



Redefining payments for environmental services

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ABSTRACT

The Environmental Economics and the Ecological Economics perspectives on payments for environmental services (PES) propose rather different views on how to define PES, its key elements, and on the role of PES in ecosystem conservation and rural development. This paper compares these two perspectives and addresses the following questions: what is an appropriate definition of PES, grounded in the theory and practice underlying it? What are the key design elements of PES? What should the scope of PES be given the possible trade-offs between efficiency and equity? It is found that PES schemes should focus on cost-effectiveness and best practice for positive livelihood impacts. PES schemes should be transparent, and provide additional services with conditional payments to voluntary providers.

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1. Introduction

Payments for environmental services (PES) schemes have been implemented in several developed and developing countries. Bilateral and international donor organizations are interested in them because of their perceived potential to change environmentally harmful behaviour and for the benefits they may bring to rural livelihoods in developing countries (USAID, 2007, p.665). PES schemes have therefore received increasing attention from scholars, including three recent special issues of *Ecological Economics* (Engel et al., 2008; Farley and Costanza, 2010; Muradian et al., 2010) and one issue of *Environment and Development Economics* (Bulte et al., 2008). Farley and Costanza (2010) identify three perspectives on PES: i) the environmental economics perspective (ENVEP), summarised by Engel et al. (2008); ii) the ecological economics perspective (ECOLEP) described by Muradian et al. (2010), and iii) a perspective that rejects PES and the concept of ecosystem services (e.g. McCauley, 2006). This paper considers the first two perspectives due to lack of space to properly address the third perspective.

The ENVEP approach was particularly criticised by Muradian et al. (2010) and the papers in that special issue of *Ecological Economics*. Muradian et al. (2010) referred to ENVEP as the Coasian approach, and pointed out several shortcomings arising from the attempt to implement the Coase Theorem in PES. The view that PES is about implementing the Coase Theorem has been explicitly put forward by writers in the ENVEP camp: 'In effect, PES programs attempt to

put into practice the Coase Theorem' (Engel et al., 2008, p665).¹ However, the ENVEP also states that 'PES programs can also be seen as an environmental subsidy (to ES [environmental services] providers) combined, in some cases, with a user fee (on ES users)' (Engel et al., 2008, p665). This results in a lack of clarity about whether PES are pure Coasian transactions or something else, given that often governments are the ES buyers. For this reason the nature of the Coasian Theorem and transactions is considered in detail.

The ENVEP has provided the earliest and most cited definition of PES, which is in line with a Coasian approach: '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)' (Wunder, 2005, p 3). The logic of PES is summarised by Engel et al. (2008) as follows. Ecosystem managers (for example, farmers) often receive higher benefits from land uses alternative to conservation and therefore choose the former. However, those land uses often have negative effects (externalities) on other people (for instance, downstream water users). The latter (the ES buyers) could therefore pay the ecosystem managers (the ES providers) to induce them to adopt practices that ensure the provision of the ES. The payment (often made in cash but may also involve in-kind benefits) needs to be: i) at least equal to the benefits forgone by the ES providers (including opportunity costs and transaction costs to enter into the PES

¹ See also Pattanayak et al. (2010, p. 256): 'As they have more recently been defined, however, PES are closer in spirit to Coase's (1960) critique of Pigou, in which Coase argues that socially suboptimal situations (e.g., too little provision of environmental services) can be resolved through voluntary market-like transactions, provided that transaction costs are low and property rights as clearly defined and enforced.'

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agreement) and ii) equal or less than the value of the ES to the buyers (Engel et al., 2008). Engel et al. (2008) further note that: i) the ES buyers may be the actual users of the ES, or a third party, normally a government agency, but could also be another entity, such as an NGO or international organization; and ii) PES schemes have mostly targeted private landholders, but communities who have common property rights over resources, as well as the state (which owns land) can be ES providers. The case in which the ES buyers contract directly with the ES providers is the closest to the pure Coasian case (Engel et al., 2008).

The ECOLEP notes that the ENVEP's narrow definition of PES results in only few cases being classified as true PES schemes, because most real world situations do not conform to it (Muradian et al., 2010; Vatn, 2010). Muradian et al. (2010) provide three criteria to achieve a broader categorization of PES schemes. The first criterion – importance of the economic incentive – relates to the role played by the incentives in the actual provision of the ES. There are cases in which the economic incentive is not the primary factor leading to the provision of the ES, which would have been provided even without the PES scheme (because of the intrinsic motivations), and there are other cases in which the economic incentive plays a critical role (Muradian et al., 2010). The second criterion – directness of the transfer – refers to the extent of the mediation present between the ES providers and the ultimate beneficiaries of the ES: 'The most indirect situation would be when the State represents buyers, there is one intermediary between the State and providers and the latter do not receive individual payments for their individual environmental protection efforts' (Muradian et al., 2010, p. 1206). In this case, the payment to the providers would take place through investment in public goods (Muradian et al., 2010). The third criterion – degree of commodification – refers to the extent and clarity with which the ES can be assessed and acquired in measurable quantities. In some cases, the ES may be clearly commodified, such as tons of carbon sequestered, whilst in others it is less defined (Muradian et al., 2010).

