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Questioning the theory of Payments for Ecosystem Services (PES) in light of emerging experience and plausible developments

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HIGHLIGHTS

A PROMINENT TOOL FOR CONSERVATION Payments for Environmental Services (PES) are emerging in the wave of increased attention to environmental services as contributors to economic activities. The underlying principle is based on contractual payments to users of a natural resource, such payments being subject to the condition that they maintain a pre-defined environmental service.

THE NATURE OF SELLERS IS FUNDAMENTAL Sellers may be traditional users of the resource (e.g. local populations with ancient rights) or “professional” (e.g. industrial companies operating with public licenses). In the latter case, the exception made to the polluter pays principle is at least subject to debate. Not only for equity reasons, but also for avoiding a dangerous shift towards a “polluter benefits principle”.

CONTRASTING APPROACHES TO PES PES can lead to the cessation of activities when payments are strictly conditional to the end of environmental degradation (e.g. forest conservation). These “use-restricting” PES are quite transitory and flexible because payments may be halted anytime. In contrast, “asset-building” PES aim at changing practices (e.g. fertilizers-free agriculture). The latter seem to be more ambitious in terms of initial costs with required investments and training, but offer better prospects for long-term effectiveness.

AMBIGUOUS LINKS WITH PUBLIC POLICIES PES are in principle substituting to public action by giving priority to voluntary contracts between beneficiaries and “providers” of an environmental service. If implemented on a large-scale, they carry the risk to deter reforms in the environment field and to actually reverse the polluter pays principle (the beneficiary would pay, not the polluter). These risks need special attention in developing countries with weak institutions.

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Introduction

A need for critical debate

Among the fiercely debated concepts in the field of conservation, that of Payments for Ecosystem Services (PES, also called Payments for Environmental Services) is now one of the most prominent (Wertz-Kanounnikoff and Rankine 2008). The emergence of PES is concurrent with increased attention to the need to maintain ecosystem services, defined as "services that are provided by ecosystems" by the Millennium Ecosystem Assessment (MEA 2005). This need arises from the rapid degradation of ecosystems, combined with the general trend for major economic growth in recent decades. While ecosystem services are widely deteriorating – i.e. their "supply" is being reduced – the ability to pay for these services is increasing in line with the pace of global economic growth, which tends to increase and make the "demand" for such services solvent. And although the recent and ongoing economic crisis may affect the ability to pay to some extent, willingness to pay for ecosystem services should continue to rise with legally binding commitments on climate and biodiversity protection in particular.

What exactly is a PES scheme? The underlying principle is based on contractual payments to users of a natural resource, such payments being subject to the condition that they maintain a pre-defined environmental service. This straightforward principle is elaborated in a definition by Wunder (2005), which continues to provide a reference today. This definition indicates that PES are (i) a voluntary transaction, by which (ii) a well-defined environmental service (iii) is being "bought" by at least one buyer (iv), from at least one provider (v) if - and only if - the service is actually preserved

(conditionality). We henceforth adopt this terminology, where the "provider", as the user of a resource, is susceptible to receive a payment for the maintenance or restoration of an associated ecosystem service, while the "buyer" is the beneficiary of this service.

It therefore appears that the PES concept has been well defined. The boundaries of the instrument seem to be clearly characterised by the presence of a voluntary agreement involving a payment for an established and previously approved result. Its undeniable popularity certainly relates to the fact that it seems to follow an inexorable logic: the internalisation of environmental services to attract additional funding makes conservation profitable and financially sustainable through the mutual interest of both parties (Pagiola 2007). More precisely, the success of the PES concept is based on the presumed validity of the simplicity-equity-efficiency triptych: its simplicity and efficiency are related to the limited number of stakeholders involved in the transaction, and the fact that the instrument addresses the problem head on. Moreover, the PES tool is able to induce changes in land use without touching on sensitive land tenure issues, as we observe in practice that resource users without formal rights may receive payments as well. This flexibility is believed to make PES more efficient, i.e. a more cost-effective and less politically risky option than alternative conservation strategies. Equity is related to the voluntary nature of the transaction, the economic value of which is in principle the result of transparent negotiations. In addition, the emergence of PES in the field of conservation has provided interesting results due to their rapid development. In particular it seems to have shifted, sometimes dramatically, the borders between local development promoters and conservation advocates. Indeed,

PES combine to some extent the participatory approach (primacy of the process) with the pragmatism of financial compensation (results-based management and direct incentives).

The accumulation of literature, whether scientific or grey, and ever increasing experience are precisely the reasons why this is an opportune moment to submit the PES concept to a detailed critical examination. IDDRI has also published a twin paper (Pirard and Billé 2010) that takes a closer look at Indonesian case studies in light of the present analysis.

A profusion of unresolved questions

The rapid emergence of PES has indeed been built on the foundation of a somewhat hasty consensus based on the merits of these payments. In some instances, where authors have explicitly referred to some of the problems raised, it seems that the appropriate lessons have not truly been learned (see for example Ogonowski *et al* 2009 on the application of PES to the REDD+¹ mechanism). The aim of this document is therefore clear: to stimulate a debate which, in our opinion, has been too lethargic. The intention is to participate in this debate in a constructive manner in order to improve understanding of the mechanisms at work and ultimately to improve the real contribution of PES to conservation efforts. In particular, we will consider the application of this instrument on a large scale – a prospect that is made possible by the high esteem in which the concept is held and the future need to channel REDD+ money down to resource users – before examining ways of sustaining the positive impacts from PES in terms of protecting biodiversity and ecosystem services.

There are several major areas that deserve further exploration. First, despite its very precise definition, the PES concept opens the floodgates to an extremely diverse array of interpretations. Indeed, the nature of the two contracting parties (provider and buyer) is undefined, which leaves significant room for manoeuvre to involve the State, the private sector, landowners, concessionaires, and individuals who, legally or *de facto*, control a resource. Furthermore, we notice that the term “payment” may be interpreted more widely

than the payment of a monetary amount, to include other types of “rewards”. For example, the *Rewarding Upland Poor for Environmental Services* programme reported a project in Indonesia where people are provided with a land title if they observe a number of constraints related to forest conservation and production methods for coffee plantations (Pender *et al* 2008). In this case, there are no payments in the strict sense, but rather reward incentives. The question here is not whether this approach can still strictly speaking be regarded as a PES – these experiments exist and are developing, and should be studied – but rather what are the challenges and implications of these various applications concerning the nature of the stakeholders involved and the transfers of wealth resulting from the implementation of PES?

