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Necessary Conditions for Ecosystem Service Payments

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What Are We Talking About?

A now widely accepted definition of payments for environmental services (PES) contains these elements (Wunder 2007):

- A *voluntary transaction*
- A *well-defined environmental service* or a land use likely to secure its provision
- At least *one buyer*
- At least *one provider effectively controlling service provision*
- If and only *if the environmental service provider secures service provision* (conditionality)

One should refer to "environmental" rather than "ecosystem" services. For instance, the carbon-sequestration service of an exotic tree plantation is specific, not "systemic"; the synergies between different services provided are often exaggerated. PES can be used for preserving, restoring, and creating new environmental services (jointly referred to as "conservation" below). PES currently exist for four environmental service types: carbon, watersheds, biodiversity, and landscape beauty.

The five PES principles hold for several real-world schemes, but the number of existing "PES-like" schemes—satisfying most but not all criteria—is much larger. Some PES schemes are "self-organized," normally at the initiative of environmental service buyers or intermediaries like non-governmental organizations (NGOs). Examples from developing countries are community and smallholder carbon schemes worldwide or mushrooming watershed schemes in Latin America (table 1). In developed countries, examples of self-organized PES schemes include the much-cited Catskills watershed protection scheme in New York or Vittel's watershed scheme in France. Typically, self-organized schemes are small-to-medium-scale sized. Single-

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site schemes may range from 496 hectares (Pimampiro watershed PES, Ecuador) and 5,100 hectares (Vittel watershed PES, France); and multi-site schemes from 3,500 hectares (RISEMP, Regional Integrated Silvopastoral Ecosystem Management Project in Costa Rica, Colombia, and Nicaragua) to 22,300 hectares (PROFAFOR carbon sequestration program, Ecuador).

Table 1 Examples of PES Type of Experiences Worldwide

Scheme	Country	Service	Land uses paid for	Seller	Scale	Spatial extent	Years	Source
RISEMP	Colombia Costa Rica Nicaragua	Biodiversity, carbon	Restoration (silvopasture)	NGOs, IO, states	International (3 countries)	3500 hectares	2002–	Pagiola et al. 2004, 27; 2007
Pimampiro	Ecuador	Watershed	Conservation/ minor restoration	Municipal government	Local	496 hectares	2000–	Echavarría et al. 2004; Wunder and Albán 2008
Conservation Reserve Program (CRP)	USA	Watersheds, biodiversity, soil+	Restoration (agricultural practices and land retirement)	Central state	National	14,500,000 hectares	1985–	Claassen et al. 2008
PROFAFOR	Ecuador	Carbon	Restoration (plantation)	Private company	Regional (selected provinces)	22,300 hectares	1993–	Albán and Argüello 2004; Wunder and Albán 2008
PSA program	Costa Rica	Carbon, watersheds, biodiversity, landscape	Conservation/ minor restoration	Public sector+	National	270,000 hectares	1996	Pagiola 2008
Vittel	France	Watershed	Conservation/ restoration (agricultural practices)	Private company	Local	5100 hectares	1993–	Perrot-Maître 2006, 24.

Source: Adapted from Wunder et al. 2008

Other PES-like schemes are run by national states, acting as buyers on behalf of environmental service users. They are typically much larger in area and tend to combine several services, but also feature various side objectives (poverty alleviation, regional and sectoral development). This bolsters political support, but may endanger their effectiveness in reaching environmental goals. Examples include agro-environmental schemes in developed economies,

such as the U.S. Conservation Reserve Program (about 14.5 million hectares) or the European Union's various agro-biodiversity programs, but also those in developing and emerging economies, e.g., China's SLCP (Sloping Land Conversion Program)—7.2 million hectares of land retired and 4.9 million hectares planted with trees;, Costa Rica's PSA (pioneering environmental services payments program)—270,000 hectares; or Mexico's PSAH (National Program for Hydrological Environmental Services)—126,000 hectares.

Economic Preconditions

The key economic rationale for PES is that an "externality" exists, i.e., compensating an outside service benefit that the landowner (potentially or *de facto*) provides to external beneficiaries. PES thus recognizes hard tradeoffs in conservation: the landowner and the external beneficiaries (downstream water users, global carbon buyers, etc.) have diverging interests, and unless the latter compensate the former, the service will be lost.

Secondly, the value of the service(s) at hand (determining the environmental service user's willingness-to-pay [WTP] for PES) must exceed the environmental service provider's opportunity costs, i.e., the profit foregone from abandoning the first-best land-use plan (determining the environmental service provider's willingness-to-accept [WTA] PES, plus transaction costs [TC]). In some situations, profits from alternative land uses may be too high for conservation to compete or transaction costs are prohibitive for PES (i.e., minimum WTA + TC > maximum WTP).

