Chapter 17

Can payments for environmental services reduce deforestation and forest degradation?

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- Payments for environmental services (PES) have the potential to become effective, cost-efficient and equitable instruments for implementing REDD+ on the ground.
- PES require certain preconditions to be satisfied, in particular land stewardship with 'the right to exclude third parties', which is not granted in many forest frontiers.
- Using spatial targeting toward high-threat, high-service and low-cost areas can dramatically improve PES carbon results. Failing to use these design features can make PES inefficient.

Introduction

Payments for environmental services (PES) schemes are mushrooming in many countries (Landell-Mills and Porras 2002; Porras *et al.* 2008). Few formal performance evaluations of PES schemes have been made so far, but there is already some evidence that well-designed PES schemes can result in efficient, cost-effective and equitable conservation (Wunder *et al.* 2008b). PES can be defined as voluntary, conditional transactions between at least one

buyer and one seller for well-defined environmental services or corresponding land use proxies (Wunder 2005). Conditionality is the key feature of PES: payments will only be made if the service provider complies with the contract. In practice, imperfect 'PES-like' transactions are more common than 'pure PES' that meet all the conditions. But 'voluntary provider participation' and especially 'conditionality' are essential features: PES represent a new paradigm of 'contractual conservation'. Unlike regulatory approaches (e.g., command and control tools, protected areas), PES schemes incorporate direct checks and balances on welfare and equity: if local people feel they will be disadvantaged by a conservation deal, they can simply decide not participate.

The concept behind PES is straightforward. External beneficiaries (e.g., downstream water users or global carbon markets) pay land stewards to change their usual land use practices so that the land provides environmental services. But land stewards are only paid if they comply with the conditions in the contract. In other words, service users (buyers) rent certain land use rights uses from providers (sellers), usually for a specified period. This means that PES service providers have to be 'land stewards', such as legal landowners, informal but recognised occupants, communities with traditional rights, or long-term concession or lease holders (see discussion below). To date, PES transactions have included conserving watersheds, protecting biodiversity, preserving scenic landscapes and capturing and storing carbon (Landell-Mills and Porras 2002; Wunder *et al.* 2008b).

REDD+ is conceptualised as a system of international transfers for reducing emissions from deforestation and degradation – i.e., an 'international PES' system. The REDD+ criteria are similar to PES criteria: carbon services are voluntary, conditional and defined by forest conservation proxies and their carbon services. What was arguably the first REDD+ pilot venture, the Bolivian Noel Kempff project, can be defined as a PES transaction (Asquith *et al.* 2002). Hence, it seems logical to ask to what extent PES can actually buy and best achieve reduced emissions from deforestation and degradation.

Preconditions for REDD+ payments for environmental services schemes

Are PES a 'one size fits all' tool for forest conservation, and can they effectively mitigate forest clearing and degradation everywhere? The answer, unsurprisingly, is that they are not and cannot: for PES to be effective they need to meet certain preconditions as regards information, economics, culture and institutions, each of which I will now briefly discuss in the context of REDD+.

Information. Buyers of environmental services will normally want to know what services providers will deliver as a result of changes in land use. In watershed protection, for example, biophysical links can be complex and it is difficult obtain reliable information. In the case of REDD+ carbon, it will normally be easier to provide information, but giving users reliable estimates of business-as-usual baselines and carbon increments could be challenging (see Chapter 7). These kinds of requirements for information are in no way specific to PES, but usually need to be explicitly set out in PES schemes where services are directly traded.

Economics. Basically, the economic value of the carbon REDD+ saves has to exceed the total cost of providing the environmental service – i.e., the opportunity costs, and the protection and transaction costs of conservation. If this condition is not met, service providers will become worse off from PES, and are thus not likely to participate. Opportunity costs, i.e., the providers' marginal losses from foregoing planned deforestation or degradation, are usually the biggest cost, whereas protection costs (e.g., establishing firebreaks, monitoring intrusions) and transaction costs (e.g., area delimitation, contracting) are supplementary. Since the Stern Review, most REDD+ scoping studies have found that on average landowner opportunity costs are low and, in many but not all cases, could be 'bought out' at current carbon and commodity prices. As carbon and commodity prices obviously fluctuate over time, the bottom line is not fixed.

Culture. Service users need to develop a 'payment culture' for PES to thrive. For instance, irrigators could often benefit economically from watershed protection PES, but most places have a history of free water services, which means that entrenched attitudes that water should come at no cost prevail. For REDD+, willingness to pay for PES seems significant, though the scale of future payments still has to be confirmed.