Moreover, the simplicity-equity-efficiency triptych is definitely not as clear as it seems. The simplicity and (therefore?) efficiency of PES tends to deflect attention away from the nevertheless crucial issue of the long term: in principle, only the symptoms and not the causes of environmental degradation are addressed. The possibility of achieving equity is particularly undermined by the aforementioned question about the respective natures of service providers and buyers, and whether or not they are taken into account when calculating the payment amount. Thus, although initially established to benefit poor rural populations, or at least those with low investment capacities, the instrument is also increasingly applied to prosperous private contractors on public land. This raises the question of whether this goes against the polluter pays principle, in spirit and in practice. Are we not actually rejecting the funding of necessary changes to the development trajectory, to the benefit of massive financial support for “professional”² providers, under the pretext of efficiency? We will see that this situation, which can at least be considered (without prejudice to the conclusions) as contentious, is likely to develop if priority is given to projects that will achieve

1. Reduced emissions from deforestation and degradation.

2. By this we mean that these providers are not the traditional users of the resource – the resident populations or landowners – but private or public organisations that exploit the resource directly (concessionaires, for example) or act as intermediaries (e.g. for investors in carbon markets).

substantial short-term results, which raises fundamental questions about the instrument itself. Due to the expansion of the application of the instrument, we consider it timely and necessary to question the possible implications of changes to the spatial and temporal scales of the PES concept. These issues arise at a time when discussions are increasingly focused on the translation of the REDD+ mechanism into a multitude of forest conservation PES, on the basis of opportunity cost estimates for the non-exploitation of forests (see Grieg-Gran 2006, for example).

Seven key questions about PES

Since the aim of this article is not to address all the dimensions of the broader issues mentioned above, we propose to focus on seven aspects:

- How are services assessed and what links are maintained between PES and economic valuations? With what kind of consequences?
- Why is the nature of the service providers (users of the resource) not neutral?
- Why does the nature of the buyer (service beneficiaries) also matter?
- How should the issue of the long-term implementation of PES be considered?
- How should changes to the geographical scale of PES (upscaling) be considered?
- What links do contract-type instruments such as PES maintain with public legislation and authorities?
- Is the environmental efficiency of PES enhanced by the involvement of industrial and commercial actors?

The analyses that follow for each of these questions are based first and foremost on the concept of PES as defined in literature. We compare this with various elements from the theory of economics, public action and environmental management, from emerging practices as we observe them in the field³, as well as from future developments of this mechanism that we consider plausible for various reasons.

3. With a focus on tropical deforestation and biodiversity due to the respective areas of competence of the authors, and also to the text's secondary objective of contributing to the highly contemporary debate on forest conservation.

The limited usefulness of economic valuations and its consequences

PES are associated with the principle of purchasing an environmental service. Perhaps because their development is part of the same international dynamic as the recent return to the limelight of the economic valuation of biodiversity and ecosystem services⁴, and because carbon storage is (wrongly) assumed to have a clear value due to the existence of carbon markets, it is often thought that agents who benefit from a service pay the equivalent value of that service. However, this reasoning, which calls for more economic valuations, is debatable for at least two reasons.

The highly uncertain value of ecosystem services

Firstly – a fact that no one denies –, estimating the economic value of ecosystem services is often difficult, sometimes almost impossible, and always subject to a wide margin of error and subjective assumptions, even when limited to the use value. Some of the many sources of uncertainty are listed below:

- The option value (related to the potential and future use of the service) is rarely known at the time of the evaluation.
- Local uses of biodiversity are often favoured, as is the case with ranking methods for priority use (but without quantification of the value) such as those implemented by Sheil *et al* (2002). A global service such as carbon storage in forest ecosystems has never been evaluated, a situation that is unlikely to improve in the future⁵.
- The value of a service depends on the number of beneficiaries taken into account, and apart from emblematic examples – a spring used for bottled mineral water, or the flow of a river allowing hydropower generation – the beneficiaries of environmental services are generally more dispersed and therefore less easily identified or mobilised than implied by the PES concept. This may

4. Return symbolised by the launch in 2007 of the initiative directed by Pavan Sukhdev: *The Economics of Ecosystems and Biodiversity* (TEEB).

5. To achieve this would require a damage curve that assigns a financial cost to the emission of one ton of carbon, whereas the market price of a tonne of CO₂ actually results from international agreements to reduce emissions.

result in a tendency to underestimate their value.

A monetary value that is not particularly useful...

Not only is it difficult to imagine a scenario where two agents easily agree on an estimated value that has such a large margin of error, but other considerations also put into perspective the usefulness of the economic valuation of ecosystem services for PES implementation.

First, from an ecological perspective, the real contribution of biodiversity or other elements of the ecosystem to the provision of a given service is often highly uncertain (Ridder, 2008): typically, if one considers the role of a forest for water regulation in a watershed, scientists often struggle to distinguish the proportion of this effect that truly derives from a complex ecosystem in good condition from one which simply relies on the mere presence of vegetation cover. Most cost-benefit analyses performed by conservation NGOs do not consider the impacts of gradual environmental changes on the economic value of the service. Thus, even in a hypothetical situation where we know the precise value of a service, it does not necessarily follow that we also know which conclusions to draw regarding requirements of the state of the ecosystem; conditions which buyers must negotiate with providers in order to maintain this service.