Competitive Preconditions

A frequent misunderstanding is that PES require "markets" to function. Only for carbon services, a homogeneous environmental service being universally provided, have some markets (e.g., the Chicago Climate Exchange) evolved. All other three environmental services (biodiversity, watersheds, and landscape beauty) are usually too spatially specific to allow for true competition: the users have to work with the providers which happen to occupy the land that provides "their" targeted environmental services. Most existing self-organized PES are thus monopsonies (transactions with one single buyer, e.g., the state or a hydro-electrical power plant) or oligopsonies (only few large buyers who can dominate the negotiations). Under genuine market preconditions with atomistic supply and demand conditions, most PES schemes would, in fact, never happen because the transaction costs of negotiating PES deals would be too high. So-called "market-based tools" (e.g., tradable development rights, biodiversity offsets) can sometimes help achieve the environmental goal. However, markets and competition are neither

necessary nor sufficient preconditions for PES. Thus, PES design needs to draw much more on contract theory than on marketing literature.

Cultural Preconditions

Economic incentives constitute the core of PES. If environmental service providers feel little motivated by receiving payments or consider them socially inappropriate, then PES will not work. When non-economic value systems are important and functioning, there may be strong resistance to the introduction of PES. Nowhere is this as apparent as with water access, often considered a human right that is threatened by PES monetization. The so-called "Andean Water Vision," built on indigenous systems of upstream-downstream reciprocity, has in particular proved to be at odds with watershed PES and is locally considered a neoliberal Trojan horse. According to psychological experiments, introducing (small) monetary payments on top of (strong) pre-existing intrinsic values (e.g., paying people to protect their own revered forest) could at worst undermine rather than strengthen conservation.

In most cultural contexts, PES are currently being accepted. Where traditional systems become dysfunctional (e.g., due to increased resource pressures), PES can also gain acceptability. Using non-monetary PES payments can in some cultural circumstances be preferable. The PES mechanism may thus be designed adaptively, to complement pre-existing values and natural resource management systems.

Institutional Preconditions

Although natural resource externalities are widespread globally, in a few places, PES have been developed locally in a bottom-up way. PES require trust between service users and providers—expecting mutual contract compliance and excluding misleading motives (e.g., users taking over providers' lands). Since users and providers have inherently conflicting interests, trust seldom develops naturally between them; an honest intermediate broker is required. In fact, the idea of applying PES in most cases comes from external intermediaries. Yet, in situations of great conflict and when rights to the land providing the service are not (and cannot be rendered) exclusive, PES cannot be applied. Given the frequency of these situations in the southern hemisphere, institutional PES constraints are often binding.

On the other hand, PES is frequently also a fitting response to institutional shortcomings, in particular, difficulties to apply command-and-control policies in developing countries. In developed countries, e.g., much watershed protection has occurred through effective legal land

protection. In other words, where command-and-control tools are working well, PES may be needed less as an incentive for voluntary change. However, PES may still be used here as a compensation for obligatory changes ensuring fairness and equity, or conditionality may be brought in through cross-compliance (productive subsidies depending on compliance with environmental command and control), as is the case for many agro-environmental schemes in the northern hemisphere.

In developing countries, command-and-control efficiency is often restricted by weak institutions and poor governance, especially at the agricultural frontier. There is also a moral imperative not to hurt poor farmers through strict prohibitions, who traditionally occupy productively marginal yet environmentally fragile lands. Land is often considered abundant, and its occupation and transformation is commonly accepted as a livelihood strategy for the poor, making command-and-control enforcement politically unfeasible. PES can thus be an effective and more equitable conservation response to those institutional limitations.

Can PES schemes be effectively enforced? In principle, contracts could be tied to the existing judicial system, so that non-complying providers can be legally pursued. Conservation easements are one such PES tool (satisfying the five criteria above) which makes use of this possibility. However, its effectiveness depends on whether the judicial system is willing and able to assume the transaction costs of effectively enforcing the PES contract. In developing countries, easements can thus run into some of the same implementation obstacles as command-and-control systems. For the same reason, easements have been applied much more frequently in developed than in developing countries. In the latter, it is often preferable to have contracts that are independent or at least not fully dependent on the judicial system. The main point of leverage here is to have a system of recurrent contingent payments (in principle, to infinity), which are stopped, reduced, or suspended in case of non-compliance (depending on the severity of the breech). This system can be quite efficient, but might run into trouble when upfront conservation costs are high (e.g., with tree planting): more or less equal recurrent payments will then not be sufficiently attractive for the environmental service seller, while high upfront payments make the buyer lose leverage.

Informational Preconditions

PES are relatively information-intensive, which triggers transactions costs. However, TCs tend to be comparatively higher in the start-up period prior to the first payment (costly negotiation, environmental-service baseline assessment, system design, etc.) than in the operational phase (monitoring, enforcement/sanctioning, administration) when the direct

implementation method of PES usually enhances cost effectiveness. For instance, in the two Ecuadorian cases of Pimampiro (watershed) and PROFAFOR (carbon sequestration), start-up costs were US$ 76/hectare and $184/hectare, respectively, while recurrent transaction costs in the operational phase were $7 and $3, respectively (Wunder and Albán 2007).

Transactional costs could be a real bottleneck for PES-led conservation, especially when there are multiple environmental service buyers and sellers which are socially diversified, and when the targeted service is biophysically complex. For instance, measuring hydrological linkages to scientific standards may come at costs grossly exceeding the required payments proper, which in most cases will constitute a deal breaker. Small-scale schemes particularly suffer the drawbacks of high start-up costs.

