

DIIS REPORT

PAYMENTS FOR ECOSYSTEM SERVICES

– ISSUES AND PRO-POOR OPPORTUNITIES
FOR DEVELOPMENT ASSISTANCE

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Abstract

The emergence of the concept of payment for ecosystem services during the late 1990s has raised expectations among rural natural resource managers, local and national authorities, public utilities and donor organizations alike, that ecosystem conservation can be achieved through popular payments rather than through unpopular measures of command and control.

Late 2005, Danida asked researchers from the natural resources and poverty research unit at Danish Institute for International Studies (DIIS) to undertake a review of experiences to date regarding payments for ecosystem services with particular emphasis on identifying pro-poor options for development assistance support.

This report summarizes the main findings of this review, including a list of approximately 200 references collected as part of the study (Annex, also available at http://www.diis.dk/graphics/_Staff/hmr/pes_literature_2007.pdf), and identifies four main options for development assistance in support of pro-poor payments for ecosystem services.

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I. Introduction

Payment for environmental or ecosystem services (PES) has become fashionable. A simple internet search gave more than five million hits. The basic notion underlying the concept of payment for ecosystem services is that ecosystems, such as natural forests, landscapes with mixed patterns of human use and natural vegetation, as well as intensively cultivated agricultural landscapes, all provide important services to people – locally, regionally and globally – and that often these services do not accrue to those directly or indirectly responsible for their provision. Thus, the payment from users to providers of the ecosystem service is meant as a direct incentive to encourage that the ecosystem is managed in ways that ensure the continued provision of the service. Attempts to estimate the value of ecosystems services suggest that they might represent significant value. As an example, crops pollinated by wild bees and honey bees in the United States are estimated to represent a value of USD 30 billion (Myers, 1996), a value which has recently been dramatically accentuated because an unknown disease has killed large populations of honey bees and thus threatens pollination, e.g. of almonds.

The concept of ecosystem services

Recognition of the importance of these ecosystem services is not new, nor is the recognition of the impact that human activity has upon ecosystems. However, as documented by the Millennium Ecosystem Assessment (MEA, 2005), the speed at which ecosystems change as a direct or indirect consequence of human activity is unprecedented.

The Millennium Ecosystem Assessment (MEA, 2005)¹ distinguishes between the following four types of ecosystem services, based on a functional perspective:

- provisioning services, such as food, water, timber, and fibre;
- regulating services, such as regulation of floods, drought, land degradation, and disease;
- supporting services, such as soil formation and nutrient cycling; and

¹ The Millennium Ecosystem Assessment was carried out between 2001 and 2005 under the auspices of the United Nations to assess the consequences of ecosystem change for human well being and to establish the scientific basis for actions needed to enhance the conservation and sustainable use of ecosystems and their contribution to human well being (MEA, 2005:xiii).

- cultural services, such as recreational, spiritual, religious and other non-material benefits (MEA, 2005:3).

The PES literature, on the other hand, tends to distinguish between ecosystem services on the basis of the resource contents of the service. Typically, four services are mentioned: hydrological services, carbon sequestration, biodiversity protection, and landscape beauty (e.g. Pagiola *et al.*, 2005; Grieg-Gran *et al.*, 2005; Wunder, 2005b) (Box 1, Section 2).

Payment for ecosystem services – one among several conservation instruments

The emergence of PES has to be seen partly as a response to a need to identify additional sources for financing conservation, partly as a response to the widespread disappointment with more conventional approaches to conservation. These approaches have been based e.g. on command and control or unconditional economic incentives, such as those provided as part of the so-called integrated conservation and development projects promoted during the 1980s and 1990s (McShane and Wells, 2004).

Whether at community, district, national or international level – people have, throughout history, sought ways to regulate human activity in an effort to regulate the flow of ecosystem services. Questions fundamental to such efforts, such as which and whose activities to regulate; who should regulate them; by which means; and to the benefit of whom, constitute the core of the contested nature-society interface.

Among the instruments which have been developed over time to regulate human use of natural resources, and thus the flow of ecosystem services, are:

- *regulations and restrictions* sanctioned either culturally (e.g. sacred trees, forests or places) or through formal law (e.g. through the establishment of protected areas or the regulation of the use of chemicals through prohibitions). Such regulations and restrictions may thus be enforced through cultural, social or legal control;
- *increasing the level of information and awareness* by informing people on ecosystem interactions, the importance of the continued flow of ecosystem services and the potential impact of their own activity upon these services and *vice versa*, assuming that such awareness may influence behaviour; and

- *economic instruments* in the form of *sanctions*, such as fines to discourage pollution or deforestation; *resource use fees*, such as licenses to be paid for the right to cut timber or use water; *incentives*, such as tax reductions; or *direct payments*, to encourage specific types of human activity such as maintaining forest cover, implementing technological change (e.g. switching from conventional to ecological farming).

Thus, it is important to recognize that what recently has become known as payments for environmental or ecosystem services (PES) only constitute one among many possible instruments that may be employed to ensure the continued flow of ecosystem services.

Payment for ecosystem services and poverty reduction

In addition to environmental concerns, poverty reduction is a crucial concern – and objective – of most development assistance, including that provided by Denmark. Hence, without denying that the conservation of ecosystems and of ecosystem services may be important in their own right, i.e. regardless of who benefit from them or are involved in their provision, ecosystems and ecosystem services which benefit poor people, or which poor people are involved in providing, are of particular interest in the context of development assistance, and thus, of the present report.

This is not to say that all PES arrangements have to be pro-poor. Actors such as the international community, national and district governments, town councils or private companies may all have valid arguments for seeking to establish PES schemes, irrespective of their potential impacts for the poor. However, in the context of development assistance, PES schemes that can be characterized as pro-poor represent a particularly interesting funding opportunity.

Purpose of study and structure of report

The overall aim of the present report is to explore under which conditions PES is likely to constitute an effective instrument to ensure continued flows of ecosystem services while at the same time being pro-poor, and thereby identify ways in which development assistance, under such conditions, can contribute to facilitating the design and implementation of PES. The study has been commissioned and financed by Danida.

The report is divided into six sections. Following this introduction, Section 2 proceeds to define PES. Based on a literature review undertaken as part of this study (see Annex I for references), Section 3 provides a picture of PES in practice with respect to geographical focus, as well as the ecosystem and ecosystem service focus of PES experiences reported to date.

Despite its relatively short history, several studies have been or are currently² being conducted to take stock of and synthesize PES experiences (e.g. Grieg-Gran *et al.*, 2005; Pagiola *et al.*, 2005; Rosa *et al.*, 2003; Wunder, 2005b). Building on these studies, Section 4 lists and further explores issues and challenges related to PES, while Section 5 identifies an indicative set of features of PES schemes that have been found conducive to pro-poor outcomes. Finally, the sixth and last section recommends four options for development assistance for providing pro-poor support to PES.