On the basis of the critique of the ENVEP, Muradian et al. (2010, p. 1205) redefine PES 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.' This definition is adopted by Farley and Costanza (2010, p. 2063) because it is 'more in line with ecological economics, in which ecological sustainability and just distribution take precedence over market efficiency in furthering social interests.'

These two perspectives not only define PES in different ways but also suggest somewhat different roles for PES in ecosystem conservation and rural development. This paper compares therefore these perspectives and addresses the following questions: what is an appropriate definition of PES, grounded in the theory and practice underlying it? What are the key design elements of PES? What should the scope of PES be given the possible trade-offs between efficiency and equity?

2. Measuring and Monitoring Environmental Services or Their Proxies

A fundamental issue is whether the ES can be measured. If measurement with a reasonable degree of accuracy is not possible, the extent of the externality cannot be ascertained, and there would be no basis for negotiating a Coasian agreement, as emphasised by the ENVEP definition of PES. Norgaard (2010) states that it is difficult to accurately characterize the ES on which most PES schemes focus, and knowledge about one type of ecosystem is not immediately transposable to another similar ecosystem, as both human actions and differences in key variables such as climate or soil affect the provision of ecosystem services. Kosoy and Corbera (2010) emphasise that ecosystem properties evolve from the interplay of various factors including behavioural, biological, physical, and social interactions. Therefore, interventions such as PES can affect ecosystems in both predictable and unpredictable ways.

According to them, PES schemes thus face important challenges about the inclusion of uncertainty into the assessment of ES. To address these problems, an ES is defined within the ECOLEP as a fund-service (Farley and Costanza, 2010). Fund-services are generated from stock-flow resources, are available at a given rate over time, do not result in the physical transformation of the stock-flow resource, and cannot be stockpiled (Farley and Costanza, 2010). The suggested benefits of this definition include, among others: i) that most PES schemes actually pay for ecosystem funds, that is, land uses generating the service, rather than the service itself, and ii) that it focuses on the physical characteristics of the ES rather than on its value to humans, thus avoiding the commodification problem (Farley and Costanza, 2010).

Despite greater emphasis within the ECOLEP about the problems faced in measuring ES (e.g. Norgaard, 2010), both the ECOLEP and the ENVEP espouse the need to define and measure the ES and recognise that often this will be done by using appropriate proxy indicators (Engel et al., 2008; Farley and Costanza, 2010). Baselines for the ES would need to be developed and monitored over time. Many existing PES schemes have given limited attention to this element (Muradian et al., 2010; Tacconi et al., 2010b). However, this does not necessarily mean that it should not feature prominently in new schemes or should not be introduced in the existing ones that lack it, as seems to be implied by Muradian et al. (2010) but not by Farley and Costanza (2010) within the ECOLEP. Our view is that these difficulties should not be taken as requiring a loosening of the definition of PES. Rather, their occurrence should lead to further study of the ES (or its proxies) and the environmental management practices that affect it. If it is impossible to define and measure the service or its proxies, and/or to establish the necessary relationships with the proposed environmental management practices, a PES scheme should not be implemented, as implied by the ENVEP. The monitoring of the provision of the ES is necessary to ensure and assess the effectiveness, the efficiency and the equity of PES schemes, as discussed below.

3. Economic Theory and Implications for PES

The ECOLEP notes that transaction costs affect the applicability of the Coase Theorem, and they can be high in PES schemes. Therefore, buyers are often public agencies (Vatn, 2010). High transaction costs may be generated by a number of factors, including the negotiation of contracts (often with many ES providers), the assessment and monitoring of ES, and generating information about the resource use activities of the ES providers, the latter point being highlighted particularly by Fisher et al. (2010). High transaction costs also influence price setting, with intermediaries frequently setting the price rather than the market. It is worth noting that the presence of often high transaction costs, and their limiting effect on the capacity of the end users of ES to initiate PES schemes, has also been recognized within the ENVEP (Engel et al., 2008; Wunder et al., 2008).

