, as actions can be easily monitored and judged.

The *level of the payment* and *targeting criteria* are both crucial for PES scheme to be socially efficient. Payments should be sufficient to induce the adoption of practices, but at a level that it would not exceed the value of services/benefits. A targeting approach based on either benefits or costs or a combination of the two has been extensively discussed in the literature (Babcock et al., 1997; Barton et al., 2003; Ferraro, 2003, 2004; Alix-Garcia et al., 2005; Wünscher et al., 2006, 2008; Engel et al., 2007). Wätzold and Drechsler (2005) argued that for the cost-efficiency criterion to be met, compensation payments should be spatially heterogeneous. The participation cost accounts for the forgone income from alternative land uses, the transaction and the protection costs (Wünscher et al., 2008). To ensure that a landowner participates, the compensation should be higher than the landowner's participation cost. It should be noted, however, that the cost will differ among landowners, as it is quite heterogeneous, depending on individual aspects such as the size of land, land use, infrastructure and landowner's socio-demographic characteristics. Wätzold et al. (2008) also incorporated landowner's attitude towards the provision of environmental services as a potential cost factor. Such a cost dimension leaves room for bargaining regarding the required compensation level. 'Government-financed' PES schemes usually target the cost of ES using alternative methods to evaluate the opportunity costs that providers confront. The BushTender auction mechanism, aiming to reveal the true payment price for landholders to conserve a natural habitat, forms an example (Stoneham et al., 2003). However, benefit and cost considerations could be combined in one targeting instrument (see Wünscher et al., 2008). An example is a voluntary participation programme in Finland (METSO Forest Biodiversity Programme for Southern Finland) that has aimed to promote conservation incentives for private forest owners. The government authority assessed the existence value for each applicant site and used it as a guideline in negotiations with landowners who had already provided their stands with associated private bids (Juutinen et al., 2005).

To produce information of costs and benefit for decision making, both the benefits to buyers and costs to providers need to be estimated. All costs and benefits should be taken into account, including ecological, socio-cultural and economic values and perceptions (De Groot et al., 2010). Nonetheless, Wunder (2007, p. 54) argued that a full economic valuation is not always necessary, since "any price providers and buyers agree to can be the right price." Instead, Wunder (2007) proposed draft calculations to set a price range and determine whether a PES scheme is feasible.

Important elements of PES schemes are the *source of funding* as well as its *duration*. The Programme of Payment for Environmental Services (PSA) implemented in Costa Rica comprises an

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