² ICRAF and its partners are currently undertaking a scoping study for Canadian IDRC on PES and its potential impact on the poor in urban and rural landscapes in the developing world. Also Dfid has commissioned a PES scoping study, in this case with IIED, on water ecosystem services, poverty reduction and climate change.

2. Defining payments for ecosystem services

As pointed out above, payment for ecosystem services is one among a range of instruments, several of which are economic instruments, which contribute to ensuring the continued flow of ecosystem services.

The most precise – and, some would argue, restrictive – definition of PES is that offered by Sven Wunder and his colleagues. They define PES as a “*voluntary, conditional transaction with at least one seller, one buyer, and a well-defined environmental service*” (Wunder, 2005a:1)

First, PES is defined as a voluntary transaction. Wunder explains that this presupposes that the potential ecosystem service providers have ‘real’ choices for how to manage the ecosystem and that this distinguishes PES from so-called command-and-control measures, such as the declaration of protected areas. However, nearly half of the legally protected forests areas are heavily used – illegally – for agricultural and forest product extraction (McNeely and Scherr, 2003; here quoted from Scherr *et al.*, 2004), just as other types of regulations are only partially enforced. This implies that potential ecosystem service providers might often have *real*, but not *legal* choices for how to use natural resources. Thus, besides having *real* choices, potential ecosystem service providers also need to have *legal* choices for how to manage the ecosystem in question (see the discussion in Section 4 on the dilemma involved in PES endorsing illegal resource use in cases where providers have real but not legal resource management choices!). In most countries, other types of economic instruments exist to promote the provision of ecosystem services in cases where potential providers do *not* have real *and* legal resource management choices. These include compensation to land owners for their potential loss of income which the restrictions may imply, e.g. as one-off compensations associated with the declaration of a specific protection status, or rewards to people for their continued contribution to achieving effective protection, e.g. through the granting of tax exemption for land within protected areas or through payments to people acting as forest guards or participating in ecosystem monitoring.

Second, Wunder argues, a PES scheme needs to involve the exchange of a well-defined ecosystem service. In some cases, the ecosystem service is directly measurable, such as the conservation of a particular biodiversity-rich forest or the storage of a certain amount of carbon. In other cases, due to the high degree of complexity of

ecosystems and the services they provide, what is being bought is expressed rather as a specific natural resource management practice known or assumed to lead to the provision of the desired ecosystem service. Examples of such cases include reforesting riparian land or land specifically important to water infiltration, or leaving it fallow to avoid sedimentation or contamination from agro-chemicals as well as to increase infiltration – all practices *assumed* or known to provide hydrological services.

As discussed by Wunder, PES arrangements based upon *assumed* causal relationships between specific natural resource management practices and the desired ecosystem service must be expected to be less robust than PES arrangements based upon *proven* relationships.

Within the PES literature, most authors identify four broad categories of ecosystem services, namely carbon sequestration; biodiversity protection; watershed protection, and landscape beauty (e.g. Pagiola *et al.* 2005; Wunder 2005) (Box 1). Obviously, one type of ecosystem management might be able to provide several of these types of ecosystem services, referred to in the literature as ‘bundling’ of ecosystem services. As an example, the protection of a traditional coffee plantation, where coffee is cultivated ecologically in the understory of natural forest, is likely to provide not only biodiversity services, but also watershed and landscape beauty services (e.g. Perfecto *et al.*, 1996).

These types of ecosystem services can be further characterized according to the degree of spatial boundedness of the beneficiaries of the ecosystem service.³ Thus, the principal beneficiaries of an ecosystem service can be either local, e.g. beneficiaries located within the area where the service is produced; regional, e.g. beneficiaries distant from the area where the service is produced; or global, e.g. beneficiaries who in principle may be located anywhere in the world. Obviously, this spatial boundedness characteristic of the ecosystem service beneficiaries has important implications for the institutional arrangements between buyers and sellers of the service.

³ In addition, Rosa and his colleagues (2003) distinguish between ecosystem services based on what they call ‘integrating levels’, where level 1 refers to self-provisioning ecosystem services, i.e. services which accrue directly to those responsible for their provision. Level 2 refers to ecosystem services that may be embedded into already marketed products, as when habitat protection is incorporated into coffee through the production and sale of shade-grown organic coffee. Finally, level 3 refers to ecosystem services which have not yet been incorporated into products, and for which new forms of ‘compensation mechanisms’ thus have to be identified.

Box I – Types of ecosystem services

Category of ecosystem service	Examples of ecosystem services	Functional type of ecosystem service (according to MEA classification)	Spatial boundedness of ecosystem service beneficiaries		
			Local (beneficiaries within area where ES is produced)	Regional (beneficiaries distant from area where ES is produced)	Global (beneficiaries anywhere on the globe)
Hydrological services	Water (quality and quantity)	Provisioning	X	X	
	Erosion and landslide prevention	Regulating & supporting	X	X	
	Micro-climate regulation	Regulating	X	X	
Landscape beauty	Eco-tourism	Cultural	X	X	X
Biodiversity conservation	Habitat protection	Regulating & cultural			X
	Gene-pool conservation	Provisioning			X
Carbon sequestration	Vegetative carbon sequestration	Regulating			X

Third, a PES arrangement requires a minimum of one buyer and one provider of the ecosystem service.

A study undertaken by Forest Trends⁴ on what is required for PES schemes to work on the ground in Latin America, Asia and Africa, identified the lack of buyers as one of the biggest barriers (Waage, 2006). “Some buyers are simply unaware of the PES concept, while others feel it is too risky a mechanism to trust” (*ibid.*:81). The difficulty of identifying potential buyers is particularly high in many parts of Africa,

⁴ The study involved fifty-seven interviews conducted with NGOs, governments, and businesses working on the establishment of PES globally.

where urban water and electricity consumers are poorly organized and the presence of resourceful beneficiaries of 'local' ecosystem services, such as steady flows of clean water, is scattered. Until the emergence and organization of such local and regional buyers, e.g. in many parts of Africa, PES schemes are more likely to be successful with respect to global rather than local and regional ecosystem services.

Based on types of buyers and sellers, the UN Economic Commission for Europe (UN, 2006) distinguishes between public schemes, private (self-organized) schemes and trading schemes in their draft code of conduct regarding payments for ecosystem services in integrated water resources management:

- *Public schemes* are schemes in which a municipality or a local or national government act as the sole or primary purchaser of a specified ecosystem service or a related land use or management practice. Public schemes tend to be local or regional (see Box 1 above).
- *Private schemes* are schemes in which both buyers and sellers are private entities (companies, NGOs, farmers' associations or cooperatives, private individuals). Private schemes tend to be local schemes.
- *Trading schemes* refer to markets in which established rights (or permits) and/or quotas can be exchanged, sold or leased. Trading schemes such as the CDM, tend to be global schemes.

