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## Brazil's Experience with Payments for Environmental Services

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## **Abstract**

Since 2006, there has been an explosion of Payments for Environmental Services (PES) projects in Brazil, as well as efforts to pass PES laws at federal, state, and municipal levels. Even in this short period, an extraordinarily rich range of experiences has developed, with examples of the application of PES at a variety of scales, ranging from microwatersheds to entire states; in a variety of contexts, from remote forest frontier areas to the periurban fringe of megacities like São Paulo; and using a variety of approaches, using direct payments by users, sales to regulated and voluntary carbon markets, government funding, and mixes of these approaches. In this paper, we provide an overview of Brazilian PES efforts to date, and attempt to extract some initial lessons.

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## **Keywords**

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## **Cover photo**

Forest and agricultural areas surround a reservoir near Piracaia, São Paulo, that is part of the Cantareira System that supplies water to the City of São Paulo (Stefano Pagiola).

## **PES Learning Papers**

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The *PES Learning Paper* series disseminates the findings of work in progress to encourage the exchange of ideas about PES. An objective of the series is to get the findings out quickly, even if the presentations are less than fully polished. The papers carry the names of the authors and should be cited accordingly. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the International Bank for Reconstruction and Development/World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent. The boundaries, colors, denominations, and other information shown on any map in this work do not imply any judgment on the part of The World Bank concerning the legal status of any territory or the endorsement or acceptance of such boundaries.

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## Introduction

Since 2006, there has been an explosion of Payments for Environmental Services (PES) projects in Brazil, as well as efforts to pass PES laws at federal, state, and municipal levels. Even in this short period, an extraordinarily rich range of experiences has developed, with examples of the application of PES at a variety of scales, ranging from microwatersheds to entire states; in a variety of contexts, from remote forest frontier areas to the periurban fringe of megacities like São Paulo; and using a variety of approaches, using direct payments by users, sales to regulated and voluntary carbon markets, government funding, and mixes of these approaches.

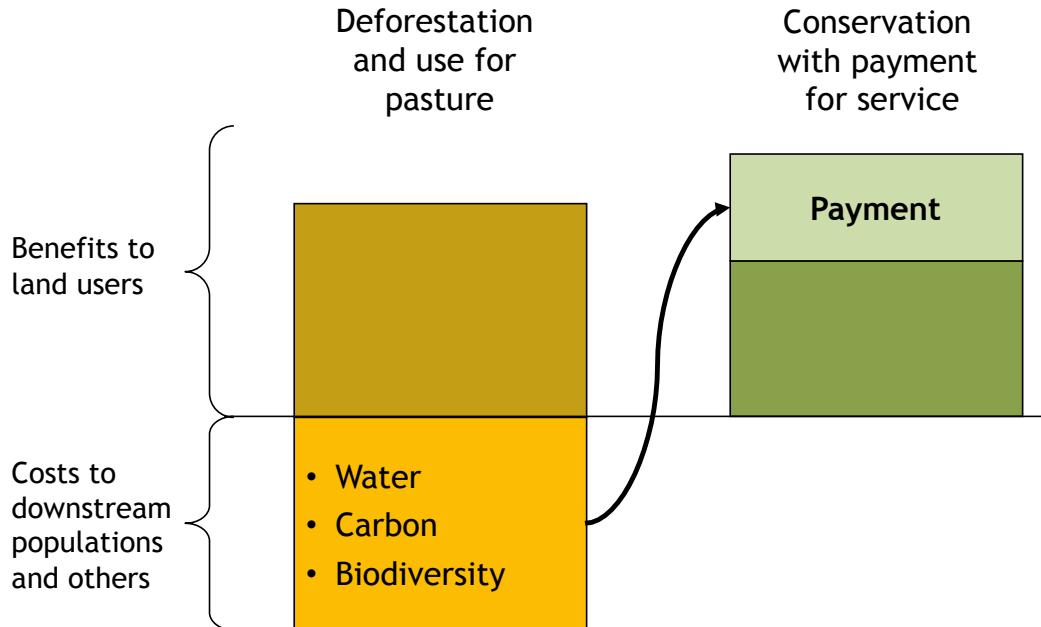
In this paper, we provide an overview of Brazilian PES efforts to date, and attempt to extract some initial lessons. It is based on cases presented at the Workshop on Payments for Environmental Services Experiences in Brazil organized by São Paulo's State Environmental Secretariat (*Secretaria de Estado do Meio Ambiente*, SMA) in São Paulo, on 29-30 March, 2011. The case studies have been published in Pagiola and others (2013).<sup>1</sup>

## Payments for Environmental Services

PES has been defined in many ways: sometimes very broadly to refer to almost any economic instrument for conservation, sometimes much more narrowly. Perhaps the most widely used definition is that offered by Wunder (2005). He defines PES as a voluntary transaction where a well-defined environmental service (or a land-use likely to secure that service) is being ‘bought’ by a (minimum one) service buyer from a (minimum one) service provider if and only if the service provider secures service provision (conditionality). Pagiola and Platais (2007) add the important qualification that the services being targeted in PES programs are those that provide indirect benefits: those that are externalities from the perspective of their providers. Consistent with these definitions, in this paper we focus on mechanisms in which direct, conditional payments are made to land users for conservation practices intended to generate benefits outside the property (such as protecting or improving downstream water supplies, sequestering carbon, or conserving biodiversity).

