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PAYING FOR ENVIRONMENTAL SERVICES: THE CASE OF BRAZILIAN AMAZONIA

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Abstract: Compensating natural resource users for the environmental services they supply is becoming an increasingly attractive policy option in a number of countries. Ranging from official carbon trading through the Clean Development Mechanism (CDM) of the Kyoto Protocol to more informal arrangements, payments for environmental services (PES) can offer financial incentives for promoting ecologically sound conservation and development practices. PES principles could be applied more widely in Brazilian Amazonia to help curb high rates of deforestation which are gradually undermining the region's capacity to supply key services such as carbon sequestration, biodiversity maintenance and water cycling, and to sustain people's natural resource-dependent livelihoods. This potential could be especially significant if avoided deforestation were eventually to be permitted for acquiring certified emissions offsets under the CDM. Copyright © 2008 John Wiley & Sons, Ltd.

Keywords: environmental services; deforestation; livelihoods; Amazonia; Kyoto Protocol

1 INTRODUCTION

Providing financial compensation to natural resource-users for their contribution to the long-term preservation of the physical environment through 'payments for environmental services' (PES) has climbed high on the international policy agenda (UNDP, 2005; WRI, 2005; Stern, 2006). The search for new instruments such as PES has intensified with the gradual move away from a total reliance on punitive, command-and-control interventions in environmental policy, and towards a sustainable development approach which attempts to reconcile outright protectionism with economic activities to sustain the livelihoods of

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local populations. Paying people to conserve ecosystems for wider benefit rather than degrade them for individual, short-term gain has an obvious appeal. Not only are punitive systems based solely on negative sanctions notoriously ineffective in the context of developing countries with weak institutions and limited policing capacity. Providing financial incentives to the poor can generate income and employment for resource users while helping to conserve ecosystems, supporting local populations as major stewards of the environment.

Paying resource users to sustain vital environmental services adds a significant dimension to previous approaches by recognising that usually intangible functions, which have traditionally been considered 'free' public goods, have a value that can be measured in economic, social and ecological terms. The growing scarcity of these services as ecosystems come under pressure makes them tradable; they include, for example, biodiversity conservation, carbon sequestration, watershed management and maintenance of landscape beauty. They underpin environmental sustainability at local, national and global levels; a case of local action having global impacts and implications (Hall, 2005). Yet the PES approach also recognises that, as a contingent method, costs are incurred and trade-offs are inevitable as competing interests are reconciled through the making of compensation payments.

Brazil is becoming a testing ground for the design and application of environmental service payments, illustrating both the potential for this method as well as its pitfalls and limitations. Although still very much in its infancy, experiments with PES are being made in the southern industrial heartland (see below). Yet it is in the Amazon region where PES offers the greatest potential for simultaneously improving the livelihoods of poor resource-users while helping to reduce rates of deforestation and limit greenhouse gas emissions. Globally, deforestation is the source of about 20 per cent of greenhouse gases, the second largest contributor after fossil fuels. In Brazil, however, where Amazonia covers almost two-thirds of the surface area, deforestation and associated burning was responsible for over 70 per cent of the country's CO₂ emissions by the early 1990s and this proportion has increased since then (UNFCCC, 2005a; Stern, 2006). The strategic targeting of PES policies on critical areas of settlement and deforestation in Amazonia could, therefore, help slow down the region's persistently high rates of destruction and maintain key environmental services generated by the standing forest.

The main market in environmental services involves greenhouse gas emissions trading, principally for the purpose of carbon sequestration. In terms of international financial flows, the potential role of forests (Amazonia in particular) in averting global warming is especially significant (WRI, 2005; Stern, 2006). Based on article 12 of the Kyoto Protocol, forest carbon projects entered the policy arena via the Clean Development Mechanism (1997) of the 1992 UN Framework Convention on Climate Change (UNFCCC). For the first commitment period (2008–2012), the CDM has set a mandatory combined emissions reduction target for industrialised countries of 5 per cent below 1990 levels. Individual country targets vary, while the US and Australia infamously refused to sign up.

Within the CDM, Northern enterprises producing 'excessive' greenhouse gases may offset their surplus by purchasing credits from organisations that under-produce such emissions, moving towards 'carbon neutral' status in due course. In their turn, although not yet bound to specific targets by the CDM, developing countries have begun to sell carbon credits to northern enterprises. In the forest sector such trading is based on environmental services generated by the restoration of degraded lands and reforestation projects. Controversially, the maintenance of standing forest ('avoided deforestation') is not at

present included in the CDM as a vehicle for the acquisition of carbon credits.¹ This restriction has major implications for Brazil's future participation in carbon trading markets.