The ECOLEP also points out that the Coase Theorem has limited applicability because the allocation of property rights² has considerable distributional implications and it cannot be overlooked in PES implementation and analysis (Muradian et al., 2010). Rights to the natural resources that deliver the ES must be clarified in order to design and implement PES, therefore requiring the intervention of the state (Vatn, 2010). Vatn (2010) emphasises that, in most cases, PES is purported to be a market solution to environmental problems (as an alternative to state and community governance), but in practice PES relies on state and/or community engagement, including NGOs. This point had been acknowledged by Engel et al. (2008, p. 667) who noted that: i) an increase in the number of ES buyers could also result in increases of transaction costs and incentives for free-riding; and ii) when the ES are public goods, appropriate conditions

² See below on the role of property rights in the Coase Theorem.

for user funded PES may not be present and government funded PES schemes may be the only option.

The ECOLEP also emphasises that intermediaries can affect PES schemes by setting the price for the ES and limiting the voluntary nature of the involvement of the users of the ES (Vatn, 2010). It needs to be noted, however, that the ENVEP too has highlighted the role of (not clearly defined) property rights in the design of PES, the role played by intermediaries by stressing that their motivations – such as poverty alleviation, regional development and the improvement of governance – affect the design of the schemes and that states are often the buyers of ES and will have to continue to be buyers due to the public good nature of many ES (Engel et al., 2008).

Let us now consider the Coase Theorem to understand better the implications for PES. Coase (1960) criticized the Pigouvian approach (Pigou, 1920) because it had led most economists to believe that it was always desirable to make the polluter liable for the damage to those affected (or to place a tax on the polluter, or to exclude the polluting activity from the area) rather than considering the overall benefits to society of the polluting activity compared with the option of no pollution. Coase's underlying philosophical stance was the criticism of Pigou's view about the need for state intervention (see Coase, 1960, p. 431). Coase (1960) pointed out that externalities should be considered a reciprocal problem, rather than being viewed simply as the polluter affecting those affected, because if the polluter's activities are restricted, he would also suffer damage. Coase's fundamental argument was that assigning property rights to pollute or not be polluted would result in private, voluntary negotiations leading to an efficient allocation of resources, regardless of the initial assignment of rights, with government intervention limited to assigning the rights. In the presence of high transaction costs, government intervention might be warranted, but that is also costly and there are no reasons why government intervention would lead to outcomes that are superior or inferior to leaving the problem to the market or the firm (Coase, 1960). It is important to consider the required conditions of the Coase Theorem. Even when all those conditions are met, an efficient outcome might not eventuate:

"Even if there is only a single polluter and a single victim, even if it is clear who has the property right, even if there are zero transaction costs to negotiations, even if both parties have "complete information," i.e., they know not only their own marginal profit or damage curve but the marginal profit or damage curve of the other party as well, even if both parties know that the other knows this as well, even if players care only about the absolute size of their own payoffs, and even if the bargaining procedure is carefully structured, it is possible a polluter and victim might fail to reach an efficient outcome if either has reason to be concerned for their bargaining "reputation" (Hahnel and Sheeran, 2009, p. 232).

Hahnel and Sheeran (2009) proceed to note the likely outcomes under more realistic conditions:

- i) in the likely event that the parties do not have complete information, the party with the property right has an incentive to inflate her profit or damages, and if agreement is reached, it would be an inefficient outcome;
- ii) in the presence of multiple pollution victims, the important factors leading to lack of agreement or inefficient outcomes are perverse free-rider and hold-out incentive problems, rather than just an increase in transaction costs³;
- iii) the size of the payment resulting from the completion of a voluntary Coasian negotiation does not necessarily equate marginal benefits and marginal damages (based on market prices), but it depends on the parties' relative bargaining

power and their views of what constitutes an equitable agreement.

It is important to emphasise that Coasian negotiations are often described as market-based transactions, but in reality they are not, as implied in point (iii) above. Coasian negotiations may be referring to market prices used to calculate marginal profits and damages – as Coase (1960) had hypothesized – but the price negotiated for the amount of pollution reduced is *negotiated*, it is not a given as it would be in a true market (Hahnel and Sheeran, 2009).

From this brief exposition of the Coase Theorem, which highlights its very limited applicability, it appears unlikely that many PES schemes based on private voluntary transactions between the ES users and providers will emerge and lead to efficient outcomes. This is due to the presence of transaction costs, as pointed out by the ECOLEP but which was noted by the ENVEP,⁴ and because of the other restrictive necessary conditions for the Theorem to apply. The true Coasian-type PES scheme – that is, one established and funded through private voluntary negotiations – is likely to take place in a very limited number of cases.⁵ Furthermore, those cases should not be considered to represent actual market values of either the resources or the ES involved in the agreements, given that the prices are negotiated prices rather than market prices.