Logically, one might actually expect payment amounts to be based mainly on the opportunity cost, that is to say the cost for the users of not exploiting a resource, or to exploit it less or differently and thus preserve or restore an environmental service. The logic then shifts from one of demand (obtaining services) to one of supply (sacrifice of revenue). While this would appear to simplify the calculation, significant methodological problems nonetheless arise: the opportunity cost is an economic concept which is as simple to explain as it is complex to estimate. The chosen calculation methods can greatly influence the results (Pirard 2008): period of time, discounting rate, social or private costs, business mobility, capital costs and reinvestment opportunities in other areas, calculation perimeter and inclusion of downstream processing, etc. The perception of the opportunity costs by recipients is also

crucial, and there is no guarantee that this will be similar to the economic calculation carried out by external experts or by service beneficiaries. Last, as a matter of example, a recent article suggests that the "boom and bust" phenomenon observed in the municipalities of the Brazilian Amazon is linked to the declining productivity of land converted from forest into pasture (Rodrigues *et al* 2009). Nowhere in the existing literature on the opportunity costs of forest conservation can we find evidence of such considerations

Finally, following economic rationality, we can consider that the value of the ecosystem service and the opportunity cost for the non-degradation of this service are, respectively, the maximum that the buyer is willing to pay for a continued service, and the minimum the provider may accept to receive in exchange for his change in behaviour. In practice, these values, as we have seen, are very uncertain – stakeholders frequently do not recognise or understand them – and therefore the transfer amount at stake in a PES is essentially the result of a negotiation. This means that asymmetries of power and information play a key role, which strongly downplays the role of economic evaluation. Far from bringing objectivity and mechanical interactions to the traditional conservation and development nexus, it leaves stakeholders in a situation where power struggles, government and governance issues are central.

The nature of buyers and sellers

The two main stakeholders in a PES scheme are obviously the buyer and seller of a given service. While the nature of the seller involves more fundamental issues for consideration, in our opinion, and is thus the main topic of this section, we also address the question of the buyer in a first sub-section.

The nature of the buyer depends on the service and implies specific PES modalities

Environmental services must be separated into at least two categories: local or private utility services; and those of global, and therefore public utility. Although united under the same term and the same instrument, these two service types in fact have characteristics that make

them fundamentally different⁶. Consequently, a potentially distinguishing feature is the nature of the buyer. Payments may originate from three different types of “buyers”⁷: local direct beneficiaries of the service (e.g., PES “private deals” for watershed services); public entities acting as representatives of groups of beneficiaries (e.g., PES “public programme” in Costa Rica); or a wide market (e.g., PES tied to the voluntary carbon market).

In a situation where a service is of local or private utility, the buyer is limited, identifiable, and aims to maintain the benefit that results from the service. Assuming that the provider shares these characteristics, the two contracting parties may conduct negotiations to reach an agreement on the condition that in principle the buyer has the financial means to offer payments that are at least equal to the opportunity costs of the provider. The intervention of the public authorities is then relevant only to enforce laws or to provide an institutional framework capable of promoting this type of agreement. Although the benefits withdrawn are within the private sphere, the generalisation of such a solution may in fact contribute to the increased well-being of the population by correcting certain market failures.

Where a service depends on a public good, especially a global public good such as climate, the world’s population can potentially be considered as the buyer; therefore achieving an agreement cannot be immediately accomplished through negotiations between the two contracting parties. For this type of good of public value, alternative forms of negotiation must be sought, for example through interfacing with the market (which is then responsible for assigning a value to the service and commercialising it), with the public authority (via an international fund financed by countries representing the beneficiary population), or through other channels.

Therefore the nature of the buyer (an individual, State, etc.) is closely related to the

nature of the service (local, global public good, etc.), with consequences for the nature of the PES mechanism (direct contract, markets as interfaces, tailored or standardised payments, etc.).

The nature of the seller is critical for equity issues

PES have traditionally been conceived and applied in contexts where the providers of the service were populations (as opposed to industrial companies) – fishermen, “villagers” using a forest, farmers – which has several important implications. Indeed, the financial amounts are usually limited by the size of sites and by the low opportunity costs of relatively poor populations in rural areas. In addition, populations in receipt of payments reside more or less “on site”, even if their rights over the resource may be informal (not recognised by the public authorities). This inclination towards poor rural populations is logical for an instrument that leaves the initiative to a buyer whose interest is to best negotiate the provision of an environmental service. This is especially true when the service concerned has a more widespread usage, as potential providers are then numerous and in competition⁸.

However, given that PES are now applied more widely and presented as a suitable instrument for very contrasting environments, the explicit question of the nature of the service providers must be raised. It is indeed possible that radical changes will occur, and we are seeing the beginnings of this process. In the near future we could thus move from a situation where PES are an emergency solution – to bring a rapid halt to environmental degradation by contractually binding individuals with reduced negotiating power and limited demands in terms of compensation levels – to a situation where the service providers consider these payments as the result of commercial activity in a portfolio

6. It is common, however, for these two service types to be provided at the same time, even if only one is paid by the PES whereas the other is a positive collateral effect. In this case, the tendency to reward one over the other is not a problem in itself.

7. This distinction goes beyond the two categories of PES distinguished by Engel *et al* (2008), “user-financed” and “government-financed”.

8. This phenomenon can be observed today with the proliferation of studies dedicated to the identification of sites where the costs to reduce carbon emissions from deforestation are the lowest. It is precisely the objective of works such as the diagram representing the abatement costs of emissions across all sectors (McKinsey & Company, 2009), those centred on the main forest countries (Grieg-Gran 2006), or those limited to single countries (Laporte *et al* 2007, on the Congo). This approach explains why the PES instrument was considered from the perspective of poverty reduction and economic equity by both the academic world (Corbera *et al* 2007) and practitioners (Leimona and Lee 2008).

of income generating activities. One case illustrates this perfectly: a British investment fund (Canopy Capital) has bought the Guyanese government's international trading rights to the environmental services of a forest with an area of 371,000 hectares, which includes the maintenance of rainfall levels, climate regulation, biodiversity preservation or water regulation⁹.

These two situations are very different in many respects and it is especially important to analyse their possible implications, since we can interpret such a shift as a result of the legitimacy originally acquired by PES as a tool for economic support to poor populations. We see, however, that it is difficult to justify a uniform application to practitioners of slash and burn agriculture in Central Africa, cattle ranchers in the Amazon, paper manufacturers in Indonesia, tuna fishermen in the Mediterranean and investment funds with a speculative orientation.