Equally, service providers need to feel motivated by PES incentives to boost services. Landholders are seldom motivated purely by profit; they may also conserve forests for the common good and other motives. The psychology literature shows that offering small monetary rewards for 'privatised public-good provision', the core idea underlying PES, can sometimes be counterproductive because the rewards undermine the providers' pre-existing altruistic motives (e.g., Heyman and Ariely 2004). Thus, a lesson for REDD+ PES is to examine pre-existing local motives, and consider how payments could affect them.

Institutions. Institutional preconditions for PES are multifaceted. Here, I'll discuss four factors – markets, trust, transaction costs and land tenure.

First, PES are often mistakenly thought to require competitive markets. Yet, most PES are bilateral or multilateral contracts. Competition for providing services and, in particular, for buying services is limited. On the service provider side, there are some PES experiments with auctions. These 'simulated markets' aim to boost cost efficiency by keeping provider rents down through competition. Auctions have recently also been piloted in the tropics (Jack *et al*. 2009), but not, so far, for avoided deforestation.

Second, PES require trust between users and providers as they are entering into voluntary contracts. Especially in remote forests with weak governance – the main REDD+ scenario – service providers often suspect that PES contracts constitute hidden land expropriation. However, over time, intermediaries (e.g., NGOs, government agencies) may well overcome initial mistrust through negotiation and adaptive management.

Third, the institutional set up must keep seller and buyer transaction costs reasonably low (see 'Economics' above). Scenarios in which many smallholders hold complex, overlapping forest rights could be challenging for effective REDD+ PES schemes – unless these can be bundled into collective contracts, such as in Costa Rica (Box 17.2). One assessment of 13 PES schemes found that start up costs were relatively high, while recurrent transaction costs were moderate (<1–7% of total costs; Wunder *et al*. 2008b: 844–849).

Finally, service providers have to be, or become, land stewards with *de facto* exclusion rights. If they are unable to defend their land against third party intruders (e.g., loggers) or land grabbers (e.g., large-scale ranchers or squatters), then they cannot provide reliable services – and paying them may not buy the services stipulated. If land rights overlap, or are contested, similar problems arise. A worse scenario is where illegal deforestation is the first step in establishing *de facto* tenure rights on quasi open access public lands. In these cases, PES are simply not possible as there are no legitimate land stewards to pay.

This last institutional bottleneck is particularly binding in many forest frontier areas, where much of the deforestation worldwide is happening. A recent scoping study in the Brazilian Amazon found that only about one-quarter of threatened forest is governed by land tenure rules that are appropriate for PES (Börner *et al*. in press). However, Brazil recently accelerated clarification of land tenure in the Amazon. PES options might justify such acceleration, as in two Indonesian cases (Arifin 2005; Wunder *et al*. 2008a). However, clarifying land tenure on a large scale can be expensive, and if it is not effectively combined with other incentives, such as large-scale PES, it could *reinforce* deforestation by making investments in converting land use more attractive.

Lessons from PES experiences

How are PES programmes doing, and how can we learn from their experiences to inform REDD+? The previous section showed that PES is simple in principle, but can be institutionally demanding. This means that the distribution of PES programmes worldwide is uneven: PES have developed quickly in Latin America, are incipient in Asia and almost absent in Africa (Landell-Mills and Porras 2002; Huang *et al.* 2009; Ferraro 2009). In Africa, Ferraro (2009) cites obstacles on the users' side, such as the lack of water-user institutions and payment vehicles, and a low tax base that limits the funds available to implement public PES programmes. On the providers' side, rural population density in Africa is much higher than in Latin America (driving up transaction costs). In particular, there is less security of land tenure and there are more customary collective tenure systems with overlapping usufruct rights in Africa, which can make it more difficult than in Latin America to hold individuals accountable for complying with PES contracts. These factors may help explain why PES, like other more complex business arrangements, have not taken off in Africa. More generally, they may also indicate that forested countries and regions with under-developed institutions and weak governance will have difficulties in developing REDD+ PES systems.