Norgaard (2010) rightly notes that the market may lead to the efficient allocation of ES, but that allocation is not necessarily sustainable or equitable from an intergenerational distribution perspective. The foregoing discussion of the Coase Theorem implies that PES schemes based solely on private voluntary negotiations would be even less likely to lead to the efficient allocation and equitable distribution of ES than markets because of the limited likelihood of them taking place and the fact that they are based on the bargaining power of the parties.

Coase's (1960) argument clearly focuses on private negotiations. Many PES schemes are state-initiated and state-funded, and even if they involve voluntary transactions (at least on the part of the ES sellers), they certainly cannot be defined as true Coasian agreements. For example, out of the fourteen PES case studies reported by Wunder et al. (2008), only three could be considered true Coasian schemes – that is, they do not involve government organizations, and only one of the three was funded by a private company. If one applied a truly Coasian perspective, eleven of the schemes considered by Wunder et al. (2008) would therefore be "PES-like", rather than just two, as categorised by those authors. This indicates that: i) whilst Coasian agreements may be relevant in some cases, simply taking a Coasian approach to PES is very limiting; and ii) the authors within the ENVEP do not take a strict Coasian view of PES. We need to ask, therefore, which economic approach may be relevant to PES beyond the Coasian one?

The broad objective of PES schemes, as obviously implied in the name, is to ensure the continued supply of an ES, or a bundle of them, through the provision of incentives. There is a risk that if the allocation of ES is left to the market, the allocation might be Pareto efficient in some cases but likely to be unsustainable (Norgaard, 2010). Sustainable allocation therefore needs to rely on physical measures indicating the amount of ES to be provided (Farley and Costanza, 2010). PES schemes can then be used to maintain or augment the supply of the ES. That is, they do not determine the allocation of the ES, rather they are used to achieve the given allocation as efficiently

³ When the property right is assigned to the polluter, each victim has an incentive to deny being affected in the hope that another victim will pay (free rider problem), whilst when the victims hold the property right, each victim has an incentive to exaggerate damages and to threaten to veto any deal to secure the largest share possible of the payment (Hahnel and Sheeran, 2009).

⁴ Engel et al. (2008, p. 657) state that as 'the number of ES buyers increases, transaction costs and incentives for free-riding increase as well.'

⁵ Engel et al. (2008, p. 657) state: 'User-financed PES is also likely to emerge if individual users have sufficiently large ES benefits that they stand to gain from ES provision even when bearing all the costs, and/or if users have a sufficiently large share of total ES benefits that it would be unrealistic for them to expect to free-ride on the efforts of others.'

as possible (the relationship with an equity objective is discussed later).⁶

The approach proposed by the ENVEP is relevant at this point. PES schemes seek to (Engel et al., 2008): i) change resource management practices that are unprofitable to resource managers but which generate positive externalities, and ii) change resource management practices that are profitable to resource managers but generate negative externalities.⁷ The latter would be best addressed through taxes if there are no concerns about distributional impacts and if lobbying by powerful actors involved in those management practices does not block the application of taxes (Engel et al., 2008). From a Kaldor–Hicks efficiency perspective, to make the implementation of a PES scheme worthwhile, the value of the payment must be lower than⁸ the value of the ES provided.⁹ To be attractive to the ES provider, the value of the payment should be at least equal to the opportunity and transaction costs faced by the ES provider. That is, the difference in net benefits between the activity that would have been undertaken in the absence of the PES scheme by the ES provider and that undertaken with PES.

Using taxes to change resource management practices that generate negative externalities would basically involve the adoption of the Pigouvian approach. Providing subsidies to polluters involves an implicit recognition of their right to pollute, which conflicts with the often standard practice represented by the polluter-pays principle. As noted above, however, this can be justified if there are distributional concerns (Engel et al., 2008), which are discussed later. The provision of subsidies would appear to be at odds with part of the first criterion of the ECOLEP (that is, the importance of the economic incentive) which includes cases in which the ES would have been provided even without PES. There are two reasons why the latter case should not be covered by PES schemes: i) there are many practices that do not reduce the provision of ES or enhance ES, and therefore would all be rewarded, and ii) doing that would decrease the funds available to correct practices with negative environmental implications (in other words, a portion of ES would be lost because funds would not be available to maintain them), as well as negative equity implications (that is, the reduced supply due to the failed maintenance just noted above would at least affect future generations).