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<sup>1</sup> Throughout this paper, all information concerning specific cases was obtained from the relevant chapter of Pagiola and others (2013), unless a specific reference is made to another source.



Source: Pagiola and Platais, 2007

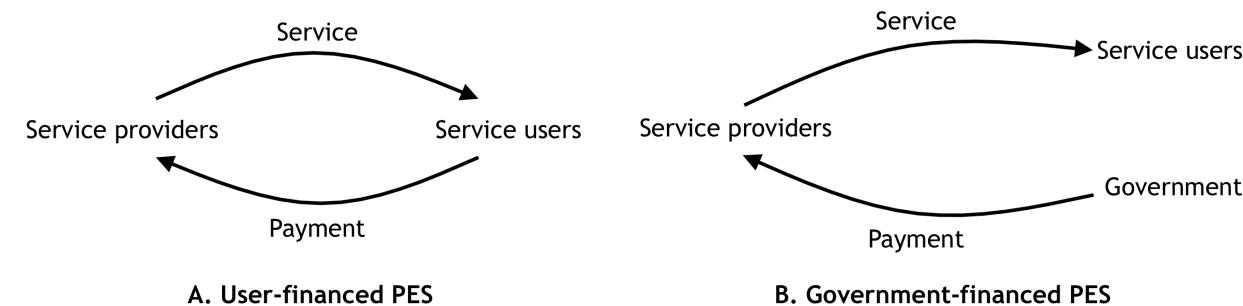
**Figure 1: The logic of PES programs**

Figure 1 shows the simple logic of PES. For the purposes of illustration, it shows a simple example in which landholders are faced with a choice between conserving a natural forest and managing it sustainably, or clearing it for use as pasture. The basic problem is that the benefits that landholders would receive from conserving the forest are often quite low compared to the benefits they would receive from converting it to another use. If they maintain the forest, they receive the benefits of harvesting timber and fuelwood and perhaps some other materials. Obviously, this is a very partial view of the benefits provided by forests. In addition to producing timber and other products, forests also often provide many other valuable environmental services, such as regulating hydrological flows, conserving biodiversity, or sequestering carbon. But landholders receive few or none of these services. Hydrological benefits, for example, often do not accrue to local landholders, but instead to water users downstream.<sup>2</sup> Likewise, carbon sequestration benefits accrue to global society as a whole, through their effect on mitigating climate change. By ignoring these additional benefits of forest conservation (or, equivalently, the disbenefits of forest clearing), conversion appears to be more profitable than conservation from the perspective of landholders. So long as landholders receive no compensation for providing environmental services, they are unlikely to give them much consideration when making their land use decisions. PES works by transferring part of the benefits generated that forest conservation generates for downstream service users to landholders, thus making conservation become more attractive. The

<sup>2</sup> There are exceptions, of course. For example, landholders benefit from protecting springs from which they themselves obtain water.

payment must obviously be more than the additional benefit to landholders of the alternative land use (or they would not change their behavior) and less than the value of the benefit to service users (or they would not be willing to pay for it).

The PES approach is attractive in that it (i) generates new financing which would not otherwise be available for conservation; (ii) is likely to be sustainable as it depends on the mutual self-interest of service users and providers and not on the vagaries of government or donor financing; and (iii) is likely to be efficient in that it conserves services whose benefits exceed the cost of providing them, and does not conserve services when the opposite is true.



Source: Pagiola and Platais, 2007

**Figure 2: Types of PES programs**

There are two basic kinds of PES programs (Pagiola and Platais, 2007; Engel and others, 2008): user-financed PES programs in which service providers are paid by service users, and government-financed PES programs in which providers are paid by a third party, typically a government (Figure 2). User-financed PES programs are preferred in most situations because they are most likely to be efficient as service users provide not only financing but also information on what services are most valuable, can readily observe whether they are receiving the desired service, and have a strong incentive to ensure that payments are used effectively. Conversely, government-financed PES programs typically cover much larger areas, but are less likely to be efficient because governments have no direct information on service value or on whether services are being provided, and need to respond to numerous pressures that are often unrelated to the program's objectives.

PES has come into widespread use in Latin America. The earliest formal PES programs (though they did not use the name) were begun in Colombia's Cauca Valley in the mid-1990s (Echavarria, 2002), but PES really took off after Costa Rica instituted its *Programa de Pagos por Servicios Ambientales* (PPSA) program in 1997. Costa Rica's example led many other countries, as well as other actors concerned with natural resource management at many scales, to consider PES. By the end of the decade, there were over 150 PES and PES-like programs in operation in Latin America, conserving about 2.5 million ha, including national, government-financed programs in Costa Rica, Mexico, and Ecuador, and local, user-financed programs in most countries (Camhi and Pagiola, 2009).

User-financed PES programs have most commonly been for water services, where users are easy to identify and receive well-defined benefits (Pagiola and Platais, 2007). There are now numerous PES programs in existence that involve direct payments by various types of water users at a variety of geographic scales.