A growing number of industrial enterprises are entering into voluntary agreements outside of the Kyoto Protocol. This 'informality' has the dual advantage of allowing companies to test how the system works for future reference and to strengthen their 'green' credentials. According to the World Bank, the value of carbon trading has grown from US\$10 billion in 2005 to US\$30 billion in 2006 (Capoor and Ambrosi, 2007). These credits were purchased mainly by rich countries under the EU Emissions Trading Scheme (US\$24.3 billion) and to meet their obligations under the CDM (US\$4.8 billion), but voluntary offsets have grown to reach US\$100 million in 2006. Not just industrial enterprises but also banks, airlines and other companies are joining the fray through trading channels such as the Chicago Climate Exchange and the New South Wales Market (Bayon *et al.*, 2006; Capoor and Ambrosi, 2007).

2 PAYING FOR ENVIRONMENTAL SERVICES

It has been established that natural ecosystems provide services which benefit humanity, thus possessing both intrinsic and potential economic value (Daily, 1997; Daily and Ellison, 2002). In the case of Amazonia, arguments have long been put forward for the more rational use of economic instruments to promote sustainable forest management to attend to the basic needs of local populations and wider interests (Fearnside, 1989, 1997). In order to harness this value, making PES is based on the principle that the external beneficiaries of such services may make direct, contractual payments to local landholders and resource-users in return for adopting practices to restore and sustain ecosystems. By providing incentives to both suppliers and consumers of environmental services, PES hopes to encourage ecosystem preservation in situations where traditional command-and-control methods are on their own unlikely to work properly.

The PES approach has certain distinctive features which make it broadly appealing to stakeholders (Wunder, 2005). In principle, it has the following advantages: (i) *Voluntarism*. Unlike conventional 'fences-and-fines' policies, PES is essentially a voluntary, negotiated framework between those who supply environmental services and those who exercise demand for them. However, the principle of payments can also be built into more traditional, obligatory conservation policies to reward service suppliers; (ii) *Quantification*. In order for payments to be calculated, services should ideally be quantifiable; for example, in terms of tons of carbon stored, area reforested, deforestation avoided or volume of clean water supplied; (iii) *Contingency-based*. Payments to service providers are conditional upon a continuous supply being maintained and upon monitoring of compliance within negotiated agreements; and (iv) *Flexible format*. PES schemes may adopt a number of formats. They are mainly area-based (for example, protected conservation units and catchments or forest-carbon plantations). Increasingly, however, they are product-focused around 'green' or certified items such as sustainably managed timber, forest fruits or ecotourism. There is no guarantee, however, that revenues generated will feed back into ecosystem maintenance. Schemes may be publicly managed (as in the case of Costa Rica mentioned below) or, far more typically, involve mixed arrangements embracing partnerships of communities, government agencies, private companies and NGOs.

¹In the CDM, the only eligible activities under the 'land-use, land-use change and forestry' (LULUCF) category are reforestation, afforestation and forest management. An industrialised country is allowed to offset no more than 1 per cent of its base-year emissions through CDM forestry projects. In practice, such projects have not proved to be a popular option and they are expected to account for just 0.22 per cent of CDM credits by 2012 (Karaousakis, 2007).

By 2004, some 300 PES schemes had been identified around the world, located principally in the industrialised countries (Mayrand and Paquin, 2004). At September 2007, almost 800 projects were registered under the CDM, with a further 78 having requested registration and over 2100 more in the pipeline (UNFCCC/CDM, 2007). India has the largest proportion of registered schemes (35 per cent), followed by China (15 per cent), Brazil (14 per cent) and Mexico (11 per cent). In addition, other projects are funded through an increasingly large, informal carbon market (Bayon *et al.*, 2006).

Costa Rica boasts the world's only national PES system. Introduced in 1996, it rewards landowners for conserving forests through reforestation and maintenance of existing areas. Industries compensate their carbon emissions through a tax on fossil fuels and purchase of carbon offset certificates, the revenue from which helps fund the PES programme. Initial support was received from the World Bank and the Global Environmental Facility (GEF). The scheme now covers some 10 per cent of the country and benefits around 8000 landowners engaged in forest protection, management and reforestation over 500 000 hectares, at a cost to date of US\$120 million (Zbinden and Lee, 2004; Karaousakis, 2007).

Apart from Costa Rica's national PES programme, other experiences in the South are limited to a relatively small number of projects in Latin America and elsewhere (Landell-Mills and Porras, 2002; McShane and Wells, 2004; Grieg-Gran *et al.*, 2005). For example, in the Cauca Valley, Colombia, downstream sugarcane growers affected by flooding pay poor upland farmers to protect the watershed, reducing damage and bringing development benefits to the communities. From 1995 to 2000, some \$1.5 million was generated for investments in the uplands. Mexico's pioneering programme of payments for environmental hydrological services (PEHS), introduced in 2003, protects over 600 000 hectares of cloud forest and lowland rain forest in both private and collective (*ejido*) areas (Karaousakis, 2007). China's sloping land programme, started in 1999 to encourage planting in erosion-vulnerable areas, covers seven million hectares and is set to double in size (Chomitz *et al.*, 2007).