The foregoing discussion of economic theory indicates that incentives should be provided to those who contribute to the supply of the ES (subject to conditionality and additional factors discussed later). On the basis of the behavioural economics literature (such as Frey and Oberholzer-Gee, 1997; Gneezy and Rustichini, 2000), the ECOLEP points out that the provision of incentives may crowd out intrinsic motivations for providing the ES (Farley and Costanza, 2010; Vatn, 2010). There is, however, a significant difference between the resource management issues considered by the behavioural economics studies reported above and those normally faced by ES suppliers. The former involve very small changes in the budget of those affected – for example, payments for the acceptance of a nuclear energy facility (Frey and Oberholzer-Gee, 1997) – whereas ES suppliers face decisions that have significant implications for their budgets. Whilst their willingness to participate in PES schemes may not be determined

solely by the (amount of) payment (Kosoy et al., 2007; Vatn, 2010), the environmental psychology literature indicates that monetary considerations dominate when pro-environmental actions have high individual costs, even if a number of factors affect individual environmental behaviour (Lindenberg and Steg, 2007; Moore and Loewenstein, 2004). In effect, the resource management practices that negatively impact the ES targeted by PES schemes are evidence that individual (or community) practices are not driven by pro-environmental behaviours. However, further research needs to consider which environmental strategies could complement payments, given that multiple and complementary strategies work better than in isolation to change environmental behaviour (Moore and Loewenstein, 2004). That research would also need to consider how combinations of payments and other strategies affect behaviour in different cultures because the latter have been shown to affect the degree to which biospheric, egoistic or altruistic motives drive individuals' environmental decisions (Milfont et al., 2006).

4. Voluntary Nature of Transactions

Voluntary negotiations are a key element of the Coase Theorem and the ENVEP's definition of PES stresses the voluntary nature of PES agreements. However, the ECOLEP has pointed out that in many cases the involvement of intermediaries, particularly the state, results in involuntary involvement of the final users of the ES. PES schemes for watershed management are an example of the latter point because downstream water users may not be aware that they have to pay more for water due to the PES scheme because the government deals with the service providers (Kosoy et al., 2007). The ENVEP's consideration of PES schemes managed by the state implies, however, an implicit acceptance that voluntary involvement by the final users of the ES is not an essential condition. This may be the case for at least two reasons. First, final users would normally receive benefits from a PES scheme and their contribution to the provision of the ES is warranted (as it normally occurs through taxation for the provision of public and club goods), however, involving them directly would result in high transaction costs (Vatn, 2010). Second, if a PES scheme does not (fully) deliver the ES, the cost to each involuntary final user can be expected to be relatively low, because if any fees are charged by the state for the ES, they would normally amount to a very small percentage of the users' budget. However, the voluntary involvement of the providers of the ES is important because of its potential impacts on ES providers and its efficiency implications, and it appears to have been applied in existing PES schemes – although its violation in a program that had formally adopted it has been reported (Bennett, 2008). The implementation of a PES scheme can involve substantial changes to ES providers' resource management practices with significant implications for their livelihoods. Therefore, their right to choose which option they prefer should be taken into account. The voluntary participation of ES providers is also more likely to lead to more Pareto efficient PES schemes because those who would be made worse off through participation have the non-participating option available. The voluntary participation of ES providers can also lead to more cost-effective PES schemes, especially if the price for the provision of the ES is set through auctions (e.g. Jack et al., 2009). The voluntary participation of ES providers therefore has greater significance in the implementation of PES schemes than the voluntary participation of the ES users.

5. Conditionality, Additionality and Transparency

5.1. Conditionality

Conditionality has a prominent position in the ENVEP's definition of PES, but not so in the ECOLEP's. In presenting their inclusive definition of PES, Muradian et al. (2010) emphasise that many PES schemes

⁶ The adoption of this approach has implications for the definition of efficiency used in the context of PES. The concepts of Pareto efficiency and Kaldor–Hicks efficiency normally preferred by economists face a difficult application in PES schemes due to various factors, including the difficulty of measuring the value of an ES (Pascual et al., 2010). Efficiency is best defined as cost-effectiveness: a PES scheme is efficient when it delivers a unit of ES at the lowest cost possible.

⁷ The categorization of externalities is a political decision depending on historical and socio-institutional entitlements (Van Hecken and Bastiaensen, 2010).

⁸ This is to allow for transaction costs.

⁹ It should be noted that this approach implies that the ES can be accurately valued, which is problematic, as discussed above. Therefore, whilst the payment needs to cover the ES provider's opportunity cost, from a society's perspective, the payment would be set on a cost-effectiveness basis, that is, minimizing the cost of providing a given level of ES.

have not been monitoring (well) the provision of ES, fundamentally resulting in the impossibility of including a conditionality aspect, and they do not highlight the need for conditionality in PES schemes. The need for ‘strict conditionality’ is questioned on two fronts (Farley and Costanza, 2010): i) it may be expensive to enforce, resulting in a substantial increase in transaction costs; ii) conditional payments may crowd out the intrinsic motivations to do the right thing for society. The second issue was dealt with in Section 3. In relation to enforcement costs, we need to address the impact that a lack of conditionality could have on a PES scheme. If lack of conditionality results in the outright failure of the scheme to deliver the ES, then all the resources allocated to the scheme would have been wasted – obviously a more significant cost compared to enforcement costs. Clearly, there is a need to ensure that enforcement costs are not extremely high,¹⁰ but not having conditionality and some enforcement costs does not seem to be an effective option. This is perhaps what is also meant by Farley and Costanza (2010) when they distinguish ‘strict conditionality’ and ‘conditionality.’