Carbon projects are a smaller, but rapidly growing group of PES programs. These projects seek to mitigate climate change by either reducing emissions through avoided deforestation or by sequestering carbon through reforestation and afforestation. The resulting emissions reductions are then sold either in regulated carbon markets, such as those established under the Kyoto Protocol's Clean Development Mechanism (CDM), or in voluntary markets. By 2010, a total of about 75 million metric tonnes of carbon dioxide equivalent (MtCO<sub>2</sub>e) had contracted in projects affecting almost 8 million ha in 49 countries, with a total value of about US\$430 million (Diaz and others, 2011). Voluntary markets dominate, accounting for about 83 percent of total carbon transacted, and 81 percent of total value.

Government-financed PES programs depend either on annual appropriations from the national budget (as in Mexico) or on revenues from earmarked taxes (as in Costa Rica). Government-financed programs can, in principle, target any environmental service deemed to be of social importance. In practice, they have also focused primarily on water services. The main window of Mexico's Payments for Forest Environmental Services (PSAB) program deals largely with water services (Muñoz-Pina and others, 2008). Costa Rica's PPSA program currently defines its eligible areas primarily on biodiversity criteria, due to early financial support from the Global Environment Facility (GEF) to the program, but is evolving towards a greater focus on water services (Pagiola, 2008).

## PES in Brazil

Over the years, a wide variety of mechanisms to promote conservation have been developed and applied in Brazil. Initial efforts focused on laws requiring conservation of environmentally sensitive areas such as riparian corridors; efforts to establish protected areas at the federal, state, and municipal levels. In the last few decades, these efforts have been complemented by a wide array of market-based instruments (Box 1).

Despite these many efforts, the scale and diversity of environmental problems has led to a continued search for new approaches. This search led the country to begin experimenting with PES in 2006. The PES approach, although it had by then achieved substantial adoption in Latin America, had not previously been used in Brazil, except in a few externally-financed carbon sequestration projects, such as the Prototype Carbon Fund's (PCF) Plantar Project in Minas Gerais (Kossoy, 2005). The municipalities of Extrema and Montes Claros, both in Minas Gerais, led the way with local PES programs in 2006. They were quickly followed by others, as well as by several states and many environmental non-governmental organizations (NGOs).

### **Box 1: Market-based instruments for conservation in Brazil**

**Ecological Value Added Tax.** Several states, beginning with Paraná in 1991, have incorporated the area under conservation in their formulas for allocating value added tax (*Imposto sobre Circulação de Mercadorias e Serviços*, ICMS) revenues to municipal authorities, partly to compensate them for the foregone revenue from such areas, and partly to foster increased conservation. States that have adopted the *ICMS Ecológico* have experienced a significant increase in the number and size of protected areas (May and others, 2002).

**Transferable development rights.** Under Brazil's forest law (Law No.4771 of 1965, replaced in 2012 by Law No.12651), landholders must maintain a minimum portion of their land under forest—the so-called Reserva Legal (RL). This portion ranges from 20 percent in southern Brazil to 80 percent in the legal Amazon. The Forest Reserve Quota (Cotas de Reserva Florestal, CRF) system, instituted in 2001 and reformulated in 2012 under Law No.12651, allows landholders with insufficient RL to meet their obligations by contracting other landholders to maintain areas greater than their own RL requirements. This approach attempts to minimize the opportunity costs of protecting a given amount of habitat, by shifting conservation to areas with equivalent value as habitat but lower value under agriculture (Chomitz, 2004).

**Private reserves.** Landholders who voluntarily place land under perpetual conservation, creating a Private Natural Heritage Reserve (*Reservas Particulares do Patrimônio Natural*, RPPN), are exempt from land taxes (Rylands and Brandon, 2005). To date, over 1,000 RPPNs covering almost 700,000 ha have been created (CNRPPN, 2012).

**Subsidies to sustainable production.** Beginning in Acre, a system of extractive reserves coupled with subsidies to sustainable production has evolved to help conserve valuable ecosystems by supporting economic activities that do not damage them. The best-known such program is the Acre's Chico Mendes Law, which subsidizes rubber tapping. The system of extractive reserves has spread widely throughout the country.

**Forest Replacement Associations (FRAs)** collect fees from consumers of forest products and plant forests to replace the harvested trees. FRAs originated in São Paulo and then spread to the rest of the country (Ceccon and Miramontes, 2008).

Figure 3 shows the distribution of current PES mechanisms in Brazil, based on information from a recent inventory (Pagiola and Camhi, 2011). The majority of mechanisms that focus on water services are found in the southern half of the country, while carbon sequestration projects are found more widely. Large-scale, state-wide programs are also being implemented or considered primarily in the southern part of the country, with the notable exception of Amazonas with its *Bolsa Floresta* program.



Source: Based on data in Pagiola and others (2013) and Pagiola and Camhi (2011).