Depending on the nature of the service provider, the legitimacy of PES, and therefore the calculation of the payment amount, must be distinguished accordingly. While the establishment of provider categories should be subject to a detailed analysis, we can already justify this line of thought by considering three typical contrasting situations: a village population in an isolated area, a population composed of migrants near a pioneer frontier, and a private company in possession of an exploitation license. In these three situations the legitimacy of the payments is not identical, not to mention the difficult question of property rights: opportunity costs correspond respectively to the production of goods for self-sufficiency, to the generation of additional income, or to the pursuit of profits from the exploitation of a public resource. The issue of the ecological effectiveness of the PES mechanism is raised in the same terms in all three cases. But as far as the legitimacy of compensation paid to villagers with little or no alternative can be defended, if only for reasons of economic redistribution, the compensation paid to the commercial sector benefiting from rights granted by the community is at best questionable. Yet this concern is well grounded

in reality, as recent news suggests: in Indonesia, the NGO Fauna and Flora International is planning to negotiate with major private palm oil producers, who benefit from licences granted by the State for public land, in order to share profits from the sale of carbon credits if forests are left intact¹⁰. This tendency is consistent with the proliferation of studies estimating opportunity costs, which are simultaneously a consequence of the pervasiveness of the compensation principle in the field of environmental conservation, and a means to facilitate their implementation. While the causes of deforestation (and therefore the object of opportunity cost calculations) increasingly originate in industrial rather than subsistence agriculture (Butler and Laurance 2008), the application of PES to industrial companies as providers is an expected consequence.

In the three aforementioned examples, the calculation method for the compensation amount, according to the nature of the provider, is also subject to discussion. The production of subsistence goods does not pass through the commercial circuit and the estimation of its value using the conventional methods for calculating opportunity costs is therefore problematic. One must then consider the possibility of taking into account the cost of supplying substitute consumer goods, the valuation of unpaid work, as well as the weakness of capital costs due to the possible absence of economic alternatives. For migrants who invest in the conversion of land with the support of considerable financial capital, the capacity to invest in other places or sectors may exist, and the pertinence of compensation that would take into consideration the capital cost is therefore more important. Finally, for private companies that have benefited from the granting of an exploitation licence for a public resource, a classic calculation of opportunity costs may be equivalent to the payment of a rent that is actually only related to the good will of the public authority that decided to grant the license. However, it is clear that these distinctions do not often appear in literature, for example in the influential works devoted to the mapping of potential PES for carbon storage in the Amazon according to opportunity costs (Nepstad *et al* 2007, Wunder and Börner 2008).

9. "Private equity firm buys rights to ecosystem services of Guyana rainforest", Mongabay.com, 27 March, 2008.

10. www.mongabay.com, 22 July 2009.

Designing PES for immediate gains or longer term changes?

In their conception, the aim of PES is to preserve the environment through payments that are conditional on abandoning degrading activities. It is their simplicity and the direct way in which they address environmental problems that purportedly constitute the basis of their effectiveness. In principle, the instrument is intended to obtain immediate results, whilst the issue of achieving a long-term solution to the problem is not addressed. Indeed, periodic payments reflect a mode of action consisting of removing a threat for as long as payments are maintained. These payments are calculated on the basis of the conditions observed at the time the contract is made, and are potentially subject to future revisions according to diverse parameters: price of agricultural commodities, labour costs, costs of inputs, yields, etc.

In principle, the PES therefore consists of an instrument to delay the moment when environmental degradation takes place, but does not structurally remove the possibility of its occurrence. This observation can be regarded positively or negatively: on the one hand, it may be seen as a means to retain flexibility over time, allowing more satisfactory solutions to be found; on the other hand, it can be seen as an incomplete solution to the problem, leaving a sword of Damocles hanging over the situation that will fall once the funds are no longer available or if the contract is broken. However, neither the market nor the public authorities can ensure financial sustainability of payments over the long term. In addition, we may safely assume that in some cases, the provider has an interest in maintaining the threat that its activity poses to its ecosystem service in order to ensure that the payments do not cease: PES is then a disincentive to the profound changes needed (professional retraining, change of practices, etc.).

There are, however, specific examples, such as Vittel in France (Perrot-Maitre 2006), which convincingly illustrate the fact that PES can encourage new practices and bring long-term solutions to the threat of environmental degradation. In this example, through external aid and technical support, farmers have been encouraged

to modify their practices with the intention that this reorientation will be "definitive", or at least structural, with the payments expected to trail off after a certain period. It is legitimate to consider a replication of this model, which is resolutely turned towards lasting solutions, but at the price of a specific understanding of payments which Wunder's definition does not particularly favour in principle. In the Vittel example, moreover, it should be noted that payments are not linked to water quality but rather to the implementation of best practice.

Therefore, it can be argued that the conventional definition of PES overlooks fundamental aspects of the instrument and fails to draw a line for risky experiments. This debate on the duration of PES contracts (permanent compensations *versus* temporary investments) relates to the question of *how* the ecosystem service is delivered by the provider. After showing that the type of seller should matter for PES (section 2), as well as the nature of the buyer (section 3), it is also crucial to consider the specifications of the PES contract, and more precisely, the type of obligations incumbent upon the provider. A clear divide can be made between providers who are receiving money simply to "freeze" some rights over the natural resource and those who receive payments (not necessarily monetary transfers) conditional to investing in alternative activities that are compatible with the permanence of the ecosystem service (e.g., establishing a plantation forest, shifting from extensive to intensive ecological farming systems, building capacity and infrastructure for a tourist activity, etc.). Wunder (2005) coined these two types of PES respectively "use-restricting" and "asset-building". The example of Vittel in France is clearly an "asset-building" type of PES, whereas, at the other end of the spectrum, conservation concessions¹¹ illustrate "use-restricting" contracts. While the latter are commonly cited in written documents, the former seem to be more frequently implemented in practice¹².

11. A conservation agency (e.g. NGO) buys logging rights to public forest from the government. Conservation concessions have been implemented in Guyana and Peru in particular, and are being negotiated in Cameroon (Korchinsky and Wiel 2009).

12. This is also stated in the FAO (2007) report on PES for farmers, but with a possible bias as PES applied to agriculture are more likely to involve changes in practices than PES applied to forest conservation.

“Asset-building” PES schemes have the highest probability (but no certainty) of building the conditions for temporary payments (see Figure 1) and potentially remove the risk of bargaining for permanent compensations, at least not from the part of the same stakeholders. The appeal of “use-restricting” PES lies in their simplicity and their lower costs in the short term compared to “asset-building” PES (see red curves in Figure 1). It is easier to give cash and monitor the cessation of logging in a given tropical forest than to provide training and equipment for setting up tree nurseries and sustainable forest management practices. However, in the longer term, the “use-restricting” PES are likely to become both costly (continued payments and upward bargaining) and ineffective (people still need wood).