5.2. Additionality

Additionality¹¹ does not have a prominent position in the ENVEP’s definition of PES, but it is considered a fundamental principle of its implementation (Wunder, 2007). This is not the case with the ECOLEP. In their first criterion for characterising PES, Muradian et al. (2010) note that there are cases in which the economic incentive is not the primary factor determining land use practices (resulting in the provision of the ES) which would have taken place even without the PES scheme.

Lack of additionality implies that the resources invested would not really deliver environmental benefits. In that case, there would be no reason from a public policy perspective to fund the scheme, unless the objective was other than an environmental one. The significance attributed to additionality within the discussions on climate change mitigation initiatives (e.g. Gustavsson et al., 2000) is an example of its importance. Additionality should be considered at the aggregate level for the whole PES scheme rather than for the individual ES providers. Some Individual ES providers expected to provide (at least in the short term) the ES even without payment may be worth including to avoid leakage.¹² This approach is being considered, for example, in relation to individual country participation in a mechanism for Reducing Emissions from Deforestation and Degradation (REDD) (Cattaneo et al., 2010) which would involve, among other things, payments from the international to the national level.

Although it may be difficult to assess additionality precisely (Sommerville et al., 2009), and it does not seem to be present to a significant extent in ongoing PES schemes (Pattanayak et al., 2010), it should be considered in the design of PES schemes to minimize the likelihood of wasting scarce conservation resources.

5.3. Transparency

Transparency is defined as the timely and reliable provision of information to all relevant stakeholders (Kolstad and Wiig, 2009). So far, transparency has not been considered a key aspect of PES either by the ENVEP or the ECOLEP, although it has been mentioned as an issue by some authors. Low levels of transparency in the negotiations of contracts for PES schemes have been observed, and it has been

suggested that databases can increase knowledge about prices for the ES in question (Landell-Mills and Porras, 2002). Related to that issue, the benefit valuation rules need to be made public to support transparency and avoid (perceptions of) corruption (Ferraro, 2008). Corruption can certainly affect PES schemes (e.g. Leimona et al., 2010), especially if the amount of funding made available through them increases. Transparency is also thought to be necessary in schemes in which collective action is required, given that transparency is linked to verification, which is in turn related to trust and the latter is required for successful collective action (Muradian et al., 2010). Finally, transparency is needed in order to make accountable those who manage a system (Mulgan, 2000) and to provide much-needed information to the parties who are in a weaker position in negotiating agreements, as emphasised earlier in our discussion of the Coase Theorem. Transparency in PES can be supported, for example, by publicizing information on the process of selection of areas targeted for the provision of the ES, the valuation rules for the ES, the process to select participants and the benefits paid.

6. Property Rights and the Scope of PES

Existing PES schemes and the literature have mostly focused on private and common property resources, although it has been acknowledged by the ENVEP that states are also landholders and PES schemes might be focused on those lands as well. For example, states could be recipients of PES in the context of international PES schemes, such as a mechanism for Reducing Deforestation and forest Degradation. The question is how PES could be used for state lands. This is a significant issue in terms of ES from forests in developing countries, where many states claim ownership of most of the forests (Tacconi et al., 2010a).

The adoption of a strict Coasian approach would require property rights to forest land to be transferred to individuals or common property groups for them to engage in Coasian negotiations.¹³ This solution might be appropriate in situations where people (for example, indigenous people) have a traditional or proven long-standing claim to the land. However, it is not the only option for the implementation of PES in public lands.

People living near the lands in question could be paid to ensure the provision of the ES. For example, the Philippines’ No-Fire Bonus scheme aimed to reward local level governments and communities that controlled fires in state forests in their area in order to maintain watershed services and wildlife habitats (Leimona et al., 2010). Payments were conditional on the non-occurrence of fires. The issue here is whether such a scheme should be considered a PES scheme, given that the people receiving payments have limited control over the provision of the ES. A similar question is encountered in relation to the employment of individuals or contractors to provide ES from private lands. The South African Working for Water programme uses contractors (who employ previously unemployed individuals) through a tendering process for contracts to remove weed trees from public or private lands (Turpie et al., 2008). In that case, the conditionality of the payment relates to performing the specified contractual tasks, which are in turn expected to contribute to the provision of the ES. If the private landowners (who could in turn outsource weed control) were contracted directly to provide the ES, it would obviously be a PES scheme. So if the government contracts those who will control the weeds, possibly reducing the cost of the program if there are efficiencies of scale, it leads to a similar outcome and there is not an obvious or clear reason why it should not be classified as a PES scheme.