**Figure 3: PES mechanisms in Brazil**

The current area under conservation in PES programs is still small, accounting for less than 50,000 ha.<sup>3</sup> For comparison, Costa Rica's PES program has about 340,000 ha under conservation contracts (Pagiola, 2008), and Mexico's has over 2.2 million ha (Muñoz-Piña and others, 2008). The figure for Brazil does not include the *Bolsa Floresta* program in Amazonas, as this program makes payments on a household basis rather than an area basis. *Bolsa Floresta* is being implemented in 14 Conservation

<sup>3</sup> Counting areas enrolled under PES programs is always difficult, partly due to the limited data available, and partly due to differences in what is being reported. Some sources cite newly enrolled area, others cite total current enrolled area, and yet others cite cumulative enrolled area since program start (including areas that are no longer enrolled), but often without specifying what is being used. There are also differences in how programs define areas enrolled. Extrema's *Conservador das Águas* program, for example, counts the entire area of participating farms, whereas most other programs only count the specific portions that they are intervening in.

Units (*Unidades de Conservação*, UCs) covering over 10 million ha. It currently makes payments to over 7,000 households.

### **Water services**

As in most countries, the bulk of PES programs in Brazil focus on water-related services, such as improving water quality, regulating water flows, and reducing sediment loads. They are listed in Table 1.

**Table 1: PES programs in Brazil focusing on water services**

Programs	Estado	Year started	Area enrolled <sup>a</sup> (ha)		
			Conservation	Restoration	Total
<b>Under implementation</b>					
Conservador das Águas - Extrema	Minas Gerais	2006			2656
Projeto Ecocrédito - Monte Claros	Minas Gerais	2006			1479
SOS Nascentes - Joinville	Santa Catarina	2006		50	50
Projeto Oásis - São Paulo	São Paulo	2007	748		748
Produtores de Água e Floresta - Guandu	Rio de Janeiro	2009	4270	460	4730
Projeto Oásis - Apucarana	Paraná	2009	2999		2999
Manancial Vivo - Campo Grande	Mato Grosso do Sul	2010	2463		2463
Produtor de Água no PCJ	São Paulo	2010	525 <sup>b</sup>	87	612
<b>Under preparation</b>					
Produtor de Água no Rio Camboriú	Santa Catarina	2012			
Florestas para Vida - Vitória	Espírito Santo	2012			
Produtor de Água na Bacia do Ribeirão João Leite	Goiás				
Produtor de Água na Bacia do Ribeirão Pipiripau	DF/Goiás				

*Notes:* a. Most recent available data, generally for 2011.

b. includes 115 ha of soil conservation.

A notable aspect is the number of initiatives by local municipal water users. Two municipalities in Minas Gerais, Extrema and Montes Claros, were the first in Brazil to establish PES programs aimed at protecting watershed services. They have since been joined by Joinville and Camboriú (Santa Catarina), Apucarana (Paraná), Campo Grande (Mato Grosso do Sul), and Guandu (Rio de Janeiro). Many others are in the planning stages, including state capitals such as Vitória (Espírito Santo) and small rural towns such as Guaratinguetá (São Paulo).

Water-related services are also a major focus of state programs. Espírito Santo's *ProdutorES de Água* program focused exclusively on water services, for example (however, the *Reflorestar* program which has recently replaced *ProdutorES de Água* takes a broader focus). São Paulo's incipient PES program, although it is based on the state's climate change policy, also has a strong focus on water services, notably in its *Mina d'Água* pilot program.

Unusually, there is also a water-related PES program with voluntary buyers: Fundação Grupo Boticario in collaboration with the Mitsubishi Corporation makes payments to landowners who preserve natural areas on their land in one of the watersheds serving metropolitan São Paulo. The project currently covers about 750 ha. Although it has not succeeded, so far, to convince São Paulo's water company (*Companhia de Saneamento Básico do Estado de São Paulo*, SABESP) to participate, it has succeeded in Apucarana, a small city in Paraná, where the project covers about 800 ha, with financing from the local company (*Companhia de Saneamento do Paraná*, SANEPAR).

As in other countries, watershed PES programs in Brazil tend to be relatively small, usually ranging between 1,000 and 3,000 ha. As can be seen in Table 1, programs the bulk of area enrolled is under conservation contracts. The areas devoted to restoration are substantially smaller, accounting for less than 5 percent of the total.

There is a great potential for growth in PES programs aimed at conserving and restoring forests and conserving soil. Brazilian water legislation, at the federal and state level, provides for charging for water user. Revenue generated by water fees was the primary source of financing for Mexico's PES program in its early years (Muñoz-Piña and others, 2008) and is helping expand Costa Rica's (Pagiola, 2008). Brazil differs from these countries, however, in that the revenue from water charges is managed by basin committees and not by the central government. As such, they are likely to result in more decentralized PES programs than in Mexico or Costa Rica. Some basin committees have already invested in PES, on a pilot basis. The Comitê de Bacia of Piracicaba, Capivari e Jundiaí (PCJ), for example, is supporting the PdÁ-PCJ pilot PES program in São Paulo. However, appropriate arrangements need to be put in place for this to occur on a larger scale.

### **Carbon services**

PES programs focusing on carbon span the range of modalities, including Clean Development Mechanism (CDM) projects under forest (for example, AES-Tietê, in São Paulo, which sequesters carbon through reforestation) and non-forest rules (for example, *Plantar*, in Minas Gerais, which generates emissions reductions by reducing the use of fossil fuels) and a range of projects aimed at the national and international voluntary carbon markets, some based on reforestation and some on avoided deforestation. It should be noted that there is a much larger number of projects in the country that are sometimes described as 'carbon projects'. Guedes and Seehusen (2011), for example, list over 30 such projects just in the Atlantic forest region. However, many do not appear to fit the definition of PES; rather, most appear to be traditional conservation projects that do not involve conditional payments to landholders.