Although resource conservation and not poverty alleviation was the original, overriding objective of PES schemes, the idea has been seized upon for its potential to link environmental payments to the strengthening of local livelihoods (Grieg-Gran *et al.*, 2005; Murdiyarso *et al.*, 2005; Wunder, 2005). Indeed, this 'pro-poor PES' concept is enshrined in the Millennium Development Goals.² The discovery of this potential is hardly surprising, given the fact that local inhabitants and resource-users, if provided with appropriate support, are arguably the most effective guardians of forests and other populated ecosystems. Although there is an issue to be considered when designing such schemes concerning equity versus efficiency (see below), research shows that PES payments can have a significant impact on the livelihoods of the poor and may contribute up to 40 per cent or more of household income (Wunder, 2005).

3 THE AMAZON CONTEXT

Deforestation is an increasingly serious problem in the Amazon. About three-quarters of Brazilian Amazonia comprises tropical moist forest, with the remainder consisting of savannah grassland (*cerrado*), largely on its southern fringes. In recent years, annual forest loss has averaged about 20 000 km²; in 2003–2004 it rose to 27 000 km², the second highest ever recorded (having reached 29 000 km² in 1995) but in 2005–2006 fell back to 13 100 m². A

²MDG Target 9, Goal 7 identifies the preservation of ecosystem services for 'equitable environmental management and poverty reduction'.

further 15 000 km² is damaged annually by forest fires and illegal logging (Nepstad *et al.*, 1999). Although just 17 per cent of Brazil's Amazon rainforest has been totally lost to clear-felling, half of the region has been affected by human activity, with currently intact areas in the west coming under growing threat. Forest fragmentation has led to further biodiversity loss owing to the reduced ability of small areas to support flora and fauna (Lovejoy, 2000).

It has been calculated that, at current rates of destruction, almost 50 per cent of the Amazon rainforest will have disappeared by 2050 (Soares-Filho *et al.*, 2006). Deforestation and forest fires in Brazil emit 200–300 million tons of carbon a year (reaching up to 500 tons per hectare annually in dense rainforest), while fossil fuels account for less than 100 tons overall. Climate change projections for the Amazon based on the HadCM3 model³ predict major forest die-back and savannisation of the region by 2050 at current rates of deforestation, leading to an average temperature rise of 2°–3°C and a rainfall reduction of 10–20 per cent (Cox *et al.*, 2004; Marengo, 2006, 2008; Greenpeace, 2006; Betts, 2008; Huntingford *et al.*, 2008; Nobre, 2008).

These disturbing figures attest to the steady erosion of Amazonia's natural resource base and the seemingly inexorable undermining of its ability to supply vital environmental services. Under the military regime from 1964 to 1985 an aggressive strategy of regional development was implemented, favouring large landowners and commercial enterprises but also encouraging small farmer settlement (Hall, 1989). Overall, medium and large-scale cattle ranching has been responsible for around 70 per cent of forest loss in the region, small-scale farming for some 20 per cent and commercial logging and mining for the remainder (Fearnside, 2005). Subsequent civilian governments have been equally supportive of settlement and commercial development policies that have led to consistently high rates of forest loss. Expansion of the highway network and soybean cultivation in the Amazon has recently added to such pressures (Fearnside, 2005; GTF, 2005; Greenpeace, 2006).

Deforestation rates in Brazilian Amazonia respond principally, at least in the short to medium term, not to environmental policy as such but rather to the macro-economic climate and the resulting financial incentives that encourage land speculation, ranching and farming. For example, the peak rainforest destruction year of 1995 reflects economic recovery under Brazil's *Plano Real* which encouraged investment, while the subsequent drop in deforestation during 1996–1997 was a response to the fall in inflation and land values (Fearnside, 2005). Similarly, the fall in deforestation rates registered during 2005–2006 has been attributed in large measure to the drop in commodity prices and US dollar, while the subsequent increase in forest loss has been put down to the increased price of soybean (ESP, 2007b). In terms of policies designed to directly control deforestation, the most successful strategy has arguably been the designation of protected areas. Some 40 per cent of the region is set aside under either the National System of Conservation Units—SNUC (including biological reserves, national parks, national forests and extractive reserves, amongst others) or as indigenous reserves.

Levels of legal protection vary considerably by state, ranging from the relatively intact and sparsely populated Amazonas in the west to long-settled, degraded and conflict-ridden Pará in the east of the region. Outright conservation has been relatively effective in preventing deforestation and maintaining environmental services, although serious problems remain with vigilance and law enforcement, including susceptibility to illegal logging and informal mining. Brazil's Forest Code (1965) requires that 80 per cent of forest cover on individual properties in the Amazon be maintained. Yet owners have no direct

³Hadley Centre Coupled Model, version 3.

economic incentive to do so and the law is frequently flouted as land is converted to pasture or other legally designated 'productive' uses requiring forest removal.