¹⁰ Milne and Niesten (2009) note that monitoring and enforcement activities can provide benefits to the rural people engaged in them.

¹¹ The contribution of a PES scheme to the provision of an ES compared to a ‘without scheme’ scenario.

¹² The displacement of resource management practices with negative impacts on the ES from the areas of those receiving payments to other areas.

¹³ These rights could involve outright land ownership or long term leases.

7. Equity, Efficiency and Poverty

Muradian et al. (2010) criticize the ENVEP because the latter sees PES as primarily an instrument for improving the efficiency of natural resource management and not necessarily for alleviating poverty, a point made by Pagiola et al. (2005). In other words, the ENVEP implies that the poor should be targeted if their inclusion does not lead to efficiency losses (Muradian et al., 2010). The problem with the ENVEP, according to Muradian et al. (2010), is that efficiency and equity are usually closely linked, and practitioners will increasingly face the challenge of having to link PES with rural development programs because the interest displayed towards PES by governments, donors and NGOs is in part due to the expectation that PES may become a win–win mechanism for both conservation and poverty alleviation. The ENVEP notes, however, that there is a need to understand how PES schemes affect the poor and that, at that time, there was limited empirical evidence on the actual impacts (Engel et al., 2008).

According to the ECOLEP, two inter-related questions are how equity is defined in relation to PES (Pascual et al., 2010) and whether there are any *a priori* reasons for efficiency or equity to prevail (Muradian et al., 2010; Norgaard, 2010; Pascual et al., 2010).

Pascual et al. (2010) focus on the allocation of outcomes (a distributive justice approach to equity) and present several fairness criteria that could be considered in designing PES schemes. Those criteria focus on the equity effects on those participating in PES schemes. A further equity aspect concerning participants – that has been raised by the ECOLEP although from a different perspective – needs attention: whether the provision of incentives is appropriate, given that in some cases it may have a negative impact on the provision of the ES because incentives may weaken intrinsic motivations for providing the ES. If incentives are not provided and other motivational approaches are used instead to ensure the supply of the ES, this could result in negative equity impacts if those supplying the service bear the costs of supplying the ES whilst others derive (most of) the benefits. The lower the income of those supplying the ES compared with the ES users, the more significant the distributional implications of this approach.

There are other equity aspects, beyond the equity implications for participants, which need to be considered. First, a PES scheme may implicitly recognise a right to pollute which can have equity implications. For example, if those polluting are richer than the ES users, it may be argued that, from an equity perspective, PES should not be used to address the ES provision problem. Second, a PES scheme may affect local non-participants (Pagiola et al., 2005), for example, by limiting their access to resources which were previously managed as open access. Whilst there is, so far, limited evidence of this type of impact (Tacconi et al., 2010b), the design of PES schemes needs to take it into account: evidence that it has not taken place so far does not mean it cannot occur. Third, equity between generations needs to be addressed (Norgaard, 2010), and is related to the relationship between equity and efficiency.

Whether equity concerns should take precedence over efficiency (Farley and Costanza, 2010) is a complex decision issue, given the links between equity and efficiency noted by the ECOLEP itself. A cost-effective PES scheme delivers the maximum amount of ES possible given a certain amount of funding (assuming additionality and absence of leakage). This has obvious positive environmental implications, but it can also have positive equity implications. First, whilst individual ES suppliers may not receive as much per unit of ES as in the case of a less cost-effective scheme, more ES suppliers could be allowed to participate. Second, the larger the amount of ES maintained, the better off future generations would be (assuming they will value that ES).

Let us now consider the view that both efficiency and equity need to be considered because the interest in PES in the policy arena of

developing countries is due in part to the expectation it can be a win–win mechanism for both environmental protection and poverty alleviation (Muradian et al., 2010). First, equity and poverty alleviation are different concepts. For instance, a PES scheme could be equitable under a certain criterion¹⁴ but might not be able to reduce poverty. The poverty and livelihood impacts of PES schemes are determined by a range of factors, including the amount paid for each unit of ES supplied and the conditions of the PES contracts (Tacconi et al., 2010b). Second, it may be tempting to sell PES schemes to policy-makers as win-win mechanisms, but the reality is that they are designed to provide ES rather than reducing poverty (Engel et al., 2008). Other mechanisms specifically designed to reduce poverty, including direct payments to the poor (e.g. Hanlon et al., 2010), are more likely to reduce poverty than PES schemes, even when compared to a PES scheme that adopted a criterion such as the maxi-min which maximises the benefits to the poorest (Pascual et al., 2010) because it would impose on the poor some constraints and costs related to the provision of the ES. The best solution would be to design a cost-effective PES scheme that would eventually free up resources for the most appropriate pro-poor program to complement the PES scheme. PES practitioners should be aware that despite a policy discourse emphasising the achievement of multiple goals, it may be counter-productive to attempt to produce those outcomes given the limited likelihood that they can be achieved, as experience with community-based natural resource management demonstrates (Blaikie, 2006). Obviously, this should not stop practitioners from designing cost-effective PES schemes according to the best standards for livelihood impacts (e.g. Tacconi et al., 2010b).