São Paulo's *Mina d'Água* program is also nominally targeted on carbon services, as it finds its legal basis in the state's climate change policy (*Política Estadual de Mudanças Climáticas*, PEMC). Within the range of activities that contribute to

mitigating climate change, however, it focuses on those which also generate water benefits (as suggested by its name).

Similarly, many programs based on sales of carbon credits to the voluntary markets do so with the primary intention of helping to preserve biodiversity. This is the case of both the *Carbono Seguro* and Pau Brazil-Monte Pascoal Corridor projects, for example.

### ***Biodiversity services***

As in other countries, there are no PES mechanisms financed directly by biodiversity buyers. However, biodiversity conservation is a primary focus of Amazonas state's *Bolsa Floresta* Program. The SICC program in Santa Catarina, although nominally targeting water, biodiversity, and carbon services, is likely to appeal primarily to voluntary biodiversity buyers.

However, several active water PES mechanisms also have a secondary focus on biodiversity, often because agencies whose primary concern is biodiversity conservation, such as GEF and TNC, have played an important role in their formation. In the *Floresta para Vida* Program in Espírito Santo, for example, GEF is financing a program of short-term PES payments aimed at inducing the adoption of biodiversity-friendly production practices, as well as the initial costs of developing a program of long-term PES payments that will be financed by the water utility of Vitoria, CESAN. These complementary efforts hope to improve biodiversity conservation in one of the richest remaining areas of Mata Atlantica.

Likewise, several mechanisms use carbon payments primarily as vehicles to preserve biodiversity, including the *Carbono Seguro* and Pau Brazil-Monte Pascoal Corridor projects.

### ***State-level PES programs***

Several states have established state-level PES programs, and others are considering doing so. Amazonas led the way in 2007 with its *Bolsa Floresta* program, which began work in 2008. Espírito Santo followed in 2008, with its *ProdutorES de Água* program. More recently, Minas Gerais established the *Bolsa Verde* program, and São Paulo the *Mina d'Água* program as the first phase of a planned statewide program. Santa Catarina and Paraná have also passed PES laws and are in the process of establishing PES programs. Bahia is also discussing a state PES program and has formed a working group to prepare a proposal (de Souza, 2011). Acre's System of Incentives for Environmental Services (*Sistema de Incentivos a Serviços Ambientais*, SISA), established in 2010, also envisages the use of PES as part of a broad array of conservation instruments. These programs generally target a range of environmental services, but protecting water services is often the dominant focus, except for *Bolsa Floresta*, where carbon sequestration and biodiversity conservation are most important.

At present, there is no federal PES program *per se*, although the *Proambiente* program administered by the Ministry of Environment has some PES-like features

(Hall, 2008). However, the federal water agency (*Agência Nacional de Águas*, ANA) has a program of technical support to local water users wishing to develop PES programs to protect their water supplies—the *Produtor de Água* program (ANA, 2001). A draft law on a national PES policy is being debated in congress.

Large-scale programs usually have much larger areas enrolled than local programs. This is true in the case of Minas Gerais's *Bolsa Verde* Program, in which about 32,000 ha—by far the largest area of any Brazilian PES program. More surprisingly, Espírito Santo's *ProdutorES de Água* Program has only succeeded in enrolling less than 4,000 ha in four years. São Paulo's *Mina d'Água* Program is also off to a slow start.

### Distinguishing features of Brazilian PES mechanisms

Brazil's PES programs were able to build on experience of similar efforts in other Latin American countries. As a result, they share many common features with other PES mechanisms being implemented in the region. However, Brazil's PES programs were not simple copies, they also differ in several ways.

Payment levels are a critical feature of any PES program. Almost all PES mechanisms in Latin America use flat payments per hectare (at most distinguishing different land uses with different flat payments). Costa Rica's PSA program, for example, offered US\$63/ha/yr for forest conservation throughout the country (Pagiola, 2008).<sup>4</sup> In contrast, almost all Brazilian PES mechanisms use a formula to determine payments, sometimes explicitly and sometimes by using a formula to generate a table relating payments to specific ranges of environmental service and benefit conditions. Thus payment levels tend to be more closely proportional to expected benefits than in other Latin American countries.<sup>5</sup> The *Bolsa Verde* program in Minas Gerais is the main exception to this pattern, offering a flat R\$ 200/ha/year for forest conservation.

Brazilian PES mechanisms often use detailed land management plans prepared by technical teams and then submitted to applicants for approval and modification. In contrast, PES mechanisms in the rest of Latin America typically rely on broad guidelines for the actions that participants must undertake, or on land management plans developed by the participants themselves, which are then submitted to the PES program for approval. The Brazilian approach is likely to improve the technical quality

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<sup>4</sup> More recently, Costa Rica has introduced more differentiated payments, by offering higher payments in hydrologically important areas, for example. Within each area, however, payments remain flat.