There is an urgent need for new policy instruments such as PES to be applied in Amazonia, complementing existing conservation measures, in order to create a more effective environmental policy framework. Since the Earth Summit (1992), increasing emphasis has been placed in Brazil and elsewhere on the incorporation of forest dwellers into programmes of environmental governance. These have typically been labelled under the rubric of 'integrated conservation and development projects' (ICDPs) such as terrestrial and aquatic extractive reserves, sustainable forest management, agroforestry initiatives and ecotourism. This move towards reconciling natural resource conservation with livelihood strengthening, or 'productive conservation' (Hall, 1997a), is still in its infancy but is finding greater space on the policy agenda. However, the provision of indirect payments to encourage conservation through ICDPs and similar schemes suffers from a number of problems. These include institutional complexity, high administrative and financial costs and poor sustainability (Ferraro and Kiss, 2002). Being a more direct form of remuneration to forest peoples, PES could help overcome some of these obstacles by generating longer-term income flows for participating groups in return for their conservation efforts. Yet as noted in the concluding section below, many operational challenges remain.

4 PES POTENTIAL IN AMAZONIA

Brazilian Amazonia, the world's largest remaining area of tropical rainforest, supplies environmental services which are vital for national and global climatic stability. Although calculating the economic value of environmental services is notoriously difficult, it has been estimated that in the case of Brazilian Amazonia such payments could generate between US\$500 million and \$2.5 billion a year in revenues which could be used for conservation (Fearnside, 2006a,b; The Economist, 2006). Farmers in the Amazon currently destroy rainforest to create croplands and pastures worth perhaps US\$200 per hectare. This same area could yield US\$10 000 in carbon payments at the EU price of US\$20 per ton for the average 500 tons of carbon emissions per hectare saved through avoided deforestation (Chomitz *et al.*, 2007). Yet even at far more modest prices, carbon payments could provide a powerful incentive for farmers to preserve forest.

Amazonia supplies the following major environmental services:

- (i) *Carbon sequestration and storage.* Carbon is stored in the biomass and soil, making up half of the dry weight of trees. Deforestation releases much of this as carbon dioxide (CO₂) and methane (CH₄) contributing to global warming. As already noted, deforestation is the second largest global source of carbon after fossil fuels. In Brazil itself, deforestation now accounts for almost 80 per cent of the nation's CO₂ emissions. Brazil is presently the world's fourth largest emitter of total greenhouse gases after the US, China and Russia (UNFCCC, 2005a, 2006a). As a vital carbon sink, Amazonia accounts for 38 per cent of total tropical biomass, while Amazon deforestation itself contributes significantly to GHG emissions. Slowing down deforestation could play an important role in curbing those very emissions and ameliorating the process of global warming.⁴

⁴Deforestation, 20 per cent of which occurs in Brazil, accounts for some 18 per cent of global GHG emissions, (Stern, 2006). Since in Brazil this is almost entirely due to forest loss in the Amazon it can be inferred that deforestation in Brazilian Amazonia is thus responsible for around 3.5 per cent of the world's emissions.

- (ii) *Biodiversity protection*. It is estimated that Brazilian Amazonia houses 20 per cent of the world's estimated 1.5 billion species (Capobianco *et al.*, 2001). Aside from its intrinsic value, this natural capital stock represents incalculable economic, social and environmental wealth which has not only huge commercial potential for the country but is essential for supporting the livelihoods of forest dwellers and local communities. Protection of biodiversity would automatically accompany forest maintenance as mutually dependent environmental services.
- (iii) *Water cycling*. The River Amazon contributes one-fifth of total global fluvial discharge into the oceans (Araujo Lima *et al.*, 1998). Deforestation substantially reduces the region's ability to recycle water vapour. Several studies have shown that local evapotranspiration accounts for a large proportion of Amazonia's rainfall, ranging from about half to over 80 per cent (Marengo, 2006). Deforestation can thus seriously affect water recycling patterns, giving rise to local and national impacts on the weather and result in negative feed-back loops which may lead to further forest die-back (as predicted by the HadCM3 climate change model mentioned above). The south-eastern state of São Paulo, for example, is dependent on the Amazon for 70 per cent of its rainfall in December (Fearnside, 2005). Any reductions due to deforestation will have serious repercussions, as has already been demonstrated during recent drought episodes and resulting power blackouts.
- (iv) *Landscape beauty*. Ecotourism is a fast-expanding field, with pro-poor ecotourism gradually establishing itself as a niche market catering for outsiders who wish to spend time living in traditional communities (Landell-Mills and Porras, 2002). Preservation of Amazonia's diverse ecosystems for tourism purposes by both larger operators and small communities offers a valuable potential revenue source with a built-in environmental service component. It can both help reduce deforestation and maintain biodiversity by providing an alternative income source.

As the second commitment period (2013–2017) of the Kyoto Protocol approaches, there will be intense pressure on major developing countries such as China, India and Brazil, currently amongst the world's top polluters, to go beyond ratification of the treaty and make firm commitments to emissions reductions. Brazil is gradually joining the emissions trading arena and has embarked on a number of carbon sequestration projects.