Existing PES schemes range in size from 550 hectares, in Pimampiro, Ecuador (Box 17.1) to millions of hectares, such as in Chinese forest protection (56 million ha) and reforestation (24 million ha) programmes (Bennett 2009). Within PES schemes, there is a key distinction between user-led and government-led schemes, exemplified by Pimampiro (Box 17.1) and Costa Rica's national PES programme (Box 17.2), respectively. Most user-led schemes are small, whereas government-led schemes are usually nationwide. Table 17.1 summarises the features, and pros and cons of both types of PES schemes. Large-scale programmes tend to have lower transaction costs, affect larger areas, have better links with policies and deal more effectively with free riders, multiple-layer benefits and leakage – the latter being particularly important for REDD+. However, user-led, small-scale PES typically focus on specific services and do not get blown off course by political winds of change. They are usually designed through customised, participatory processes, and are thus more flexible and robust. Typically, they tend to be targeted to high threat, high value, low cost areas (see 'PES options for REDD+' below). Conversely, government-led PES schemes mostly pay a fixed amount per hectare, reducing cost efficiency. Government-led PES usually also have low conditionality and additionality. The overall advantage of government-led schemes over user-led schemes is in administrative cost efficiency; user-led schemes with high start-up costs can often only be sustained by external donors (Wunder *et al.* 2008b).

Box 17.1. User-led PES: watershed protection in Pimampiro, Ecuador

The 13,000 inhabitants of Pimampiro (northern Ecuadorian Andes) draw part of their drinking water from the 638 ha Palahurco upper watershed; however, advancing deforestation and degradation of forests and natural grasslands has been linked to increasing seasonal water scarcity and deteriorating water quality. Since 2000, a PES scheme has been set up jointly by the municipality, an NGO, a donor (which subsidised start-up costs, US $22,000) and a trust fund (US $15,000). Metered Pimampiro water users pay a 25% consumption surcharge. Although there are some free-riding water users, including irrigators, user fees still fully cover recurrent payments.

Nineteen upstream landowners – four-fifths of all families in the Nueva América Cooperative, representing 86% of the target area – have accepted quite low compensation payments to conserve natural forests and grassland. The payments are between US $6 and US $12 per ha per year, depending on the type of vegetation and the state of conservation. Given that remaining forest stocks are large (average contracted area is 29 ha) and that there has been slow previous clearing (about 0.5 ha/year), the payments seemingly make economic sense to them. The initial 5-year contracts were extended indefinitely in 2006.

The Pimampiro PES scheme fulfils the five criteria for a 'pure PES'. It is a voluntary agreement between at least one seller and one buyer over a well-defined service/land use proxy, in which payment is conditional upon delivering services. Initially, 23 of 27 upstream landowners joined the scheme. However, quarterly monitoring detected repeated non-compliance and nine landowners were excluded. Five of those have since rejoined.

One of the success factors is that the conditions that had to be met before payments were made very clear, compliance with the contractual conditions has been monitored and sanctions have been enforced with vigour when landowners failed to comply. Pre-PES (2000), 198 ha had been cleared or disturbed. By 2005, the area cleared or disturbed had been more than halved (88 ha) and timber extraction had ceased. In neighbouring areas outside the watershed deforestation has continued.

Interviews with participating households in 2002 indicated that they were better off because of the PES scheme. Water users also seemed satisfied that a potential threat had been mitigated. The co-implementing NGO (CEDERENA) withdrew some years ago, but has twice replicated similar small-scale municipal schemes in Ecuador (El Chaco, Celica), and has a handful of new schemes in the pipeline.

Sources: Echavarría *et al*. (2004); Wunder and Albán (2008)

Box 17.2. Government-led PES: forest conservation in Costa Rica

Costa Rica pioneered payments for conservation in developing countries. Forest Law 7575 (1996) had four purposes: 1) mitigation of greenhouse gas emissions; 2) maintenance of hydrologic services; 3) biodiversity conservation; and 4) protection of scenic beauty for recreation and ecotourism. The same law established a regulatory framework for contracting landowners to provide these services, as well as the semi-autonomous National Fund for Forest Financing (FONAFIFO) to manage the scheme.

To participate, landowners must submit a plan for sustainable forest management prepared by a licenced forester. Once the plan is approved, the conservation measures specified must be put in place. Conservation payments were initially fixed at US $64 per hectare per year in 2006, but higher payments were introduced for forests in strategic watersheds. After an initial upfront disbursement, all subsequent annual payments require verification of compliance.

Deforestation was already legally prohibited, but payments give incentives to go further than just obeying the law, e.g., for foregoing timber harvesting, area delimitation, firebreaks and active forest monitoring. To date, the programme has been funded primarily through a domestic fossil fuel tax (about US $10 million/year), topped up by a World Bank loan, grants from the Global Environment Facility and German Technical Cooperation and, since 2005, by a new water tariff.