<sup>5</sup> To our knowledge, the only other PES program in Latin America to offer payments proportional to expected benefits was the Silvopastoral Project implemented at sites in Colombia, Costa Rica, and Nicaragua from 2003 to 2008. The Silvopastoral Project used an environmental services index to assign points to different lands uses, and then paid for incremental points resulting from changes in land use (Pagiola and others, 2007). Follow-on, scaled-up PES program in Colombia and Nicaragua will also use a similar approach (World Bank, 2010, 2012).

of land management supported by Brazilian PES mechanisms, compared to that in other PES mechanisms, but at the price of higher costs, as discussed below.

While almost all PES mechanisms in Latin America make annual payments, Brazilian PES mechanisms almost always divide payments into several parts, with some even paying on a monthly basis.

There are also some distinctive features of individual programs that are innovative.

*Bolsa Floresta*'s approach of paying on a per household basis differs substantially from the otherwise universal practice of making payments on a per hectare basis. Several analysts have noted the potential difficulty of using PES in forest frontier areas such as the Amazon (Börner and Wunder, 2008; Pagiola, 2010). The *Bolsa Floresta* approach is one possible way to circumvent this limitation, and bears watching closely.

São Paulo's *Mina d'Água* program is implemented on the ground by local prefeituras. This differs from the approach taken in other large-scale PES programs of either establishing a separate entity dedicated to PES, as in the case of Costa Rica's National Forest Financing Fund (*Fondo Nacional de Financiamiento Forestal*, FONAFIFO) or Amazonas' Sustainable Amazon Foundation (*Fundação Amazonas Sustentável*, FAS) or assigning responsibility for PES implementation to an existing institution, as in the case of Mexico's use of its National Forest Commission (*Comisión Nacional Forestal*, CONAFOR) or Espírito Santo's use of its State Environment Institute (*Instituto Estadual de Meio Ambiente*, IEMA). By working through local authorities, São Paulo hopes to develop a PES program that is well adapted to local conditions.<sup>6</sup> National-scale organizations such as FONAFIFO and CONAFOR tend to use one-size-fits-all approaches which have often proven inefficient. On the downside, São Paulo's approach may have somewhat higher transaction costs due to lower economies of scale. The approach will also allow a gradual ramp-up of the PES program, by gradually adding more prefeituras, but not necessarily a rapid one. This will be particularly true as progressively weaker prefeituras enter the program.

Whether these innovations ultimately prove effective remains to be seen, but whatever the final verdict it is clear that Brazil has not limited itself to copying the experience of other countries, but has pushed the envelope in developing new approaches.

## Initial lessons and challenges

Brazilian PES programs are still young, and it will take some time before they can be properly assessed. Nevertheless, some initial lessons can already be discerned.

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<sup>6</sup> Part of the initial motivation for working through local authorities was that it solved the short-term problem of legal limitations on making direct payments to landholders. Under the *Mina d'Água* approach, payments are made to prefeituras; the prefeituras, in turn, use the funding to make payments to individual landholders. Legal changes now allow direct payments to landholders.

## **Legal aspects**

One of the principal obstacles to the introduction of PES in Brazil has been the legal restriction against public agencies being able to make direct payments to landholders. These restrictions are gradually being overcome by the introduction of appropriate legislation at the municipal and state levels. On a related issue, the draft federal law that is being discussed in the national congress addresses an important aspect of PES, by specifying that payments are not subject to tax.

Care must be taken in drafting the relevant legislation, however, as it can easily prove too restrictive. Espírito Santo, for example, found that its PES law, adopted in 2008, set a maximum payment for PES that only made participation attractive for conservation of existing forest, and not for restoration of degraded forest or deforested areas. To enable a broader use of PES, a second law was required. The important lesson is that, in general, it is best to leave details such as payment levels or eligible activities to regulations, which can be more easily changed than laws in light of lessons learned.

In São Paulo, PES was designed as a very flexible instrument. The decree regulating the PES program defined requirements, guidelines, and general conditions, as well as a menu of actions that can be included in PES projects, while SMA Resolutions define specific criteria for individual projects. This formulation allows the development of ‘customized’ programs, with rules designed for specific geographic areas or focusing on particular environmental services. Espírito Santo’s new *Reflorestar* program is also moving in this direction.

The fact that PES programs are being undertaken at multiple levels creates a need to harmonize these efforts - or at least to avoid them conflicting with each other. One concern here is over the draft federal law that would establish a national PES policy and a federal PES program. A national policy would be binding on state or municipal initiatives, and so must be drafted very carefully to avoid restricting current programs.

The relationship of PES programs to existing laws has often been a matter of intense debate. Should landholders be paid to do things they are legally obligated to do? PES programs worldwide have generally taken a pragmatic approach to this issue. Legal requirements have clearly failed to achieve their conservation objectives; indeed, continuing degradation despite legal requirements has been a primary motivation for the adoption of new instruments such as PES. Thus both Costa Rica and Mexico pay landholders who conserve their forests, even though deforestation is illegal in both countries (Pagiola, 2008; Muñoz-Piña and others, 2008). São Paulo has generally taken a fairly stringent approach to this issue, requiring participants in *Mina d’Água* to either be in compliance or sign an agreement to come into compliance in a specified time period. Espírito Santo is adopting a more flexible approach in *Reflorestar*, in which landholders who are not in compliance can still participate but face limits on the payments they can receive. As their compliance increases, their payments also increase - and continue to increase if legal requirements are exceeded. This approach creates incentives to come into compliance without requiring a

complete commitment to doing so from the beginning, which may well discourage many potential participants.