Fourth, to qualify as a PES scheme, resources, whether in cash or kind, should pass from the buyer(s) to the provider(s), either directly or through one or more intermediaries. Several terms are currently being used to describe the 'remuneration' taking place in return for the provision of the ecosystem service. These range from payments (e.g. Wunder, 2005b), markets (e.g. Scheer *et al.*, 2004), compensations (Rosa *et al.*, 2003) to rewards (e.g. by the RUPES⁵ programme; van Noordwijk *et al.*, 2004). Apart from semantic differences, these different terms also reflect more profound conceptual differences. Whereas the concept of rewards employed by the RUPES programme implies a rights-based notion that upland resource managers are entitled to receiving a reward for the environmental services they provide, irrespective of whether the continued provision of these services is threatened by competing land uses, the concept of 'compensations' implies that only those who incur costs associated with the provision of ecosystem services should be compensated (an amount equivalent of the costs incurred).

⁵ Rewarding Upland Poor for Environmental Services.

Fifth and finally, PES is defined as a conditional transaction, truly contingent upon continual provision of the service. Users should only pay if the service is delivered or the resource management practice assumed to ensure the service is provided, and providers will only provide the service if they receive the agreed payment. Hence, monitoring – both operational monitoring of the PES agreement itself and of the environmental impact – is of critical importance in PES. The transaction may take different forms (UN, 2006:Annex IV, section II):

Financial arrangements for sellers:

- **Direct compensation or payment:** Compensation – either monetary or in kind – or incentive rates (e.g. tax exemption) are set and defined for a specified land use or management practice.
- **Investment or development fund:** Payments collected from buyers are collected in a trust fund, which in turn is deployed by the PES scheme for investments in ecosystem-services-enhancing practices or activities. While flexible, the disadvantage is that buyers committing resources to the fund do not know which type of services and benefits they will receive in return. This can be partly overcome by buyers becoming trustees or members of the board of the trust fund.

Financial arrangements for buyers:

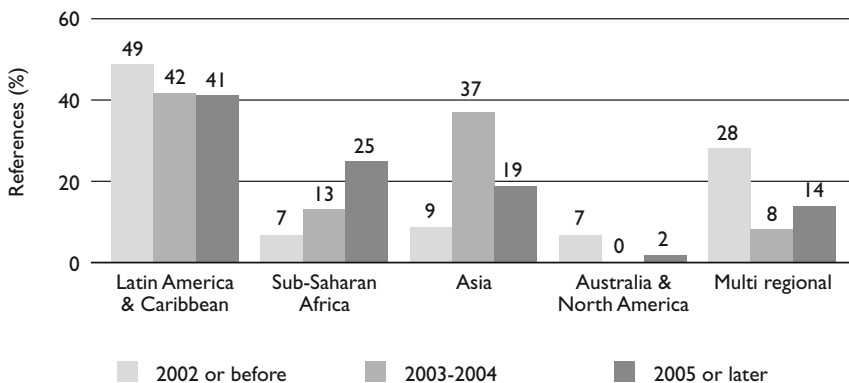
- **Customer-charged payments:** Participating utilities (e.g. water supply and electricity) and industries may charge their PES contributions directly, and explicitly, to their costumers.
- **Lump-sum contributions:** Participating buyers may contribute annual lump sums (or one-off payments in case of trust funds). These contributions may be set arbitrarily on the basis of negotiations that reflect how much buyers are willing to pay and how much is needed to acquire enough services; or as a fraction of the turn-over or profit of the participating utilities or industries.
- **Tax-based contributions:** Public schemes may be financed through taxes. However, to qualify as a “payment”, as distinct from ordinary subsidies, the tax must be explicitly demanded and spent for the purpose of the ecosystem service to be acquired.

3. Payment for ecosystem services in practice

The PES concept developed during the 1990s. Although it is hard to locate the exact origin of the concept, many associate PES with Latin America and particularly Costa Rica. For several years, the Costa Rican government had been granting tax deductions, and later subsidies, in return for reforestation. However, as part of the negotiation of the third structural adjustment loan, the Costa Rican government had to eliminate these direct subsidies. Instead, the Payments for Environmental Services was introduced with the amendments to the Forestry Law, to be financed through a tax on fossil fuel consumption (Rosa *et al.*, 2003:15-17).

To a large extent, this Latin American and Costa Rican focus is still present with respect to PES. The literature review⁶ undertaken as part of the present study (see Annex I) provides an illustration of the PES experiences to date. The literature review includes approximately 200 references. Of these, 140 references deal with regionally specific PES experiences and more than 40 percent of these deal with Latin American experiences (Figure 1). The Latin American focus is particularly strong for publications dated 2002 or before, while reporting on PES experiences from sub-Saharan Africa has been growing. Three Latin American countries top the list of references dealing with country-specific PES experiences, namely Costa Rica, Mexico and Ecuador (Table 1).

Figure 1. PES experiences reported by region (N=140 regionally specific references)



⁶ These include books and book chapters, journal articles, working and discussion papers, project reports etc. – please see Annex page 37.

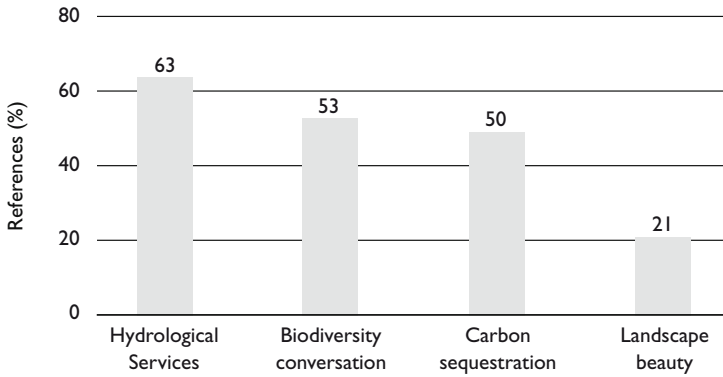
Table I. Number of references dealing with country-specific PES experiences per country (N=91 country-specific references)

Country	# of references	Country	# of references
Costa Rica	16	United States	2
Mexico	13	Vietnam	2
Ecuador	8	Argentina	1
Indonesia	7	Australia	1
Philippines	7	Canada	1
Brazil	5	China	1
Tanzania	5	Ethiopia	1
India	4	Guatemala	1
Bolivia	3	Kazakhstan	1
Colombia	3	Korea	1
South Africa	3	Mali	1
Sri Lanka	3	Mauritania	1
Uganda	3	Nepal	1
Chile	2	Panama	1
El Salvador	2	Russia	1
Kenya	2	Thailand	1

A total of 167 references included in the literature review dealt with specific types of ecosystem services. Of these, almost two-thirds deal with hydrological services, while around half deal with biodiversity conservation and carbon sequestration, respectively. Only 21 percent of the references reported on experiences related to landscape beauty as an ecosystem service. These percentages – the fact that they add to more than a hundred – reflect the frequent ‘bundling of ecosystem services’, by which a specific type of management is expected to provide more types of ecosystem services (Figure 2).