About 10% of the country's forests are part of the programme, but the effects are difficult to assess. Deforestation had already levelled off before 1996, mostly because of less cattle ranching. Payments have been flat. The scheme did not initially target specific high-threat or high-service areas. Hence, several evaluations have found that the programme has not had much additionality: initially it has mostly paid for protecting forests that would have been conserved anyway. Nevertheless, the programme was politically tremendously important in making forest conservation more palatable nationally. As a pioneer case, it also served as a live laboratory, and over time has evolved significantly (more spatial targeting, differentiated rates) toward higher service effectiveness.

Sources: Pagiola (2008); Wünscher *et al.* (2008); Pfaff (personal communication)

Table 17.1. Features of user-led and government-led schemes for payments for environmental services (PES): pros (green) and cons (yellow)

Feature	User-led	Government-led
Design process	Participatory and negotiated	Top-down decision making
Flexibility	Locally customised, flexible solutions	Some standardisation of interventions necessary
Objectives	Clear focus on environmental problem facilitates targeted design	Political objectives (e.g., social, electoral) may overload goals and reduce environmental effectiveness
Transaction costs	Typically high, especially start-up	Typically enjoy administrative economies of scale
Impact	Innovations do not spread beyond the immediate area	Good ideas replicated and spread over large areas
Policies	Policy framework is imposed	Policies can be influenced by lessons learned
Effectiveness in going to scale	Ill-suited to deal with non-excludability (free riding, leakage)	Can charge 'wannabe' free riders, control for leakage and bundle/layer benefits to multiple beneficiaries

There is a partial overlap between these two PES types and the national architecture of external REDD+ funding mechanisms, i.e., fund-led versus market-based solutions (cf. Chapters 2 and 5). Most carbon market-led schemes have historically been 'user-led'. The Costa Rica government PES programme has, however, also attracted service user financing from the private sector (Box 17.2). Conversely, fund-led approaches could either finance discrete, location-specific programmes with clear carbon conditionality – in a similar way to user financing – or co-finance government PES programmes with multiple objectives. Hence, while most carbon market financing may be channelled through 'user-led' schemes, the two mechanisms are not clearly distinct.

PES options for REDD+

To what extent could PES become a major tool for REDD+ implementation on the ground? Assuming that governments get paid by global carbon markets or funds to reduce national deforestation, they might partially delegate reducing deforestation and corresponding carbon benefits to contracted landholders. PES could thus serve as decentralisation instruments for achieving targeted reductions in deforestation in forested regions. Present national-scale PES and PES-like schemes in developing countries, such as in China, Costa Rica,

Mexico, South Africa, Vietnam and recently Ecuador – and even in developed countries like Australia, European countries and the USA – can provide countries implementing REDD+ with information on what works and what does not work in contract conservation (e.g., Karousakis 2007).

For countries to choose the PES route for implementing REDD+, some basic local preconditions have to be met. Changes in forest carbon stocks must be monitored, payments must more than cover the costs, and conservation payments must motivate land stewards. These are conditions to keep in mind, but perhaps none of them should worry us too much. The killer condition is institutional, in particular the challenge of identifying land stewards with reasonably good control over clearly delimited lands. Weak governance predominates in forest frontiers, be it in the Amazon, Borneo or Central Africa, and typically goes hand in hand with ambiguous and insecure land tenure. In cases where, for example, indigenous communities have *de jure* recognised tenure but *de facto* weak tenure, PES could be combined with command and control investments to consolidate local land rights. PES can help us reform policies characterised by regulatory excess. Yet PES still crucially depend on minimum governance conditions (Bond *et al.* 2009), and thus cannot fully substitute for command and control measures. Furthermore, on some frontiers, the conditions are such that no land stewards can possibly provide reliable services, and it is better just to forget about PES.

Once key PES preconditions are met, or can with reasonable effort be created, we can turn our attention toward the design of REDD+ PES. Should REDD+ PES be user-led or government-led? Initially, a good share of REDD+ PES pilot schemes are likely to be user-led, e.g., through NGOs or intermediaries. This could be good, since user-led programmes are typically adaptive, flexible and diverse – advantages when it comes to learning lessons about implementation. In the medium term, user-led pilot schemes could be linked in 'nested approaches' to national level accounting, or supplemented by government-led national PES schemes (or both). However, some developing countries will lack the preconditions to implement national PES systems soundly, or they will not be able to implement them because the government lacks the capacity (e.g., corruption, no authority or presence in remote forests).