4.1 Existing PES Schemes in Brazil

4.1.1 Carbon projects

Brazil has the distinction of being home to the world's first project officially registered under the Clean Development Mechanism of the Kyoto protocol. The *Nova Gerar* landfill scheme, located in the industrial region of Nova Iguaçu in Rio de Janeiro, is funded through the Prototype Carbon Fund (PCF), managed by the World Bank. It will capture an estimated 2.9 million tons of CO₂ equivalent greenhouse gases by 2012. In the forest sector, experience has so far been limited to a handful of voluntary carbon sequestration projects based on reforestation of degraded areas. Three projects stand out, of which two are in the Amazon (May *et al.*, 2003; Grieg-Gran *et al.*, 2005).

The *Plantar* carbon project in Minas Gerais (situated outside of Amazonia) and funded through the World Bank's Prototype Carbon Fund aims to generate certified emissions

reductions (CERs) to maintain the use of charcoal in the pig-iron industry instead of switching to mineral coke, and to reforest 23 000 hectares with eucalyptus. It has, however, attracted much criticism.⁵ The *Peugeot* carbon sink project is intended to reforest 2000 hectares in the 'deforestation arc' in Mato Grosso. There is at present no intention to seek carbon credits under Kyoto but rather to improve the environmental image of the car industry (sequestering 0.5 million tons of carbon over a period of 100 years) and to gain experience in the emerging carbon market while encouraging forestry extension activities. Finally, the *Bananal Island* conservation project in Tocantins state around the Araguaia National Park has been set up to test the potential for carbon storage based on avoided deforestation, forest recuperation and conservation inside public parklands. In addition to these carbon projects, the private sector in Brazil is expanding its environmental actions in other ways. For example, the *Boticário* Foundation (Brazil's equivalent of the UK's Body Shop) has announced plans to pay US\$12 million over 10 years to landowners who conserve the Atlantic rainforest at the headwaters of Greater São Paulo's rivers (Nascimento Madureira, 2006).

4.1.2 *Proambiente*

The first three above examples of corporate-sponsored carbon sequestration are promising experiments in PES but they do not significantly touch upon the lives of local populations. Another initiative designed to compensate for environmental services rendered by the region's estimated 2.5 million small producers (including family farmers, extractivists, fishers and indigenous groups) in a total regional population of around 20 million is the 'Sustainable Development Programme for Rural Family Production in Amazonia' (*Proambiente*). Originally inspired by the non-governmental organisation IPAM, several pilot community schemes were set up from 2001 by the Federation of Rural Trades Unions (FETAGRI), a broad coalition of NGOs and small farmer organisations in search of an alternative development model that would offer policy options to reconcile conservation with livelihood support in Amazonia. Following consultation between civil society and government authorities, *Proambiente* was officially taken over in 2003 by the Ministry of the Environment (MMA, 2005).

Proambiente revolves around a 'Programme of Socio-Environmental Services' supported by a 'Social-Environmental Fund' to provide payments to small producers for environmental services rendered, as well as a Support Fund for technical guidance, extension, monitoring and certification, supplemented where necessary by production credit. Some 350 families in each of 11 'development poles' throughout Amazonia (about 4000 families altogether) were initially involved. Certification of sustainable local development practices would in theory allow each participating family to receive one-third of a minimum salary (about US\$35) per month as payment for environmental services supplied.

By late 2007, however, results of *Proambiente* were mixed. Only half a dozen of the projects were effectively operational and just 40 per cent of farmers in the scheme had received one-off payments, amounting to R\$650 (US\$325) per household, considerably less than that had been planned.⁶ Furthermore, because it has not yet been possible to establish a formal channel for government budgetary support to *Proambiente* as originally intended, emergency funding was granted through the G7 Pilot Programme. The

⁵Rural unions and environmental NGOs have opposed the inclusion of Plantar in the CDM on the grounds that it has had negative environmental impacts by lowering the water table and caused social tensions with local farmers. Other criticisms relate to its allegedly poor carbon storage potential and dubious baseline assumptions (EU, 2002).

⁶Comments on *Proambiente*, unless otherwise stated, are based on the author's interviews with project beneficiaries, local technicians and staff from the Ministry of the Environment and Ministry of Agrarian Development, during August 2007.

establishment of a proper financial mechanism has been hampered by the lack of legal recognition in Brazil at the federal level of the concept environmental services and of their economic value. This situation contrasts with that of Costa Rica and Mexico, for example, where a legal framework and government funding channels for their respective PES programmes were established from the outset. In Brazil, the problem is only now being addressed through several draft bills to Congress which aim to set up a 'National Programme of Environmental Services' or 'Green Fund' (*Bolsa Verde*) for small farmers to be financed through international donations. Provision is also being made to secure more permanent domestic funding for PES from the national budget.⁷

The state of Amazonas has stolen a march on the federal government by introducing the country's first PES legislation. Under its 'Law on Climatic Change, Environmental Conservation and Sustainable Development' (published in April, 2007), a monthly grant (*Bolsa Floresta*) of R\$50 (US\$25) will be made to over 2000 households in six 'sustainable development' protected areas within the state as compensation for their conservation activities, eventually extending to 30 such reserves (Amazonas, 2007). A US\$1 billion fund is to be established from domestic and international sources to finance the scheme over the long-term. The Amazonian state of Acre is also entertaining a similar idea and it is possible that, in future, state governments will assume an increasingly large responsibility for instituting PES systems.⁸