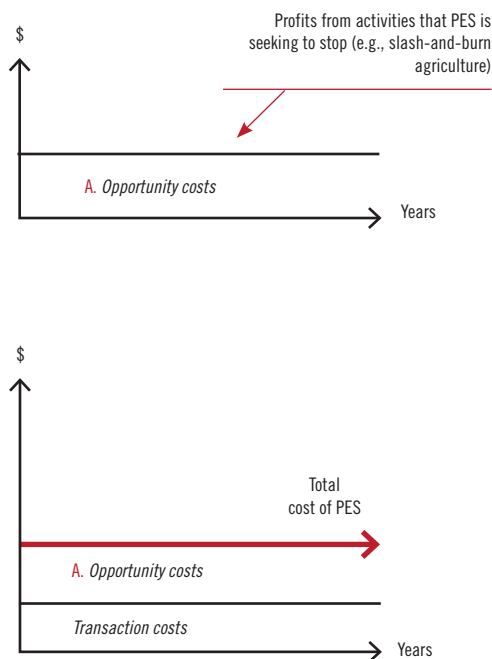
“Use-restricting” PES ignore basic demand-side pressures. The delivery of ecosystem services by the providers may be effective at project level, but demand for agricultural products, energy, timber and minerals will still have to be met somehow. In the rural tropics, cash is hardly a substitute for these products, which are either

produced for self-consumption or traded locally. The relative abundance of cash and relative scarcity of basic commodities (as a result of the progressive freezing of rights over natural resources) is expected to increase the price of these commodities and PES alike (through rising opportunity costs). “Use-restricting” PES are thus likely to result in quick ecosystem benefits that will vanish into leakage effects.

The benefits of “asset-building” PES thus appear clearer in the long term. However, in the short run, these schemes are more expensive as payments seek to cover not only opportunity costs, but also investment costs and transaction costs, which are expected to be particularly high with this type of PES (see Figure 1). Indeed, PES contracts that specify a series of investments to be implemented by the provider are more complex to monitor than deals that would only give cash for immediate results. The implications of this are that effective (and sophisticated) PES might actually be more complex and costly to develop and scale-up than first thought.

Figure 1: Temporary PES schemes need to be “asset-building”

1 “Use restricting” PES: a permanent compensation for opportunity costs



2 “Asset-building” PES: payments over limited period of time (temporary investment)

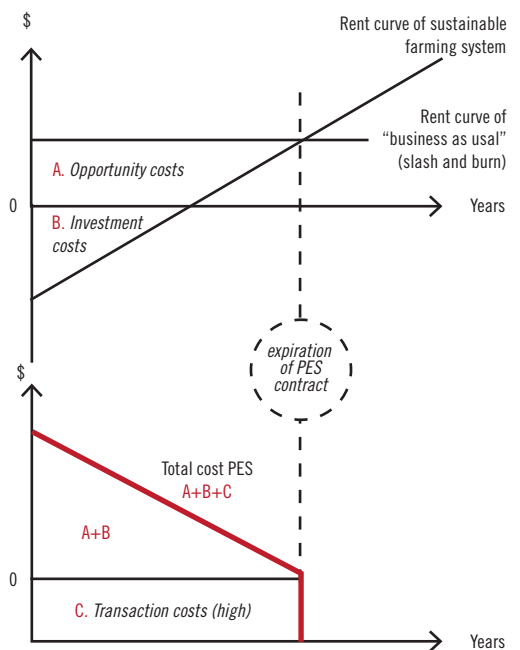


Figure 1 displays an ideal case of “asset-building” PES where payments become unnecessary to ensure the provision of the environmental service after a number of years. We are, however, not so blindly optimistic as to believe that this outcome is easy to achieve. In many instances, investing in sustainable productive activities through PES (ecological intensification of agriculture, sustainable forest management, off-farm business strategies, etc.) is not a perfect substitute for conventional practices. When PES contracts expire, some previous unsustainable activities (e.g. poaching) may resume, regardless of the continuation of the sustainable alternatives introduced by the PES scheme. In other words, new sustainable alternatives may be pursued *in addition* to previous activities when people are no longer tied to a contract. A more realistic view over the span of PES scheme is therefore to expect “asset-building” PES to be generally cost-decreasing over time, and, conversely, “use-restricting” schemes to become increasingly costly over the years.

The issue to which we would like to draw attention here echoes the question of trajectory changes, for which climate change is a good illustration. The objective of limiting global warming to less than 2°C is an aim that implies rethinking the development models in use today. Trajectory changes in most areas are therefore required as soon as possible, as opposed to targeted measures that would not fundamentally challenge the way we live, produce and use natural resources, or the way in which development and economic growth are perceived. The risk with PES schemes that would only postpone the destruction of environmental services is that they may further strengthen the very same socio-economic model that we must urgently reform. This perverse effect is increasingly believed to be a feature of carbon compensation schemes such as the Clean Development Mechanism (CDM) and voluntary carbon offsets in the transportation sector. At worst, some poorly designed carbon PES could both help northern polluters to temporarily offset their carbon footprint, allowing them to carry on business as usual, and induce sellers to postpone much-needed reforms at home.

The issue of large-scale implementation of PES: an alternative to reforms?

In parallel to the issue of the sustainability of payments (where the possibility of cessation carries the risk of the future degradation of environmental services), those programmes that promote the extension of PES on a large scale through replication of the original blueprint must be regarded with caution. This suggestion is controversial because with necessarily limited financial resources, a crowding-out effect may occur (in the sense that other actions may no longer receive funding). Then again, allowing the belief that the proliferation of PES schemes is a solution to the current problem of massive environmental degradation carries the risk of deflecting attention away from the necessary political choices regarding development trajectories.

The issue of financial resources for the large-scale implementation of PES can be considered on at least two levels: (i) where does money come from and in substitution for what? Private financial resources to replace a productive investment, public investment as an alternative to development aid, etc.? (ii) How can we globally account for the loss of production due to the cessation of a productive activity (condition of payments)? It thus appears that large-scale implementation of use-restricting PES could have important repercussions in terms of global well-being. Consideration must therefore be given to the merits of such an option compared to those involving investments in alternative activities by taking into account the global costs of either alternative.