Ideally, REDD+ PES systems would take the best elements from the two PES worlds: they would combine the best features of pre-existing government-led schemes that people already trust and that provide economies of scale, with the best features of flexible state-of-the-art user-led PES schemes that do not put political 'patron–client' relationships above environmental efficiency. Four key clear-cut lessons for designing and implementing effective and cost-efficient PES schemes emerge (Wunder *et al*. 2008b; Wünscher *et al*. 2008):

1. **Apply hard conditionality:** monitor performance closely, enforce explicit sanctions for non-compliance and pay according to performance, preferably *ex post* to maintain leverage on the suppliers of services.
2. **Target high-threat areas:** spatial modelling, or even certain proxies, e.g., nearness to roads or markets, can tell us where the risk of deforestation is highest. Only PES in areas that are truly threatened will mitigate climate change.
3. **Target high-service areas:** other things (e.g., threats, costs) being equal, give priority to forests with high carbon densities, to maximise the potential for mitigation.
4. **Differentiate payment:** set payment rates according to the opportunity costs of service providers, the threat to the forest (point 2 in this list) and the potential of services to deliver mitigation (points 2 and 3). Ideally, this should be done through procurement auctions (Jack *et al*. 2009), but other methods to approximate costs may also reveal true costs and thus help in differentiating payments.

What about equity and other issues, such as the benefits of maintaining or enhancing biodiversity? Conditionality is key to PES, and there is no excuse for deviation from this criterion. Targeting exclusively high-threat areas can sometimes create moral hazard issues by rewarding only 'the bad guys' for turning into good guys. Rewards for those who have been 'good forest guardians' can boost political acceptance of PES and prevent perverse incentives emerging, although the latter have not really been a problem in PES so far. However, payments to those who have been good stewards should probably be low, because their opportunity costs are usually zero or negative. Targeting forests that have high carbon densities does not raise any concerns about equity and the additional benefits for biodiversity could, for example, trigger schemes that integrate environmental services with capturing carbon. Payments that only cover the costs of providing services would mean that providers gain nothing. Typically, payments must be sufficient to interest providers and help alleviate poverty, so a margin over and above provision costs may need to be paid. Conversely, fixed rates could put large rents in the pockets of poor, low-cost service providers and improve their welfare substantially. But low-cost providers are not always poor, so fixed payments for PES is also not recommendable as a poverty alleviation strategy, and efficiency losses can be dramatic. Fixed rates are often erroneously seen as equitable. In fact, customising payments according to opportunity costs distributes net benefits more equitably across providers, although total provider rents (and thus aggregate provider welfare gains) may be lower. Three or four different rates, set according to the different circumstances of providers, could be a reasonable compromise between full differentiation (i.e., pressurising

providers to receive the lowest acceptable payment) and fixed payments (i.e., maximising providers' welfare gains).

An additional concern with respect to equity and fairness is that tropical deforestation and degradation are often illegal *de jure*, but tolerated *de facto*. Hence, governments are understandably hesitant to pay landholders to obey the law, even one which does not work. However, the Costa Rican (Box 17.2) and other examples show that there are creative ways to circumvent this problem, such as subsidies for landholders who make efforts to comply with the law, even if they previously have not respected it.

Conclusion

Clearly, payments for environmental services can reduce deforestation and forest degradation. Payments for environmental services, or conservation by contract, prove to be fairly effective when payments depend on delivering results. If payment rates are set appropriately, PES can also be cost effective for reducing deforestation and forest degradation, although small-scale schemes may have high start-up transaction costs. Because they are voluntary and based on incentives, PES are more equitable for conserving forests than erecting fences or imposing fines.

That said, PES schemes must meet information, economic, cultural and institutional preconditions. In particular, forest stewards must have exclusive land rights. Many forest frontier zones, where deforestation is currently concentrated, do not meet this requirement. Where there is outright land grabbing, PES will not work. Clarifying land tenure can help establish conditions in which PES will work effectively. In some cases, a mix of collective and private incentives, and, in areas remote from markets, of cash and non-cash incentives (including enhanced land and resource rights), may be needed to customise PES to local sociocultural settings.

Like other conservation tools, PES face tradeoffs between effectiveness and efficiency on the one hand and equity on the other. A narrow short-term focus on 'the biggest carbon bang for the buck' could backfire by creating perceptions of unfair and unidirectional policies, and fostering political resistance. So far, in large-scale government-led PES, there has been too little focus on efficiency and effectiveness. The tendency is to get side-tracked by other objectives. REDD+ implementers can learn from past PES mistakes by putting the horse before the cart, while still striking a reasonable balance as regards equity and other objectives.