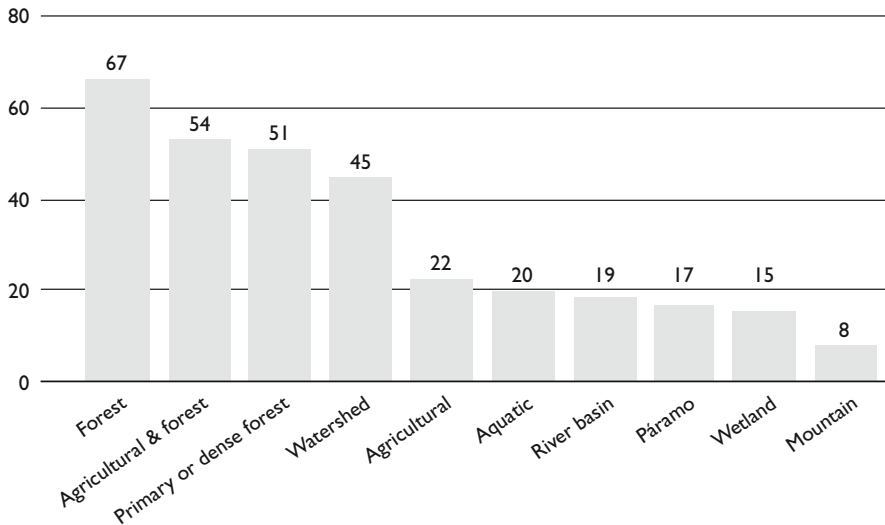
Figure 2. Ecosystem service types dealt with in references regarding ecosystem service type included in literature review

(N=167 ecosystem service specific references)



Finally, most of the PES experiences reported in the references included in the literature review have taken place in forested areas, either in forest ecosystems (67%), in mixed agricultural and forest landscapes (54%), in primary or dense forest (51%), or in watershed (45%), obviously with significant overlaps between these ecosystems (Figure 3).

Figure 3. Ecosystems in which PES experiences are reported in ecosystem-specific references included in literature review (N=157 ecosystem specific references)



While more than half of the references included in the literature review deal with the potential poverty impact of PES, less than five percent of the references deal with gender-specific aspects or impacts of PES. This fact obviously calls for concern!

4. PES issues and challenges

Despite the relative simplicity of the PES concept and the five defining criteria, relatively few real-life PES schemes actually meet all these criteria. Hence, in their assessment of incipient PES initiatives in Bolivia, Robertson and Wunder (2005) did not find any which met all five criteria. This conclusion was generally echoed at a regional workshop held in Ecuador in 2006 as part of the IDRC scoping study on PES and Poverty, which brought together a wide range of experiences from Latin America (Poats, 2006). As so often happens when new approaches come into fashion, many ongoing and new initiatives are currently being (re)labelled as PES without necessarily meeting the criteria for qualifying as PES. Such ‘opportunistic’ labelling may partly explain the shortcomings of so-called PES experiences in meeting the five criteria. However, beyond that, the shortcoming may also reflect some real challenges – and in some cases dilemmas – facing efforts to use PES as an instrument to achieve the protection of ecosystems and the continued flow of ecosystem services. Some of these challenges relate to the PES concept itself and could be considered ‘internal’ challenges, while others rather relate to the contexts within which PES is put into practice and could therefore be referred to as contextual challenges. The remainder of this section deals with the following internal and contextual challenges:

Internal challenges:

- Incomplete knowledge on the links between desired ecosystem services and ecosystem management practices can lead to de facto non-conditionality
- Involving intermediaries without sacrificing the direct, voluntary transaction
 1. *Intermediaries acting on behalf of numerous individual consumers of ecosystem services*
 2. *Intermediaries acting on behalf of numerous providers of ecosystem services*
 3. *Intermediaries acting as transfer agents, brokers etc. between service buyers and providers*

Contextual challenges:

- the risk of endorsing illegal resource utilization;
- PES is only one among several conservation instruments – and sometimes it is the wrong instrument;
- PES as an instrument to strengthen – contested – resource claims
- the role of the state

Internal challenges

Incomplete knowledge on the links between desired ecosystem services and ecosystem management practices can lead to de facto non-conditionality

In most cases, our knowledge about the impact of specific changes and combinations of natural resource management practice on the provision of ecosystem services is only partial. This means that PES arrangements have to be designed on the basis of *assumed* rather than *proven* causal relationships between the two. Muñoz-Piña and his colleagues (2005) describe how the Mexican hydrological environmental services programme had to be launched on what they call a precautionary principle rather than based on a proven relationship between forests and water flow. This was, however, acceptable to the majority of the ultimate service buyers – the water tax payers – due to a strong perception by the public, civil society organizations and government officials that forests do play an important role in protecting water resources. Hence, in order to avoid the ‘perfect’ becoming the enemy of the ‘good’, such a pragmatic approach is advisable in many situations. However, the risk is that the conditionality criterion of a PES scheme is sacrificed, because buyers become trapped in an agreement through which they pay for a specific management practice rather than for the ecosystem service they demand. Therefore, PES agreements based on assumed rather than proven causal relationships between paid-for management practices and demanded ecosystem services need to be accompanied by mechanisms that regularly examine the validity of these assumptions and contain options for re-negotiating the agreement in case new knowledge renders these assumptions invalid. Judging from the experiences reported in the literature collected as the basis for this study, such systematic monitoring of environmental impacts and the validity of assumed relationships between management practices and the provision of ecosystem services is surprisingly rare.

Involving intermediaries without sacrificing the direct, voluntary transaction

What in the ideal world can be described as ‘a voluntary transaction between at least one buyer and at least one seller’, turns out, in the real world, to be a considerably more complicated affair. Urban water consumers who want to ensure the continued provision of water for their water utility cannot themselves choose to deal with just one provider, if the catchment area for their water supply is owned and managed by thousands of independent land managers, nor would it make much sense if each of them opted to deal with all the catchment managers individually. An African community interested in reforesting their community land would rarely succeed on its own in making a deal with a European country interested in buying CO₂ emission rights. Hence, despite the obvious truth in the general recommendation given e.g.

by Burstein on the basis of studying PES in Mexico (here quoted from Rosa *et al.*, 2003) to reduce as much as possible the number of intermediaries, it is hard to imagine a PES scheme without the involvement of intermediaries. However, to minimize the risk that the involvement of intermediaries implies that no direct transaction takes place, and that the transaction becomes forced rather than voluntary, it is important to specify the accountability of the intermediaries involved. In this context, three broad roles can be distinguished for intermediaries in PES arrangements. One PES agreement might include one or more intermediaries involved in one or more of these three roles:

1. Intermediaries acting on behalf of numerous individual consumers of ecosystem services

When users of ecosystem services consist of many individual users such as urban water or electricity consumers, intermediaries may conveniently act on behalf of the direct users of the ecosystem service, collecting user fees and negotiating agreements with service providers. In many cases, already existing public utilities will undertake this function, thus acting as the buyers of the ecosystem service on behalf of already known ecosystem service users. In other cases, eco-tourism agencies act as buyers of ecosystem services such as landscape beauty on behalf of future users of ecosystem services.