Compliance with non-environmental laws may also be an obstacle in programs administered by public agencies. Landholders who are in arrears on payments to the state may not participate in São Paulo's *Mina d'Água* program, for example. In contrast, Monte Claros' *Ecocrédito* program allows such landholders to participate, but stipulates that the payments they receive must first be used to clear their debts. In effect, participants are repaying their debts with environmental services. With this more flexible approach, everyone wins: the debtors, who clear their debts; the municipality, who recovers otherwise uncollectable debts; and the environment.

From a legal perspective, carbon projects that sell to the local voluntary market are relatively simple, as they amount to contracts between private parties. In other cases, the situation is much less clear. For example, the National Indian Foundation (*Fundação Nacional do Índio*, Funai), which oversees indigenous peoples affairs, has objected to carbon sales from indigenous territories.<sup>7</sup> It issued a statement that “considering ... the lack of regulation in the context of the national REDD mechanism, these accords have no validity” [authors’ translation].

### **Design issues**

Most programs focus on conservation of existing forest, but others also address restoration issues.

The main challenge likely to face conservation efforts is that of additionality—the extent to which PES increases conservation compared to what would have occurred in the absence of the program. Even in areas with high levels of deforestation, it is likely that some fragments of forest and other valuable ecosystems will remain, either because their value under alternative uses is low (for example, if they are inaccessible or if the soils are poor) or because they provide benefits to landholders (for example, if they protect a spring that supplies the landholder’s home). Offering payments to such areas would not, therefore, result in increased conservation.<sup>8</sup> For example, while some estimates suggest that about 38 percent of the conservation contracts in Costa Rica’s Program of Payments for Environmental Services (*Programa de Pagos por Servicios Ambientales*, PPSA) result in additional forest conservation (Tattenbach and others, 2006), other estimates suggest that as little as 1 percent of conservation contracts are additional (Pfaff and others, 2008). Careful targeting is needed to improve the efficiency of PES programs in such

<sup>7</sup> For example, the Paiter-Surui tribe has been developing the Surui Forest Carbon Project in the Sete de Setembro Indigenous Territory in the states of Rondônia and Mato Grosso. The project has been validated under both the Verified Carbon Standard (VCS) and Climate, Community and Biodiversity (CCB) Gold Standard (Rainforest Alliance, 2012). A legal opinion commissioned from Baker & McKenzie concluded that the Surui have carbon ownership rights (Katoomba Incubator, 2012).

<sup>8</sup> When forests are conserved because of legal requirements, there may also not be any additionality, but the situation is different, as the payments do compensate landholders for conservation, thus reducing opposition to the requirements and reducing the social costs that may be imposed on poor landholders.

situations.<sup>9</sup> São Paulo has also examined the potential for using reverse auction mechanisms to improve additionality (Hercowitz and Figueiredo, 2011), but this approach has yet to be tried in practice.

Beyond additionality, PES programs also need to worry about attracting participants in areas where environmental services are valuable but where alternative land uses are also attractive, resulting in high opportunity costs. In principle, payments for conservation should be at least as high as the net benefit from the most profitable alternative use.<sup>10</sup> Although the use of formulas makes direct comparisons difficult, payments for conservation range from about R\$ 100/ha/year to about R\$ 250/ha/year.<sup>11</sup> *Bolsa Verde*'s relatively high payment of R\$ 200/ha/year might explain its success at enrolling a large area in a short time. Offering high payments throughout a program area, however, risks exacerbating additionality problems, as well as being costly in budgetary terms. The use of formulas to vary payment levels depending on expected benefits is thus a very interesting innovation. It will be important to carefully calibrate the formulas so that they provide adequate incentives. Local mechanisms are likely to find this easier to achieve, as the range of conditions encountered in their area of operation is likely to be limited. Conversely, statewide programs are likely to struggle to find the right balance in their formulas. Addressing restoration is one of the main challenges facing Brazilian PES programs. As noted, to date enrolment in conservation contracts far outstrips enrolment in restoration contracts. One of the principal obstacles to restoration is its very high cost. PAF-Guandu, for example, has been spending an average of R\$ 33,000/ha for reforestation. In Guandu as in most programs, restoration is carried out directly by the program rather than by the participating farmers themselves. This is partly due to their high costs, and in some cases to legal limitations on paying landholders to undertake restoration. Some programs have been able to draw on separate funding to cover these costs. In Espírito Santo, the new *Reflorestar* program, which is taking over from the previous *ProdutorES de Água* program, is planning to pay farmers directly to undertake restoration, thus creating an incentive to reduce its costs.<sup>12</sup> São Paulo, which had earlier been prevented from using direct payments for restoration (World Bank, 2011), is making similar plans.

Combining carbon payments with water payments provides one possible avenue to overcome the high costs of restoration. Under this approach, the emissions credits

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<sup>9</sup> Note, however, that when areas provide particularly valuable services, using PES to conserve them may be justified from a precautionary principle perspective even if their risk of deforestation is low.