8. Conclusion

In the description of the theory of PES, the ENVEP has over-emphasised the role played by Coasian transactions, as demonstrated by the fact that in practice, the ENVEP considers some of the schemes funded by governments and other intermediaries as 'true' PES schemes. The ECOLEP has over-emphasised the reliance of the ENVEP on the Coasian Theorem. Comparing these perspectives allows us to develop an improved definition, a better understanding of its key design elements and its possible role in the provision of environmental services and rural development. The definition, the key design elements and the potential role of PES as summarised below differ from those proposed by other authors within the ECOLEP, but the author believes that they fit within an ecological economics perspective on PES. More importantly, it may be useful to move beyond the characterization of the different approaches to PES as environmental economics or ecological economics driven because they present significant overlaps.

A well structured system is required to implement PES. The system needs to identify, at the appropriate scale, the environmental service(s) to be maintained (and potential links with other services), or the proxy environmental management practices that are shown to contribute to the provision of the ES. The system needs to include a process of selection of geographic areas and providers eligible to participate, setting up the contracts specifying the conditions of participation (including rewards and penalties), monitoring compliance with the agreement, and reviewing the performance of the scheme (see for example Pagiola et al., 2005). Conditionality, additionality and transparency are important characteristics of PES. The voluntary participation of at least the ES providers should be preferred. Trade-offs between efficiency, defined as the cost-effectiveness of the scheme in the provision of ES, and equity may be present (e.g. Engel and Palmer, 2008; Pagiola et al., 2005). In addressing them, the design needs to consider both intra- and inter-generational equity and the relationship with cost-effectiveness. This paper tends to support

¹⁴ Pascual et al. (2010) provide examples of alternative criteria.

the primacy of the cost-effectiveness aspect given that a cost-effective program can have positive implications for equity (e.g. including more participants), but equity and cost-effectiveness are linked, and they need to be considered simultaneously. Furthermore, activities to improve livelihoods and reduce poverty are often best designed with that focus as their primary objective. That said, the design of a PES scheme should certainly take into account best-practice design features that are most likely to benefit the livelihoods of both the PES participants and non-participants (e.g. Milne and Niesten, 2009; Tacconi et al., 2010b).

The revised definition of a PES scheme proposed here is, therefore, as follows: a PES scheme is a transparent system for the additional provision of environmental services through conditional payments to voluntary providers. This definition is broader than Wunder's (2005) but more specific than that presented by Muradian et al. (2010) and also implied by their three criteria. It encompasses a variety of PES schemes. It includes schemes at various geographical levels, from the international (such as payments for REDD) to the local level and pure Coasian schemes involving individuals and businesses. The voluntary nature of participation is included in the definition to emphasise its importance in relation to cost-effectiveness, Paretian efficiency and, in the case of individual ES providers, the right to choose. The important role of intermediaries in PES schemes as correctly emphasised by the ECOLEP, but also noted by the ENVEP, is obvious in the foregone discussion and is implied in the definition.

The review of the Coase Theorem has added arguments to the ECOLEP on the limited applicability of true Coasian transactions to the provision of ES. It has also pointed out that those transactions (which are not market transactions) are likely to lead to less-than-efficient outcomes. If a market for the ES can be created, for example involving the trading of permits, it is likely to lead to a more efficient allocation of resources than Coasian transactions. However, the existence of such a market does not necessarily lead to the sustainable provision of the ES and the equitable distribution among the members of the present generation and between the present generation and future ones. The operations of the market should therefore be regulated through physical measures of the stock of the resources and the flow of the service.

Finally, concerns about the potential impacts of market forces on the provision of ES are valid. An important issue to considered, however, is that the use of PES systems is not the same as a letting the 'free market' decide on the provision of ES, or even decisions to conserve nature on the basis of economic valuations. As currently applied and as presented in here, PES schemes are essentially instruments to maintain or recreate the supply of ES through the provision of incentives. Societies need to carry out decision-making processes at a level above PES to define conservation goals.

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