2. Intermediaries acting on behalf of numerous providers of ecosystem services

Intermediaries acting on behalf of individual providers of ecosystem services will often be needed in order to bring down transaction costs compared to a situation where each potential service provider has to enter individually into a PES agreement. In addition, certain ecosystem services cannot be provided by potential service providers individually, but require coordinated resource management to ensure their provision. Whereas carbon sequestration can be provided discretely by individuals who accept planting trees on a specified area of land, other services such as watershed protection and landscape conservation depend on the coordinated resource management among all or at least the majority/critical resource managers within a given area. Hence, intermediaries may be needed to ensure such coordination. Depending on the case, the role of the intermediary ranges from simply negotiating an ecosystem service provision contract with ecosystem service consumers on behalf of interested service providers, to also ensuring the existence of resource management coordination among resource users in a given area. Obviously, submitting to such coordinated resource management would be less 'voluntary' for some resource managers than for others within a given area. Thus, the legitimacy of the

intermediary is critical, be it a community-based organization or an external NGO acting on behalf of the potential service providers.

3. Intermediaries acting as transfer agents, brokers etc. between service buyers and providers

Finally, in certain cases, intermediaries will work as brokers or transfer agents, establishing contact between potential service providers and potential service buyers, either directly or represented by their intermediaries. In Colombia, electricity consumers are required, through their hydropower company, to pay an environmental fee to a regional environmental agency acting as a transfer agent, responsible for investing in reforestation and watershed management, either directly to ecosystem service providers or, as often happens, through an intermediary acting on behalf of the service providers. This agency can be an NGO or a community-based organization, representing forest owners and watershed stewards.

Contextual challenges

The risk of endorsing illegal resource utilization

Often, part of the motivation for implementing PES schemes is that previous attempts to protect ecosystems and ensure the continued flow of ecosystem services have fallen short of expectations. In Mexico, despite regulations that prohibit land use changes in forest areas except when authorized by the government, the majority of the deforestation taking place during past decades has occurred without such authorization (Muñoz-Piña *et al.*, 2005). Nevertheless, the Mexican Payment for Hydrological Environmental Services programme took the pragmatic – and according to Muñoz-Piña and his colleagues, almost surrealistic – decision to give incentives to forest owners to refrain from illegal deforestation.

Similarly, in Ecuador, the *páramo* is perceived to be under increasing pressure from grazing animals as well as from cultivation. The *páramo* is a neotropical ecosystem located in the high Andes region between the upper forest line (about 3,500 m altitude) and the permanent snow line (about 5,000 m). Besides hosting a wide range of endemic species, the *páramo* absorbs and gradually releases water, and rivers descending from the *páramo* are characterized by a high and sustained base flow (Palacios, 2004). Thus, in Ecuador as in other northern Andean countries, *páramo* situated above 4,500 m is considered public land and is protected as an ecological reserve (*ibid.*). The fact that the *páramo* is being degraded reflects that while not having a legal choice, resource users have *real* land use choices with respect to the upper parts

of the *páramo* due to lack of enforcement of existing regulations. Ongoing attempts to establish payments for ecosystem service schemes to pay local people for not cultivating or letting animals graze the upper *páramo* thus turn into *de facto* legitimization of illegal land use. As pointed out by Vogel (2002, here quoted from Proano, 2005:5), the same dilemma applies to forested areas in Ecuador in general: "... paying private landowners for the water services provided by their forests contradicts current legislation. Landowners are not permitted to deforest their land, and even more, they do not own the water that flows from their property".

Because the basis for wishing to establish a payment-for-ecosystem-services scheme is in many cases that other – often regulatory – instruments have failed to produce the desired protection, the establishment of PES schemes often entails a dilemma: on the one hand, attempting to effectively alter resource managers' *de facto* resource use choices through offering the PES, while on the other hand, by doing so, implicitly making illegal resource use legitimate. This dilemma is often ignored or played down as a purely ethical dilemma due to pragmatic concerns about achieving effective conservation. However, there are at least two practical implications of *not* confronting this dilemma, each of which can undermine the effectiveness of a PES scheme in achieving conservation.

The first implication relates to situations where a PES scheme is considered an alternative to regulatory conservation instruments, without however modifying the regulatory conservation instruments. Given the voluntary nature of a PES arrangement, potential ecosystem service providers might decide *not* to participate, e.g. because they consider the benefits to be higher from the resource use alternative to that prescribed as part of the PES. As described by Muñoz-Piña and his colleagues (2005), some forest owners – in particular the more resourceful – chose to continue previous, illegal practices of converting forest into pasture, often with the perspective of selling off the land within a relatively short time horizon, rather than enrolling their land into the medium-term Mexican Payment for Hydrological Environmental Services programme.

Under such circumstances where the PES scheme is implemented as an *alternative* to more regulatory conservation instruments, and where resource managers may have real but not legal resource management choices, PES might turn into a mechanism that legitimizes illegal resource utilization, particularly by the more resourceful actors. Therefore, PES cannot stand alone as the instrument to promote conservation in such areas. The same applies in areas where resource managers have real

and some legal, but not unlimited, resource management choices, such as in forest areas outside protected areas where logging is a permitted, but regulated activity.

Obviously, from a public policy perspective, the challenge is to identify the optimal combination between, on the one hand, a PES arrangement that is attractive to the majority of small-scale resource managers whose resource management is often too expensive and administratively cumbersome to regulate through systems of permits, direct controls and fines, and, on the other hand, a more conventional command and control-oriented system to regulate the resource use of those actors who do not find the PES agreement immediately attractive.

The second practical implication of not confronting the dilemma between, on the one hand, effectively altering resource managers' *de facto* resource use through offering the PES, while on the other hand, thereby implicitly legitimizing illegal resource use, relates to the issue of scale. Due to economic or political factors, the coverage of a PES scheme may not match the ecosystem in question. In situations where resource use is partly or fully restricted and where the coverage of the PES scheme does not match – economically or geographically – the ecosystem in question, i.e. where only a fraction of the potential ecosystem service providers are or can become enrolled in the scheme, some resource managers are paid to refrain from illegal resource use while others are not. This means that e.g. in the relevant forest or protected area, authorities will have to force the remaining resource managers to abide by restrictions, a thankless task from which many often low-paid officials are likely to shy away. The net conservation result of such partial PES schemes may thus very well turn out to be negative. Finally, paying resource managers for abstaining from illegal resource use may reduce consumers' willingness to pay for ecosystem services. As expressed by a Peruvian urban water consumer: "If you ask me to pay for my water, I will happily do so, but if you ask me to pay these illegal migrants not to illegally deforest the catchment, I would rather pay the police to throw them out and prevent more illegal immigrants from coming to deforest" (Alonso Moreno, *personal communication*).