PES Implementation Features

At first sight, the obstacles to PES implementation might seem formidable, but in many cases, PES just make transparent the contradictions that implicitly apply to other conservation tools. For instance, if potential service providers decline to switch to environmentally benign productive activities because their opportunity costs are not covered (*economic obstacle*), this will clearly be featured during the PES negotiations. In many other conservation actions, this may remain an underlying root cause of failure that is not openly recognized. Land-access exclusion rights (*institutional obstacle*) are *sine qua non* for PES, but indirectly so are they for other actions. For instance, an integrated conservation and development project might be very effective at engaging a community to shift the livelihoods of its members into a more conservation-friendly direction. But, if lower local occupancy of the land targeted for conservation induces outsiders to take control over it, the line of action of the integrated conservation and development project will fail due to the same root constraint. Finally, baselines of service provision are key for PES and might be difficult and expensive to set (*informational obstacle*). However, as has been correctly pointed out, in fact, *any* conservation action should carefully define and monitor “what would happen in the absence of the targeted intervention” (Ferraro and Pattanayak 2006).

In which fields and scenarios are PES thus likely to face implementation obstacles that are genuinely superior to those of other conservation tools? As mentioned, probably some start-up costs are higher and some obstacles more evident, simply because PES requires a greater degree of explicitness. These cases most of all reconfirm that conservation *per se* is an undertaking riddled with obstacles. However, one field where PES truly “underperforms” other tools is the high cost of negotiating contracts, at least in self-organized schemes where both the

buyer and the seller are fully voluntary. Where many buyers and sellers (perhaps of various services from the same land plot) are present, PES schemes are unlikely to emerge, unless the negotiation parties are extremely well-organized from the outset. However, the proper process of PES negotiation could, in turn, also provide side benefits in terms of platforms for democratization and improved governance—which is one reason why donors tend to be interested in PES. Hence, some transaction costs are not worse, but are also actually good for something.

The Beauty of PES

In spite of the current incipient scale and spread of self-organized PES schemes and the implementation imperfections of many larger-scale state-led PES-like schemes, many conservation (and rural development) stakeholders continue to have high hopes for PES, as key to a new paradigm of "contractual conservation." Why is PES thought to be such a promising idea? One can divide PES proponents into two stylized camps:

- ***Supply-side innovation***: PES, as a direct, conditional way of "buying conservation," promises to use existing conservation funds more efficiently, with a strong focus on conditionality, i.e. the environmental service provider securing environmental service provision, and less so on increased user financing (Ferraro and Kiss 2002).
- ***Integrating supply and demand sides***: PES is a tool to buy conservation *and* generate sustainable funding, where the "user pays" and "provider gets" elements of PES jointly assure a socially efficient resource allocation (Pagiola and Platais 2007).

Both of these camps can provide relevant perspectives: supply-side innovation more so for global non-exclusive environmental services (biodiversity and carbon) where direct user payments have little prospects of raising funding; and integrated supply and demand sides more so for watershed services or landscape values where local user financing is a *sine qua non*.

Making PES Flourish

As shown above, PES is an attractive conservation tool, both as a supply-side innovation and as an integrated financing tool. The economic preconditions for PES (win-lose/lose-win scenarios with favorable WTP/WTA ratios) are widespread, and cultural obstacles can most frequently be overcome. If we were to scale up PES from their current early development stage, the institutional and informational bottlenecks would be more severe: insecure land rights, lack

of trusts, free-riding service users, and high transaction costs. What can be done to ease these constraints?

In self-organized schemes, e.g., single watershed deals in developing countries, donors can help by subsidizing high start-up costs under the rationale that these PES appear to be cost-effective and sustainable once up and running. Rapid biophysical assessment methods (e.g., for watershed protection and carbon sequestration) can reduce the high costs of setting baselines. In the social-science sphere, directly replicating models of negotiation and design (e.g., for communities and smallholders) can also reduce costs and enhance trust building. In some cases, land-tenure consolidation can help, while in others it is too costly or difficult, thus making PES non-viable. Self-organized schemes are important for local environmental management (e.g., watersheds or ecotourism) and as pilots for our continuous PES learning and adaptation.

However, many global environmental problems (e.g., reaping biodiversity and carbon benefits by avoiding deforestation) are probably best addressed through scaled-up, state-run schemes. In principle, a far-sighted and credible state can address both institutional and informational transactional-cost constraints by providing an umbrella for multiple-user payments (thus minimizing free riding), being a trustworthy honest broker, addressing spatially fungible environmental threats at a sufficiently large scale (i.e., counteracting so-called “leakage”), providing more and cheaper land-use monitoring, etc. The real-world problem is that many developing-country nation states are seen as neither environmentally far-sighted nor institutionally credible. Furthermore, PES-like state-run schemes face constant dangers of being hijacked by competing political agendas and, at worst, degenerating into undifferentiated rural subsidies with little environmental returns. The conservation challenge here is to increase and maintain the environmental focus of PES through rate differentiation and spatial targeting to high-threat and high-service yielding areas.

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