Another point to consider regards the implications of a model that is similar to a rent economy. In Southern countries, where PES for carbon and biodiversity services are expected to thrive due to lower opportunity costs, the sale of user rights over natural resources could become an additional item on the list of rent-seeking opportunities. But the economic rent is not so much a sign of wealth as the indication of an international specialisation that is imposed on a country (Peguin and Tahla 2001). The trade imbalance between rich and poor countries could be accentuated through PES, with poor countries specialised as providers

of raw materials and “environmental rights”. Southern countries have no control over commodity prices and this is unlikely to be different for global environmental services such as carbon sequestration.

Precedents exist with rent economies linked to mining or renewable natural resources such as timber. In this configuration, the risk is that there may be a decline in investment and innovation research (see for example the study of the World Bank 1991¹³, highlighting the absence of an incentive for forest concessionaires in South East Asia to improve their practices because of the excess profits they can obtain with conventional methods). As a result, there is a risk of inhibiting the orientation of the economy towards activities that are consistent with sustainable development, especially when financial resources devoted to PES rents are no longer available for investment. In other words, the application of large-scale PES can potentially contribute at the same time to freezing efforts to change the development trajectory of countries with significant natural resources that generate environmental services. Therefore, one of these two situations will arise: either PES will remain a minor instrument, which does not seem to be the case in view of their current importance in the field of conservation; or they must favour asset-building approaches to allow their widespread application.

PES, law and public policies

The general context of the rapid development of PES and the interest they generate cannot be ignored: disengagement of the State, decentralisation and reduction of administration costs are today's motto. In southern hemisphere countries, we are very often dealing with States that at best are undergoing reconstruction and, at worst, are in decline, with decentralised levels of administration that are not usually in a better condition. In this context, some PES (of the “private deals” type, not “public programmes”) may be a way for stakeholders to escape the control of public authorities – with a well understood advantage for both parties: effective environmental protection for

the buyers, remuneration rather than regulation for the providers – or to compensate for their weakness (which is often a real absence of the State in rural tropical environments¹⁴).

As contractual mechanisms initiated by stakeholders involved in the provision and use of ecosystem services, PES raise several questions regarding their relationship with public policies and legal standards, which are the traditional mainstay of environmental action.

Firstly, PES may come into direct conflict with certain principles of public action. We initially think of the polluter pays principle which, if not universal, has been promoted by the OECD since 1972, is an element of the Single European Act that was signed in 1986, and is carved in the constitutional charter for the environment in France¹⁵. According to this fundamental principle of environmental policy, it is the user of the resource and not the beneficiary of the environmental service that should bear the financial negative externalities. We understand that this contradiction may in some cases be acceptable for pragmatic reasons, especially when PES are a means of preserving the environment in rural areas where resource users have a very limited income and little (or no) economic alternatives. In other words, PES may be justified in preference to the polluter pays principle by its consideration for the lack of solvency of the users and its parallel aim of poverty alleviation (Grieg-Gran *et al* 2005). However, when it comes to the question of addressing the degradation of services that are related to global public goods, and therefore to replicating the PES model on a large scale, or even to including as providers certain private companies that make substantial profits from the exploitation of natural resources, it is no longer possible to avoid the conflict with the polluter pays principle.

Another debatable aspect of pragmatism is that PES often have an ambiguous relationship with the law. In certain cases, which are sufficiently numerous to be of interest, the providers are compensated for abandoning illegal practices.

13. Cited in Karsenty *et al* (2008).

14. Costa Rica, the international PES flagship, is a notable exception to the rule: a centralised country with a generally strong State that is very involved in the implementation of PES.

15. Article L110-1, II, 3: “the cost of measures to prevent, reduce and fight against pollution must be incurred by the polluter”.

For example, in Vietnam, WWF¹⁶ facilitates a PES between a company operating a hydroelectric dam and people engaging in illegal forestry exploitation in the watershed (exploitation that generates erosion and the siltation of the dam reservoir, resulting in a loss of performance). Indeed, in some situations it is unrealistic to consider mitigating the threat of environmental degradation without agreeing to negotiate with users that benefit from their de facto control of the resource. But where are the limits of pragmatism? At what point are illegal practices encouraged (by other stakeholders and/or in other places) by creating a dangerous precedent? Important questions need to be raised about the political philosophy of PES, in light of basic democratic principles such as the idea that “public tolerance of a crime may exempt it from punishment, but shall not give rise to any right to profit derived from the crime¹⁷” (Condorcet, 1781).

While PES, as a market mechanism, will struggle to develop without a favourable legal context and support from public authorities¹⁸, we notice that they may also work against the consolidation of States and their policies. This brings us to the concerns expressed in the previous section, regarding the relationship between PES and reforms.

Is environmental efficiency enhanced by the involvement of industrial and commercial sectors?

The previous sections clearly show that PES are developing (or have the potential to develop) in the sense of a commoditisation of the environment which is endorsed and amplified by the commercialisation of environmental services. In an attempt to reduce transaction costs, this should logically lead to increased involvement of industrial stakeholders, such as concessionaires or large landowners, to the detriment of small-scale local stakeholders, such as villagers. This

may be considered as a positive development in the sense that the implementation of PES is conducted fluidly in large areas or, conversely, as a problematic development in the sense that the legitimacy of the mechanism, compared to the polluter pays principle, is then far from obvious. This dilemma is discussed in this section.

First, we must clarify our criteria for environmental efficiency, on the basis of which we assess the value of the large-scale application of PES. This efficiency is greatest if ecosystem services are preserved in the long term, with the lowest possible usage of financial resources. In this context it is clear that focusing on major industrial stakeholders, whose decisions and practices have an impact on sizeable areas and a large quantity of ecosystem services, will apparently multiply the effects considerably. This can be understood in terms of transaction costs: the more stakeholders there are, the higher the costs of negotiating and implementing an agreement. Specifically, it is more efficient to negotiate with one concessionaire who controls hundreds of thousands of hectares than with thousands of small owners, whose titles are often informal and likely to be challenged by the State¹⁹.