<sup>10</sup> What complicates matters in Brazil is that most of the areas targeted for conservation or restoration by PES programs should, by law, be conserved. Although legal conservation requirements have only been enforced to a limited extent, some landholders may be willing to accept payments lower than their opportunity cost to avoid possible fines for non-compliance with conservation laws.

<sup>11</sup> For comparison, Costa Rica's PES program pays about R\$ 130/ha/year, while Mexico's program pays about R\$ 80/ha/year.

<sup>12</sup> As noted above, this required a change in the state's PES law to allow for higher payments.

generated by planting trees would be sold on carbon markets, helping to offset the initial costs of restoration, and financing from water users would offer a long-term payment stream to offset the opportunity costs of maintaining the newly-restored areas under forest. Extrema already has such an arrangement in place, and it has also been discussed for possible future extension of PES in São Paulo. Worldwide, afforestation and reforestation are the most common type of forest carbon project, with over 14 million tCO<sub>2</sub>e being transacted in 2011 (Peters-Stanley and others, 2012). With economic conditions affecting the voluntary carbon market and uncertainty over the future of regulated markets such as the CDM, however, the scope for relying on carbon finance in the next few years is uncertain. The complexity of program rules poses further obstacles (BioCarbon Fund, 2011).

As noted above, one particularity of most Brazilian PES programs is that they rely heavily on technical plans drawn up by experts. This approach may well result in high-quality conservation plans, but it is costly and requires large numbers of trained personnel to execute. The PdA-PCJ pilot program in Moinho and Cancã watersheds in São Paulo, for instance, required about 36 person-hours per accepted application, not including travel time. This may well be an important reason why Brazilian PES programs to date cover much smaller areas than their counterparts in other Latin American countries. Espírito Santo's *ProdutorES de Água* program, for example, enrolled less than 3,000 ha in its first three years. In contrast, Costa Rica—a country of similar size—enrolled over 200,000 ha in its first three years. As Brazilian PES programs seek to scale up to cover much larger areas, a compromise will have to be found between the quality of land management plans and the administrative and personnel costs of implementing the programs.

### ***Implementation arrangements***

Establishing appropriate and effective implementation arrangements is one of the greatest challenges in PES program design. After the actual payments, implementation arrangements are generally the most costly item.

Most local PES programs rely on existing municipal agencies or on local NGOs to implement their programs in the field. Extrema's Department of Urban Services and Environment (*Departamento de Serviços Urbanos e Meio Ambiente*) already had a long history to working on conservation when it adopted the PES approach. In Guandu, the program was supported from its inception by the *Instituto Terra de Preservação Ambiental* (ITPA), one of the largest environmental NGOs in the state of Rio de Janeiro. Whether suitable organizations exist in an area is likely to play an important role in the future expansion of local PES mechanisms.

State programs have also tended to rely on existing agencies, such as the State Institute for the Environment and Water Resources (*Instituto Estadual de Meio Ambiente e Recursos Hídricos*, IEMA) in Espírito Santo. The difficulty of adding staff to IEMA has proven to be an important bottleneck in the expansion of the *ProdutorES de Água* program, however. São Paulo's decision to rely on local municipal authorities for its *Mina d'Água* program represents an innovative approach to the need for appropriate field implementation arrangements, as noted above. This has not proven

as easy path, so far. The state's SMA has devoted considerable efforts to training participating municipal authorities; even so, the program has suffered many delays. Problems are to be expected with any innovative approach, however, particularly in its early days.

### ***Monitoring and evaluation***

The need for strong monitoring has often been identified as one of the main weaknesses of PES programs worldwide (Pagiola and Platais, 2007; Wunder and others, 2008). As in other countries, all Brazilian programs rely on direct monitoring in the field to ensure compliance (and then release payments). The primary concern here is to ensure that monitoring is effective at detecting non-compliance while costing relatively little. The use of frequent (more than once a year) on-site inspections in some PES Brazilian programs may well result in high administrative costs as well as in personnel bottlenecks limiting program expansion.

While all PES programs worldwide monitor compliance of participants with contract conditions, few adequately monitor actual environmental benefits. Unfortunately, this appears to be true of most Brazilian PES programs, as well. This is partly due to the technical difficulty of monitoring highly variable services such as water flows, and partly to a general lack of understanding of the need for impact evaluation. Given the incipient experience with PES in the country and the innovative nature of many of the programs, it is unfortunate that few programs—not even those which are explicitly intended as pilots—have put in place arrangements for rigorous impact evaluation. São Paulo's *Mina d'Água* and Espírito Santo's *Florestas para Vida* programs are among the few exceptions, but strong monitoring and evaluation arrangements should be incorporated into other current and future PES programs as well. Unfortunately, many have already lost an important opportunity for such impact evaluation, by failing to collect data on a suitable control group.

## **Conclusions**

Brazil has developed a wide range of innovative conservation tools over the years, including the Ecological Value Added Tax, transferable development rights, private reserves, subsidies to sustainable production, and forest replacement associations. Although PES approaches have only been added to this toolkit relatively recently, Brazil is now moving ahead rapidly in this field, particularly at state and municipal levels, and the possibilities for scaling up existing pilots and replicating this experience in other parts of the country and elsewhere, incorporating the lessons that are being learned in the process, are significant.

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