Therefore, it is critically important to confront this dilemma when considering to implement PES schemes in situations where resource managers have real but not legally recognized resource management choices. This can be done by carefully identifying niches where PES can be meaningfully implemented, or alternatively, by advocating the relaxation or abolishment of inappropriate or unenforceable resource use restrictions. As part of a proposal for regulatory reform, Scherr and her

colleagues (2004) advocate that public regulation and enforcement should focus only on the most important externalities, the most important sites and the most critical resource users and uses.

PES is only one among several conservation instruments – and sometimes it is the wrong instrument

In some situations PES is *unlikely* to be the most effective conservation instrument. There appears to be considerable convergence on this issue in the available literature. In general economic terms, Wunder argues that in contexts with high opportunity costs associated with non-desired resource management practices, PES will usually not be the answer. There will simply not be enough funding available to persuade resource users to change, he argues (Wunder, 2005:21). Even if sufficient funding were available, it should be considered whether this funding would be better spent by employing other conservation instruments that are based on direct control combined with other economic instruments, such as taxes and fees. “Conversely, if the desired land use is already privately more profitable than the non-desired one, it normally makes no sense to apply PES. PES is thus most useful in the intermediate range of positive but numerically small opportunity costs: degraded pastures, marginal croplands, forests in slow-moving agricultural frontiers, etc.” (*ibid.*).

While the logic of this argument is undoubtedly correct, the problem is that in areas under transition as the ones where many of the ecosystems under threat are situated, opportunity costs are far from uniform across the area and among the resource managers. Research undertaken in Nicaragua estimates that the opportunity costs associated with one hectare of land in the buffer zone to one of Nicaragua’s best conserved tropical rainforests, Indio Maíz, varied between USD 70 for the better endowed households with well-established livestock herds and USD 30 per hectare for land belonging to resource-poor farming households with none or only a few heads of livestock (Ruiz, 2006). Similar findings were arrived at in Guatemala (Mañez Costa and Zeller, 2003, reported in Grieg-Gran *et al.*, 2005). However, in addition to varying according to resource endowments of the resource managers, there is a temporal dimension that adds to this variation. While some farmers make their resource management decisions with respect to the medium and sometimes long term, others, be they farmers or not, make their resource management decisions with the aim of maximizing short-term gains, possibly with the perspective of quickly moving their operations to new areas. This makes it important to distinguish between different types of actors when assessing to which extent PES may constitute an effective conservation instrument.

In a similar vein, van Noordwijk and colleagues argue that in situations where resource extraction and destruction of the environment is driven primarily by outside interests, as is often the case with mining or logging operations that are sanctioned formally or informally by those in power, it may be more relevant for external stakeholders to help stop these activities, which often are also harmful to local people, rather than to focus on positive rewards (van Noordwijk *et al.*, 2004:31). A similar conclusion was reached based on research conducted in relation to the biological reserve Indio Maíz in Nicaragua (Ravnborg, 2006; Ravnborg *et al.*, 2006). Only in areas where trust and positive experiences of cooperation are sufficiently strong are people capable of jointly engaging in a PES scheme and defending a PES income flow by rejecting pressures from external actors in search of rapid gains, e.g. from logging and forest conversion. Under such conditions, PES can be successfully implemented in areas associated with external actors threatening ecosystem conservation and the continued flow of ecosystem services.

PES as an instrument to strengthen – contested – resource claims

Many developing countries are characterized by legal plurality, particularly with respect to how people establish claims of access and ownership to natural resources such as land, water, forest, living organisms, and territory. Access and ownership to resources are claimed on the basis of e.g. ancestral and indigenous rights; formal land titles; actual use; community membership; universal human rights; investments and land improvements; and physical, economic and political power. Participation in a PES scheme – both as sellers and buyers of ecosystem services – might add yet another element to this repertoire of means upon which to base claims of access and ownership.

Often, access to areas such as upland catchment forests or the Andean *páramo* is not sanctioned by formal land titles, but by community membership, prior use etc. Thus, participation in a PES scheme, e.g. as an individual or as a member of a group of resource managers committed to providing specific ecosystem services through specified resource management, might serve to strengthen the claims of access of recognized PES providers and to exclude non-participating individuals and groups competing for access to the same resource or ecosystem. In a PES-like Indonesian community forestry programme, farmers were allowed to use degraded protected state forest land for coffee production, provided they protected the remaining forest and planted environmentally beneficial agro-forestry trees in their coffee plantations. Here, Kerr and his colleagues found that perceived tenure security rose

significantly among participants in the programme and reached a similar level of perceived security as for private land (Kerr *et al.*, 2006).

Likewise, particularly in the context of water as an ecosystem service, competition takes place among potential and actual users such as urban water utilities, urban water vendors, intensive farmers, traditional irrigation farmers, rural domestic consumers, industrial users and environmental uses. Despite attempts to administratively regulate and plan the distribution of water among these different actors and uses, a strong political element remains in this competition. Having paid upland resource managers for their water, ecosystem services obviously contribute to strengthening PES participants' claims to water *viz-à-viz* claims of non-participating water users to the same water resource.

Finally, particularly in Latin America, social actors such as the Andean indigenous movements are sceptical towards the PES concept. Besides the fundamental resentment towards attempts to commercialize natural resources, they fear that PES schemes represent a first step towards dispossessing indigenous populations of their ancestral lands and territories (e.g. Scherr *et al.*, 2004; Grieg-Gran *et al.*, 2005; Calapucha, 2006): "The sale of environmental services is presented as an opportunity in the local communities which are compensated for protecting ecosystems, but in practice, it is a way of selling the right to use the territories" (Acción Ecológica, 2006)

The role of the state

Despite often invoking a 'non-state' image, e.g. by drawing on the 'market' vocabulary, the PES literature increasingly points to the key role played (or to be played) by the state. First of all, the importance of the state is increasingly being recognized with respect to its role in providing – and when necessary adjusting – the legal and regulatory framework to enable:

- the legal recognition of private PES arrangements;
- the regulation of the participation of intermediaries; and
- the legal arbitration in cases where external parties wish to denounce a PES arrangement, e.g. for causing environmental damage or violating rights (of access) to natural resources.

Moreover, the state is increasingly being recognized as a direct party to PES arrangements, either as a buyer or, particularly in the case of trading schemes such as carbon sequestration, as a provider of ecosystem services.

5. PES and poverty reduction

In the context of development assistance, it is of particular importance to explore whether a specific sub-set of pro-poor PES experiences can be identified. As noted by Grieg-Gran and her colleagues (2005), who examined the impact of market mechanisms for forest environmental services for the poor, only limited systematic evidence exists in this respect. Most attention to date has been directed toward the poverty impacts of PES schemes among providers, while less concern has been directed to the PES poverty impacts among consumers of ecosystem services. Thus, only indicative conclusions can be drawn at this stage. Based on the documented experiences, the following interrelated features of PES schemes contribute to determine their pro-poor outcomes:

- eligibility criteria determining who has access to participate as potential ecosystem service providers;
- type of ecosystem service and paid-for management practice;
- institutional options for dealing with transaction costs;
- type and level of payment; and
- general level of legal and institutional equity.