4.1.3 Ecological VAT

The 'ecological value-added tax' (ICMS-E) allocates 2.5 per cent of state VAT revenues to compensate regional governments for tax income lost due to the designation of standing forests as protected areas. Introduced originally in southern Brazil, it has also been applied in the Amazon states of Rondônia and Mato Grosso. The measure has encouraged conservation in states with high levels of protection (above 25 per cent) but it has tended to benefit larger landowners disproportionately (as in the Costa Rican case) and its potential as a mechanism for 'pro-poor' PES is currently being examined (Grieg-Gran, 2000; May *et al.*, 2002; IIED, 2006).

4.2 Potential PES Initiatives in the Amazon

Although the number of PES initiatives in Brazil is extremely limited, there is major potential for adding a service payment dimension to a range of existing 'productive conservation' projects in order to help them become more financially self-sufficient. In Amazonia, extractive reserves, agroforestry and sustainable forest management are related areas in which PES could help generate a more continuous income stream to make them more independent of the fixed project cycle and budget on which so many such projects are almost totally dependent, especially during their earlier phase. This perception found political expression at the second meeting of Amazonia's 'peoples of the forest' held in Brasilia in September 2007. The final declaration demanded that 'indigenous peoples and traditional communities should be remunerated with dignity for environmental

⁷These bills are being introduced by Deputies Anselmo de Jesus (PT-Rondônia) and Antonio Palocci (PT-São Paulo) as well as by the Ministry of the Environment.

⁸Discussions with Acre state government officials, August 2007.

services provided for Brazil and the world by preserved areas in the face of climate change' (Brazil, 2007).

The 'extractive reserve' (*resex*) was introduced onto the statute books in 1990 under the administration of President José Sarney. This followed the rubber tappers' campaign to defend their lands in southern Acre against encroachment by cattle ranchers, which culminated in the murder of their leader, Francisco 'Chico' Mendes in 1988 (Gross, 1989; Revkin, 1990; Arnt, 1994). As the first formal instrument in Brazil that attempted to reconcile forest conservation with strengthening resource users' livelihoods, it was a major landmark in environmental policy for that country (Hall, 1997a,b). The first four federal reserves set up in Acre, Rondônia and Amapá covered two million hectares, and by 2005 a further 32 had been created in Amazonia with more in the pipeline (IBAMA, 2006). *Resex* are jointly managed by local resource users and government agencies at federal or state level under a form of cooperative, private usufruct on 30-year leases. Yet although they have been quite successful in terms of containing deforestation, extractive reserves suffer from continuing problems of over-dependence on single products, weak management, lack of alternative income sources, poor levels of social investment and consequent out-migration, which can deprive reserves of the human resources necessary for vigilance and management purposes (Hall, 2006).

Agroforestry combines small-scale agriculture with the cultivation of perennial tree crops (Brazil nuts, fruits, resins, palm products, etc.), replacing slash-and-burn farming with sedentary production that minimises forest removal. Hundreds of such projects exist in the Amazon region, and it is estimated that 35 million hectares of degraded lands could be adapted for this purpose (Smith *et al.*, 1998; FAO, 1999). Agroforestry schemes have a highly mixed record of success, but the guarantee of a more stable income flow from environmental services could help many embryonic community schemes through their initial phases, as envisaged in *Proambiente*, discussed above.

Sustainable forest management (SFM) caters for the growing international and Brazilian market in certified timber. Brazil has 3.5 million hectares certified by the Forest Stewardship Council (FSC) of which half lies in the Amazon. Of the country's 62 certified operations, 22 are in Amazonia (two large-scale commercial companies and the remainder community-based). Brazil's Law on the Management of Public Forests (2006) is designed to expand this potential by promoting commercial and community concessions on 13 million hectares of publicly owned forests in Amazonia. Although general fears have been expressed about government capacity for monitoring of compliance with SFM guidelines, the law does for the first time recognise the use of standing forest as a 'productive' sustainable development activity and hence a source of environmental services which could in due course be sold.

In a region as vast as Brazilian Amazonia, the targeting of PES schemes in areas where they are likely to be most effective becomes a critical issue. Although PES schemes might be technically feasible, they may not be an attractive policy option everywhere. There may be little sense in pushing PES either in well preserved areas with relatively little anthropogenic pressure (such as Amazonas and Amapá), or in states where commercial pressures are so intense that PES cannot compete with logging, ranching and soybean farming (for example, in Mato Grosso or Pará). It is in 'middling' areas of competing interests where no single activity dominates in which PES may prove critical in tipping the balance in favour of conservation, providing incentives for more sustainable forms of development as a realistic alternative to large-scale forest conversion. Thus, in order to make PES more efficient, it would probably be necessary to target lands at high risk of

being lost rather than adopt an indiscriminate flat payment approach. However, the efficiency criterion would have to be weighed up against equality of access to PES. Research on avoided deforestation schemes in Mexican *ejidos* suggests that risk-targeted payments are more efficient environmentally speaking, but flat payments are more egalitarian (Alix-García *et al.*, 2003). In the Mexican case, it has been estimated that only 11 per cent of forests in the PES programme are high-risk (Karaousakis, 2007).