Following this line of thought, the emergence of intermediary stakeholders to bridge the gap between the buyers who benefit from the service and the providers – especially, if not exclusively, when considering global services such as the fight against climate change – may be seen as a positive means to achieve the optimum while reducing transaction costs by decreasing the number of stakeholders involved. An example would be an investment fund that is active in the area of environmental services, and is responsible for trading carbon credits on international markets rather than the populations that own the formal or informal property rights for the resource. Such an investment fund would have market knowledge, contract negotiation capacity

16. Dang Thuy Nga, Asia Europe Environment Forum, 29-30 June 2009, Hayama, Japan.

17. « La tolérance publique d'un crime absout de la peine, mais ne peut former un véritable droit sur le profit du crime » (translation by the authors).

18. For example, Vietnam conducts a national policy of support for the development of PES (Wertz-Kanounnikoff and Rankine, 2008), which results in rather intense activity on the ground.

19. This aspect brings us away from the teachings of the Coase theorem, which states that whatever the initial allocation of property rights (decisions on how to use the resource), and in the absence of transaction costs, stakeholders pursuing diverse interests will be able to agree through trading and bargaining to achieve an optimal balance. But in this case the transaction costs are substantial, especially if small-scale stakeholders are involved as providers. The Coase theorem is therefore not valid, and the priority given to large-scale providers seems justified in this perspective. The nature of the providers would be neutral in the absence of transaction costs.

and the objective of profit maximisation, which are all factors that should theoretically enable it to accelerate the process and achieve the application of PES on the ground. However, we can see two failures in this mechanism: first, the issue of multiple contracts will probably not be resolved because the intermediary must also negotiate with all those that have entitlements to the site, except if these rights are not recognised (which is a real risk); and second, the intermediary is likely to negotiate directly with the public authority, in a way that lacks transparency, and by generating a profit margin which results in an increase in costs and leakage of capital outside the developing country (which corresponds to the case of Guyana mentioned in the section on the nature of sellers).

The last point that should be raised regarding the desirability of involving commercial and industrial sectors in the implementation of PES regards the limits to the beneficiary pays principle. As previously mentioned, the beneficiary pays principle is widely considered an exception to the polluter pays principle. While the polluter-pays principle cannot apply when polluters are not solvent, with industrial users the problem is quite different, especially if the logic followed is that of a diversification of activities in productive, financial and environmental sectors. The rationale for transferring the cost of pollution, or its avoidance, towards beneficiaries is then weakened. However, it should be noted that these new environmental stakeholders are active mainly in the trading of global and non-local services, which has an important implication: it is difficult to cite the polluter pays principle for environmental externalities that are distant and diffuse, unless one considers that the State itself becomes an intermediary between the representative global organisations and the polluter. This is what we observe with the Climate Convention, and some States that comply with their commitments to reducing emissions by making domestic emitters pay (e.g. through a carbon tax or the auction of emission quotas).

Discussion: Drawing red lines to optimise the effects and reduce the risks of PES

The issues raised in the previous sections focus on the risks linked to a large-scale application

of PES (through a multiplication of sites) when adhering to their strict definition, which involves the multiplication of financial compensation for users of natural resources (use-restricting PES). These risks must be taken seriously because the compulsive replication of this model is currently under debate, especially within the framework of the REDD+ mechanism. Its scope of application could therefore cover a major proportion of the forests situated in developing countries, which have carbon stocks that have now become a prime issue. The probability of its large-scale application is even higher if we consider the following two facts:

- The potential development of a market logic applied to forest conservation will clearly result in the development of markets for environmental services – with carbon as the spearhead within REDD+ – which are likely to rely mainly on private investments. According to this reasoning, the investment would be directed primarily towards the direct payment of compensation for agents of deforestation in order to obtain immediate results. It is unrealistic to expect investors to engage in the financing of policies and measures aimed at changing modes of production (asset-building PES), especially agricultural, the results of which would be more uncertain in the short term and thus the income generated by the sale of environmental services lower.
- The funding of results rather than efforts in the fight against deforestation is an incentive to implement a method that allows the quantification of results. In this respect, use-restricting PES are readily considered in a positive light, because their results can be assessed as promising when applied in a limited way and if we consider short-term consequences.

The emergence of carbon markets applied to forest conservation is beginning to produce concrete effects on the possible proliferation of PES, which could be applied to private companies operating on public lands and with licences granted by competent public authorities²⁰. This apparently surprising scenario is actually quite

20. By way of illustration, Hamilton et al (2009) report 157 million USD for voluntary carbon markets, and Indonesia signed a 1 billion USD deal with Norway in May 2010 that implies among other things, setting a two-year moratorium on the issuance of new licences on forest areas (“Indonesia agrees to curb commercial deforestation”, *New York Times*, 27 May 2010).

plausible. It is already under debate for industrial plantations of palm oil in Indonesia²¹ and could extend outwards as it prolongs and applies the innumerable efforts directed towards estimating the opportunity costs of forest conservation. If the polluter pays principle is abandoned for the industry, the door will be open to all sorts of blackmail; the very fact of threatening an ecosystem will then become a serious business. We believe that it is vital to establish a limit that must not be exceeded²².

It is particularly important to define this limit for global ecosystem services, derived most notably from biodiversity and carbon stocks. Indeed, initiatives related to PES that aim to preserve these services could stimulate substantial financial flows (particularly large in the case of REDD+) and involve a group of stakeholders ranging from the populations that use the resource to the national or sub-national authorities, through private companies operating on private or public land and international funds or organisations in charge of ordering payments. It is then necessary to agree on rules that will govern these financial flows and on a few basic principles that should be observed. These principles should address the nature of the eligible beneficiaries of PES (populations, private sector, the State), payment terms (periodic, duration, calculation of the amounts), and the nature of the reward granted (payments, technical support, property rights).

According to their current definition (Wunder 2005), and for the sake of efficiency, PES may focus on private companies or large landowners. While this has never been the stated objective – indeed PES have traditionally been associated with development goals and

poverty alleviation – it would be too difficult in practice to multiply arrangements with a dispersed group of stakeholders such as small and poor landowners (see the paper by Pirard and Billé 2010). However, it is precisely in situations where the service provider is a private company or a large landowner that a PES scheme becomes debatable for the aforementioned reasons (conflict with the polluter pays principle, dilution of financial resources that otherwise could be used to produce changes in agricultural practices, etc.).