Eligibility criteria determining who has access to participate as potential ecosystem service providers

In most cases, the provision of ecosystem services depends on a particular type of land (or sea) management, and thus requires that potential service providers are in a position to control access to and use of the land (or sea). In many cases, this requirement has been interpreted as a need to demonstrate formal land titles to be eligible as potential service providers. This obviously limits the access of the poor to participate as potential ecosystem service providers *viz-à-viz* the non-poor. However, even if, as argued by Wunder (2005b), this condition can often be relaxed as long as potential providers can demonstrate widely recognized land claims which effectively enable them to control the access to and use of the land, a large share of the rural poor suffer from lack of not only formal, but also actual access to land. Thus, in contexts where significant shares of the poor do not have access to land, this obviously limits the opportunities for pro-poor outcomes of PES schemes based on the participation of the poor as ecosystem service providers. Ways of easing this anti-poor bias include setting a maximum limit on the amount of land which one landowner may enrol into a PES scheme as well as targeting regions with less skewed land distribution.

Type of ecosystem service and paid-for management practice

Evidence suggests (Rosa *et al.*, 2003; Wunder 2005b) that ecosystem services which are spatially bound, e.g. hydrological services, landscape beauty or habitat protection, and depend upon the management of a specific area and thus require buyers to work with – all those who occupy the targeted space – are more likely to include the poor as ecosystem service providers than ecosystem services which are not spatially bound, such as carbon sequestration. Moreover, ecosystem services intended to be provided through pure conservation, limit the opportunities for small-scale landowners to participate *viz-à-viz* ecosystem services provided through management practices which provide ecosystem services at the same time as directly contributing to securing their livelihood. An example could be pure forest conservation *viz-a-viz* agro-forestry and silvo-pastoral practices (Rosa *et al.*, 2003; Grieg-Gran *et al.*, 2005; Wunder, 2005b).

Institutional options for dealing with transaction costs

The high transaction costs associated with dealing with many small-scale ecosystem service providers as opposed to few large-scale providers tend to work to the disadvantage of pro-poor PES outcome based on the poor participating as service providers. Thus, in order to promote the participation of the poor as ecosystem service providers, it is necessary to identify institutional options for moving the unavoidable transaction costs from dealing with many small-scale providers instead of few large-scale providers from the buyers to sellers. Such options include allowing communities, rather than only individuals, to register as service providers, possibly combined with support for strengthening community-level organization, including their legal recognition.

Type and level of remuneration

Despite different terminology used to refer to the remuneration of ecosystem services, broad agreement seems to exist that also non-monetary remuneration of ecosystem services may be relevant. Identifying types of remuneration which are more attractive to the poorer segment of the potential service providers than to the non-poor segment, constitutes a way of increasing the pro-poor impacts of the PES scheme. Facilitating the granting of secure access and ownership rights, e.g. to forest as in the case from the Philippines (Kerr *et al.*, 2006), provides an example of such non-monetary remuneration which may be more attractive to the poor than to the non-poor.

Another way to increase the pro-poor PES impacts is by carefully determining the level of remuneration. The appropriate level of remuneration is highly context-specific and depends among other things upon the opportunity cost per unit of land belonging to the poor and the non-poor, respectively. In situations where the opportunity costs per unit land belonging to non-poor households is high compared to land belonging to poor households, pro-poor PES impacts may be ensured by keeping the payment amount in the lower range of opportunity cost. However, the opposite situation may also exist, particularly in contexts with highly skewed land distribution, where poor landowners have relatively high opportunity costs per land unit but command only small pieces of land, whereas the average opportunity cost per unit land belonging to large-scale landowners is relatively low. In such situations, a payment at the lower range of opportunity cost would only be attractive to the large-scale land owners; therefore, a higher per unit payment would probably have to be combined with a maximum limit on the amount of land to be enrolled in a PES scheme.

General level of legal and institutional equity

In many cases, the general level of trust in the legal system – particularly among the poor – is so low that despite being offered potentially attractive levels of payment, land users are reluctant to enter into agreements which they fear may bind them to undesirable future commitments (Grieg-Gran *et al.*, 2005; Acción Ecológica, 2006). Thus, the more equitable and trusted the legal system, the better are the chances that the poor would be willing to enter into formal agreements involving the state.

6. Options for development assistance

When considering options for supporting PES schemes through development assistance, it should be recalled that a PES scheme is a voluntary transaction between sellers and buyers with respect to a well-defined ecosystem service or an associated land use or resource management practice. Unless a development agency opts to become a long-term and direct party – i.e. by financing the purchase⁷ of an ecosystem service – to a PES scheme, it is important that funds are not provided for the core functioning of the PES scheme (UN, 2006:23). Otherwise, the sustainability of the PES scheme will be at risk.

In this context, the following options exist for supporting PES schemes without sacrificing its nature as a voluntary transaction between buyers and sellers:

1. support the adjustment of legal and institutional frameworks in partner countries to enable the legal recognition of PES schemes;
2. support the careful design of PES schemes, including the design of monitoring compliance by parties to the PES agreement;
3. provide support to enlarge the offer of high-quality certification services in more remote areas and thereby reduce certification costs; and
4. support the design and, if necessary, the implementation of ecosystem and social impact monitoring through national/local authorities.

Option 1: Support the adjustment of legal and institutional frameworks in partner countries to enable the legal recognition of PES schemes

While some of the best known PES schemes have emerged within considerably well-established institutional settings, such as the Costa Rican forest PES scheme (e.g. Rosa, 1999; Rosa *et al.*, 2003; Grieg-Gran *et al.*, 2005) or the Mexican Payment for Hydrological Environmental Services Programme (Muñoz-Piña *et al.*, 2005), others are characterized by a much higher degree of institutional informality. While such informality might be conducive to experimentation in new approaches, it is important to ensure that the direct parties to a PES agreement have access to adequate dispute arbitration mechanisms in case of disputes emerging between them as

⁷ Either directly, as the legal person purchasing the ecosystem service, or indirectly, by granting budget support to e.g. a national or municipal government, allowing it to establish e.g. a trust fund, or to directly purchase the ecosystem service or associated land use or management practice from the providers.

well as between one or more of the direct parties and their intermediaries. For third parties to a PES agreement, e.g. the general public or individual competing resource users, transparency with respect to the contents of the PES agreement is important as a safeguard against – tenuous – resource capture by one or more of the direct parties to the PES agreement.