Establishing sources of revenue to fund PES schemes in Brazil is a major challenge. The Bank of Amazonia, berated over the years for favouring cattle ranching and big business over small producers, has an annual fund of about US\$1.7 billion for production which could be harnessed for PES (Arima *et al.*, 2005). Following the practice in Costa Rica, royalties could be charged on the activities of private companies in order to fund conservation. Under a new Brazilian government proposal, firms whose activities generate major environmental impacts would be required to pay 0.5 per cent of their turnover into an Environmental Compensation Fund (CI, 2006). The ecological VAT discussed above is another source, while the rural land tax could be reformed to reward conservation of forests rather than their removal as a sign of 'productive' activity (Haddad and Rezende, 2002). As already noted, new federal laws are planned to provide for the establishment of government funding channels for PES schemes such as *Proambiente*.

There is little doubt that funding for PES in the Amazon would have to draw on international sources to complement domestic financing. The inclusion of avoided deforestation under the Kyoto CDM during the second commitment period (2013–2017) is a clear option open to negotiators. However, the country's potential for capturing international payments as a source of funding for sustainable development is limited by the fact that there is strong resistance in some quarters to recognising the validity of avoided deforestation as a source of carbon credits. Although environmental organisations and community groups in Amazonia are strongly supportive of the idea, Brazil's Ministry of Foreign Affairs (*Itamaraty*) has opposed it on the grounds that national sovereignty and control over forest resources might somehow be compromised by undue foreign involvement. This has always been a delicate issue in the strategically sensitive Amazon region and the spectre of 'foreign interference' is periodically raised (Dreifuss, 2000). In response to a suggestion by the UK Secretary of State for the Environment that the Amazon rainforest should be 'privatised' in order to protect it, the Brazilian government responded unequivocally that the region is 'not for sale' (Folha de São Paulo, 2006; The Independent, 2006). President Lula himself made a similar declaration at the UN General Assembly in September 2007.⁹ Furthermore, the large European environmental NGOs have also been against the proposal, which has been seen as letting the US and other industrial powers off the hook in terms of reducing consumption of fossil fuels by allowing them to buy 'rainforest credits' (Fearnside, 2001). This position has also been shared by Brazil's Ministry of Science and Technology (ESP, 2007a).

However, these entrenched positions are gradually softening. One proposal based on the principle of 'compensated reduction' has been put forward (Santilli *et al.*, 2005). Countries choosing to reduce deforestation levels in relation to an agreed baseline would receive *post facto* compensation in the form of tradable carbon certificates that would generate income for promoting conservation and sustainable development. Two competing ideas were aired at the 12th meeting of the Conference of the Parties to the UN Convention on

⁹Claiming success for the federal government in reducing Amazon deforestation rates, he declared that, 'under no circumstances will Brazil forfeit its sovereignty nor its responsibility for Amazonia' (ESP, 2007c).

Climate Change (COP12) held in Nairobi in November 2006. The Coalition of Rainforest Nations (a block of over 30 developing countries headed by Papua New Guinea and Costa Rica) lobbied for the inclusion of avoided deforestation as a criterion for acquiring certified emissions offsets within global carbon emissions markets in addition to reforestation and afforestation (UNFCCC, 2005b; Heal and Conrad, 2006); Coalition for Rainforest Nations, 2006; Chomitz *et al.*, 2007). The issue of providing compensation for 'reduced emissions from deforestation' (RED), or maintenance of standing forest, is being considered by scientific groups under the aegis of the UNFCCC. Recommendations were considered at the Conference of the Parties (COP-13) held in Bali, Indonesia in December 2007, and the issue of RED is currently under consideration by the scientific body of the UNFCCC.

At COP-12 in Nairobi, Brazil's Minister of the Environment proposed the creation of a voluntary international fund supported by the industrialised nations to compensate countries for the 'effective reduction of emission from deforestation' rather than avoided deforestation or carbon stock maintenance (UNFCCC, 2006b: p. 3). However, serious doubts have been raised about the viability of a major voluntary fund such as that suggested by Brazil compared with market-based alternatives. A voluntary mechanism would have to compete for scarce official development aid in the forestry sector. Furthermore, donors would be reluctant to finance the scheme in the absence of verifiable measures of progress towards meeting specific targets in reducing deforestation.