We believe that a promising option to properly and effectively address these risks is to both specify and broaden the PES concept, and to reduce the scope of application when public financing is at stake²³. It should be possible to systematically go beyond monetary payments and to integrate elements of technical support to encourage changes of practice for productive activities. This would make it possible, *inter alia*, to guarantee that: mobilised financial resources are usefully invested; the relevant agents remain part of the production process; vital environmental conservation does not fall under the sole control of “market logic”; and it also minimises the risk of wealth hoarding by economic agents who are well-informed and well-connected with political elites.

PES should be designed as a means of guiding production practices in a direction that is desirable both for the environment and for the creation of wealth and revenue. Wunder’s definition of PES may be elaborated in this way: PES are (i) a voluntary transaction in order (ii) to preserve or enhance at least one well-defined environmental service, between (iii) at least one provider, (iv) who clearly cannot be subject to the polluter pays principle²⁴, (v) and at least one buyer, (vi) who offers a payment over a limited period (vii) as a means for

21. “Palm oil companies trade plantation concessions for carbon credits from forest conservation”: Mongabay.com, 22 July 2009.

22. Several recent examples reinforce this statement, pushing the principle of compensation for opportunity costs to absurd limits, for example: a proposal from the Ecuadorian government not to exploit around 20% of its oil resources located in the subsoil of the Yasuni National Park, which protects one of the planet’s richest tropical forests in terms of biodiversity; claims from the Gulf countries related to the economic loss associated with a gradual decrease in the world’s oil consumption due to the fight against global climate change (submitted by Saudi Arabia to the UNFCCC, February 6, 2008); and even a proposal by a fur manufacturer to renounce its quota for hunting baby seals in Namibia in exchange for a payment of 14 million USD from NGOs involved in environmental protection...

23. These safeguards are less pressing for *user-financed* PES in which benefits associated with the transaction remain private (see section 3). Having said that, this type of private PES is likely to remain quite marginal as the growth potential for PES clearly comes from two global public goods, namely carbon sequestration and biodiversity conservation.

24. “Who clearly cannot be subject to the polluter-pays principle”: either by lack of solvency, or because buyers want to incentivise efforts to *generate* ecosystem services beyond the mere conservation of what already exists (situation where PES seek to internalise positive externalities and where resource users cannot be assimilated with “polluters”).

investment in locally productive and sustainable activities.

We call for research to expand the application method for PES, which should explicitly include agricultural issues. This should be made a priority in order to illustrate the urgent and compelling need to extend policies and measures beyond the threatened sites. Let us consider an example that is at the heart of our reasoning. Deforestation is often, and justifiably, presented as resulting from differential rents to the benefit of agriculture: agricultural rent (income from the cultivation of forest land) is higher than forest rent (income from the sustainable exploitation of forest resources), which constitutes an often irresistible incentive for deforestation (see Angelsen 2007 for a good review of this issue). PES is then a way to counter this phenomenon by increasing the forest rent by the internalisation of environmental externalities. However, the productive activity is then generally reduced and the forest rent is guaranteed by external financial payments, which is equivalent to providing a crutch for local activity. We would like to consider the possibility of reversing this logic to develop a virtuous cycle, where the agricultural rent would be increased but not in the forest area, and under conditions that the forest must be maintained. Ideally, the same economic agents would then be encouraged (and financially supported) to develop new agricultural techniques that are generally more profitable (e.g. through higher yields) while maintaining forested land. The question is then to develop new types of contracts suited to this purpose, to identify or invent the relevant farming systems, and to give ourselves the time and means to attain this goal. This aim is indeed ambitious, but seems inescapable; hence the need to avoid the dilution of efforts which can only achieve less sustainable solutions.

For this it is possible to draw inspiration from two attempts to expand the PES concept. The first concerns the Vittel source in France, where users of the resource, who in this case were dairy producers, have benefited from financial aid to change their practices in order to sustain the beneficial effects on the environment without drastically reducing the local activity, and with the hope that these payments

will eventually stop (Perrot-Maitre 2006). The second concerns a forest conservation project in Madagascar, where the establishment of a system has been proposed based on "a specific currency" which allows payments given to households that abandon hunting activities to be reinvested in effective technical solutions for food production (Karsenty et al. 2010).

In both examples, we notice that the users of a resource are encouraged to pursue a productive activity while reducing their impact on the environment and its services. It should inspire current and future thinking on the development of virtuous PES that are able to jointly address environmental and development issues.

Take-home lessons

The analysis we conducted leads us to a number of points we would like to make clear to the reader, keeping in mind that field research will be necessary to test most of these hypotheses²⁵.

- There is a strong disconnect between economic valuations of ecosystem services and the design of PES, which is bound to persist.
- The nature of sellers should be subject to debate when it comes to "professional" sellers (not traditional users of the resource) to ensure that making an exception to the polluter pays principle by using PES is justified. The use of PES to persuade commercial actors not to degrade the environment is a dangerous shift towards a "polluter profits principle".
- The nature of buyers is closely related to the type of service that is provided (for instance local or global public good) and implies specific PES mechanisms; various logics may therefore apply to various services and buyers.
- There are two contrasting approaches to PES, one leading to the cessation of activities (use-restricting) and the other generating changes in practices (asset-building), suggesting that the former would be rather transitory and flexible while the later would

25. We have begun to do so on several Indonesian sites, the results of which are presented in another paper (Pirard and Billé 2010).

create greater needs for investment but better prospects for long-term effectiveness.

- Large-scale implementation of PES (a great number of sites) generates risks of deterring the elaboration and implementation of reforms because of the creation of incentives for rent-seeking behaviour and the use of financial capital for ceasing productive activities.
- From the perspective of law and public policies, PES reverse the polluter pays principle and potentially encourage illegal activities for resource users to claim payments. These points need consideration particularly in developing countries where there is a case for public action to be strengthened in the long term rather than being substituted by private deals.
- The Coase theorem hardly applies to PES because of very substantial transaction costs that impede the multiplication of deals between stakeholders to reach a social optimum. While this could be understood as an argument in favour of “professional” stakeholders including intermediaries (see for instance the carbon market), this trend may eventually generate new costs *inter alia* through profit margins collected in the meantime, and needs to be considered with caution as it carries the risk of unduly reversing the polluter pays principle. ■

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Questioning the theory of Payments for Ecosystem Services (PES) in light of emerging experience and plausible developments

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