Hence, in order to facilitate the participation of public utilities in PES schemes, to ensure that direct as well as third parties to a PES scheme have access to legal support in case of disputes, or that third parties have access to information about PES agreements, many countries will need revise their legal and institutional frameworks. Drawing on the UN draft code of conduct for water-related PES (UN, 2006:18), it is particularly important:

- to review and (where required) amend national legal and regulatory frameworks to ensure that there are no obstacles to the establishment of PES in all their diverse forms and scopes; and
- to issue guidance regarding under which law a PES management entity should most suitably be registered in order to be recognized as a corporate entity that can issue and administer the PES contract; the legal/institutional form(s) the entity may take; and the requirements it has to fulfil under the law.

Option 2: Support the careful design of PES schemes, including the design of monitoring compliance by parties to the PES agreement

As already mentioned, translating the basic PES concept into an operational scheme tends to be complex. The description of the process of designing the Mexican Payment for Hydrological Environmental Services (Muñoz-Piña *et al.*, 2005) provides an instructive illustration of this. A large number of detailed and fundamentally important issues had to be dealt with, ranging from which land-use practice to use as a proxy for the hydrological service; how much to pay per proxy-land use unit; how to define eligibility as providers in order to give buyers the highest value of hydrological services for their contribution; whether to pay providers – forest owners – to refrain from illegal deforestation; and who should undertake the financial management and how – just to name a few.

While some of these issues have to be settled through political deliberations (cf. the previous discussion on PES schemes running the risk of legitimizing illegal resource use in Section 4), others require empirical data and analysis to be settled. Referring

to the Mexican case, studies had to be carried out of the importance of different types and locations of forests for aquifers and watersheds, of the per hectare opportunity cost of different forest areas, and of the deforestation risk associated with different types of forests at different locations.

Supporting such a design process, including the necessary background studies, represents a funding opportunity where development assistance can make a positive difference. In the Mexican case, the preparatory phase was funded through a donation from the Japanese government, channelled through the World Bank's Environment Department upon request from the Mexican Ministry of Environment and with the National Forestry Commission, CONAFOR, as the client agency.

Although assistance from experts, external to the direct parties to the PES scheme-in-the-making, is likely to be needed during the design phase, it is important that the design process is institutionally anchored with the parties to the PES scheme.

Referring to the dilemmas discussed in Section 4, the following reminders should be heeded during the design process:

- Always see PES as one among a number of ecosystem protection instruments.
 - PES is a questionable instrument in situations where potential providers have real but not legally recognized natural resource use choices
 - Depending on the amount paid, PES might represent an attractive alternative to some potential providers while not to others. In such situations of differential opportunity costs for different types of resource managers, PES will have to be combined with other ecosystem protection instruments.
- Beware that PES might be used to strengthen – or weaken – contested claims to natural resources
 - PES represents an additional source for defending access or property claims for both buyers and providers.
- Beware that intermediary PES management agents, who are not directly accountable to the direct parties – the buyers and sellers – of the PES scheme, may impede the development of a true PES scheme by imposing rather than facilitating what should be a voluntary agreement; by obstructing the direct contact – and contract – between buyers and sellers or their direct representatives, or by obstructing or putting non-PES conditions on the payment transfer.

In its code of conduct on PES, the UN Economic Commission for Europe singles out monitoring as one of the most critical aspects of establishing and operating PES

(UN, 2006:19). Two levels of monitoring are distinguished: operational and impact monitoring. Both are of crucial importance to ensure the willingness of buyers and sellers to continue as parties to the PES scheme, and both should be contemplated as part of the design process. However, whereas the funding of impact monitoring may constitute an opportunity for donor assistance – and therefore is discussed separately below – the operational monitoring forms part of the core functioning of the PES scheme and thus should be funded by the direct parties to the agreement. The operational monitoring consists as a minimum of the monitoring the compliance of the buyers and sellers with the agreed terms of the PES contract as well as, if relevant, the compliance of the participating intermediaries with the agreed terms of its participation. The operational monitoring should be able to document the extent to which:

- buyers are paying as agreed;
- sellers are undertaking the agreed resource management practices at the agreed locations and to the agreed intensity;
- transfer of payments are made as agreed to sellers complying with agreed terms; and
- intermediary agents are undertaking agreed functions at agreed costs.

Option 3: Provide support to enlarge the offer of high-quality ‘environmental’ certification services in more remote areas and thereby reduce certification costs

Most countries have established practices for financial ‘certification’, namely accounting and auditing systems, to assure tax payers, cooperative members, investors, etc. that their funds are spent according to agreed purposes. Obviously, such financial ‘certification’ is also a crucial element of the operational monitoring of a PES scheme described above. However, in addition, what in broad terms could be labelled ‘environmental certification’ is necessary to ensure that resource management is undertaken according to agreed terms. In some cases, such environmental certification is straightforward, consisting of testifying e.g. whether trees have been planted and are surviving. However, such environmental certification quickly becomes more complex, as when parts of a forest have been destroyed and the cause of the destruction has to be established in order to provide the basis for determining whether the provider is partly or fully responsible for the destruction, and on this basis the extent to which he or she is eligible to receive (part of) the payment (cf. the Mexican Payment for Hydrological Environmental Services scheme – Muñoz-Piña *et al.*, 2005). It thus requires a certain level of environmental qualifications to earn

the trust of buyers of ecosystem services so they feel convinced that their payment is well spent.

During recent decades, specialized companies have emerged to fill the need for certification of organic agricultural production. As new standards emerge, such as the 'bird friendly' standard for shade-grown organic coffee, certification companies have accommodated certification for these new standards within their portfolio of services. Encouraging such companies to provide certification services also in the context of PES schemes that are not related to organic production might constitute a feasible modality for meeting the need for environmental certification of PES schemes. Moreover, finding ways of enlarging the offer of such environmental certification services in more remote areas, e.g. through environmental private sector support (as provided e.g. in the case of the Danida environmental sector support to Nicaragua) may contribute to reduce the operating costs relating to such certification. Donor support can be instrumental in initiating such processes of enlarging the offer of environmental certification.

Option 4: Support the design and, if necessary, the implementation of ecosystem and social impact monitoring through national/local authorities

As many PES schemes are likely to be based on assumed rather than proven causal relationships between paid-for resource management practices and desired ecosystem services, there will be a need to carefully monitor the effectiveness of the agreed management practices in delivering the desired ecosystem service outcomes. Apart from site-specific monitoring data, this might require the capacity to draw upon and learn from a wider pool of knowledge.

Likewise, it is necessary to examine the distributional impacts of the PES scheme, both among the direct parties to the PES scheme (e.g. between providers and users), and within each of these two groups. Finally, there is a need to monitor the intended or unintended impacts of PES agreements upon third parties' access to resources as well as their ability to benefit from ecosystem service. As the direct parties to the PES agreement can only be expected to be partially interested in such wider environmental and societal monitoring, this should be regarded as a public good. Thus, the design and implementation of ecosystem and social impact monitoring through appropriate national and local authorities represents an important funding opportunity for development assistance.

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