5 CONCLUSION

PES ventures in Brazilian Amazonia have so far been limited to a handful of carbon projects, the ecological VAT and the incipient *Proambiente* programme for small farmers. It could also be argued that much of the funding channelled into sustainable development projects since the 1990s actually represents a form of indirect compensation for environmental services rendered; for example, the small projects (PD/A) component of the Pilot Programme to Conserve the Brazilian Rainforest (PPG7) in key activities such as agroforestry, support for extractive reserves, sustainable forest management, ecotourism and prevention of forest fires (FAO, 1999). Yet this funding is neither contingent upon the provision of quantified and monitored environmental services nor is financial support assured beyond the early years. Furthermore, the generation of environmental benefits is assumed to be an automatic by-product and there is no accounting system in place. *Promambiente* itself as well as the Amazonas state-level PES scheme could also be accused of the same shortcomings.

International cooperation to assist developing countries in preventing deforestation through carbon trading is now regarded as one essential vehicle for mitigating the impacts of global warming (Stern, 2006). While no panacea, it is increasingly seen as one viable policy option if appropriately conceived and implemented. Yet neither should PES be viewed through rose-coloured spectacles. Many problems must be overcome if its potential is to be realised.

A major first hurdle will be to establish appropriate funding mechanisms to finance PES initiatives on a sustainable basis. In the early stages, overseas development assistance has been instrumental in helping to kick-start PES schemes, as witnessed in the cases of Costa Rica and Mexico, for example, where the World Bank, the Global Environmental Facility (GEF) and bilateral donors have played a key role. Conversely, as discussed above, lack of government funding has created major problems for *Proambiente*.

Funding options for PES are on the increase internationally. Specialised funds already exist, such as the BioCarbon Fund, set up in 2004 as a private sector trust managed by the World Bank. The Bank's US\$128 million Community Development Carbon Fund (CDCF), a multi-donor Trust Fund, set up in 2003 to benefit the poorest countries, could be extended. The World Bank's proposed 'Global Forest Initiative' would bring together major conservation NGOs and the private sector, which would include a US\$300 million Forest Carbon Partnership Facility (FCPF) to pilot RED schemes. However, according to some observers, the potential for significantly expanding voluntary transfer payments (along the lines envisaged by the Brazilian government) to reduce deforestation is in reality extremely limited. Since foreign aid for the forestry sector has been in decline for over a decade, it is suggested that a project- or sector-based market approach could offer much greater possibilities to reduce emissions from deforestation (Karaousakis, 2007).

Yet even assuming that it is possible to generate sufficient 'willingness to pay' on the part of buyers—by no means a foregone conclusion—this is but the first step towards installing an effective PES system (Wunder, 2005, 2006; Karaousakis, 2007). The actual implementation of PES schemes faces many operational challenges in terms of setting up an appropriate legal framework and institutional structure, establishing a permanent funding mechanism and introducing appropriate implementation methodologies. The latter include, for example: (i) identifying those geographical areas where such payments are likely to have most impact on environmental service provision, (ii) estimating carbon emissions from forest conservation activities in diverse situations where the carbon content of forests may vary considerably, (iii) documenting or quantifying the value of environmental services against an agreed baseline to calculate payments, (iv) monitoring compliance with agreed targets and guidelines, (v) deciding how to distribute available resources while reconciling equity and programme efficiency in facilitating access to PES schemes—should large producers who are normally responsible for most deforestation be allowed to monopolise PES payments? (v) providing the required implementation capacity amongst stakeholders, including agricultural extensionists, community-based organisations, state officials and financial institutions, (vi) ensuring compliance and (vii) facilitating cross-sector collaboration amongst government and non-governmental organisations to promote an integrated approach in meeting the needs of resource-users.

An increasing number of countries seeking to conserve natural resources and support local livelihoods are experimenting with PES schemes. Although only Costa Rica has a national programme in place, many other nations are supporting individual projects and area-based programmes (Mayrand and Paquin, 2004; McShane and Wells, 2004). Brazil has been relatively slow on the uptake so far but RED discussions have widened the global response to climate change. The government has gradually warmed to the principle of PES and is supporting the idea of compensation for forest conservation, albeit through voluntary international funding rather than via market-based carbon trading. However, before such arrangements can be implemented, a number of problems would have to be resolved (Ebeling, 2008). These include concerns over 'market flooding' by a large volume of credits which would depress carbon prices, the causality issue of attributing changes in deforestation levels to government action (versus the impact of macro-economic forces such as international commodity prices) and the possible non-permanence of emissions reductions due to forest conservation as against reductions from fossil-fuel combustion.

However, even if agreement can be reached over these issues in a post-2012 policy scenario and if some of the legal, bureaucratic and logistical problems mentioned in the preceding paragraphs can be overcome, schemes such as *Proambiente* and *Bolsa Floresta*

will become increasingly popular as a form of providing direct conservation incentives to poor resource-users. Indeed, in such a large country as Brazil, decentralised, state-level PES projects could prove particularly effective if applied in strategic areas under growing threat of deforestation. While it would be a mistake to underestimate the difficulties involved, paying the people for their contribution to conservation and sustainable development promises to become a significant arm of environmental policy in the Brazilian Amazon.

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