

Utilizing Payments for Environmental Services for Reducing Emissions from Deforestation and Forest Degradation (REDD) in Developing Countries: Challenges and Policy Options

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I. Introduction

This paper from the Center for Clean Air Policy (CCAP) explores how models of payment for environmental services (PES) programs could be applied in the context of reducing emissions from deforestation and forest degradation (REDD). The paper discusses a range of key elements and issues that would need to be addressed to develop and implement a successful PES program to protect forest areas in developing countries. Evaluation of PES and related programs can provide useful lessons about the likely effects of alternative policies that might be enacted domestically to achieve national REDD goals in developing countries, under an international post-2012 climate change agreement.

In the three years since REDD was first put on the international climate change agenda, it has become one of the most important and challenging areas of deliberation in the negotiations. To date, much of the discussion in international and policy forums has focused on the design of an international mechanism to provide financial and other support to developing countries interested in undertaking REDD programs. A related and important issue concerns how such assistance can best be utilized within developing countries, and how detailed domestic policies that would be most appropriate and effective in this regard might be developed. PES programs have been employed in different countries to achieve a range of environmental protection goals, including forest protection, and have been cited as one of the key tools developing countries might consider as they evaluate their options for achieving national REDD targets in the future. There is thus an important need to explore and understand the major issues and challenges that would need to be addressed in implementing a PES program for REDD.

This paper is intended as a contribution to improving this understanding. Evaluating the specific policy issues related to the design of a PES framework for REDD implementation will help policymakers and academics to better understand the available options and the potential benefits, challenges and costs. In addition, some research indicates substantial possibilities exist in key developing countries for development of PES programs that are both cost-effective and environmentally successful (see for example Nepstad, D., et al. 2007). The implementation of streamlined and effective REDD programs will be a necessary component in the effort to meet international greenhouse gas (GHG) reduction and climate change objectives; PES programs can therefore play a pivotal role in their achievement.¹

This paper begins with a brief summary of REDD policy and the general structure of PES programs. The paper then presents a detailed discussion of key issues for consideration in the design of a PES program and potential policy options to address them. These issues include: baselines and additionality; eligibility of forest activities; monitoring and verification; definition of buyers and sellers; payment setting and structure; prevention of leakage;

¹ Many models indicate that global emissions must peak by 2020 in order to meet a 2°C target. In some, deforestation would need to be reduced by at least 50 percent by 2020 and global forest cover loss halted by 2030 at the latest (Communication from the Commission to the European Parliament, EU, 2008).

maintaining permanence; and relationship to development goals, co-benefits, and indigenous peoples. It concludes with some conclusions and considerations for policy implementation.

II. Background on REDD and Payment for Environmental Services (PES)

This section provides a brief introduction to potential REDD policy approaches, PES programs, and the relationship between the two.

A. STATUS OF REDD POLICY APPROACHES

Policymakers and researchers alike acknowledge that REDD can only work through a series of "financial incentives" designed to make maintaining standing forests more profitable and attractive to countries than the conversion of such areas for agriculture, timber and other uses. Most discussions of financial incentives to date have focused on global frameworks to be included in a post-2012 international climate treaty, such as approaches based on the carbon market, the Brazilian proposal for an international forest fund, and the CCAP Dual Markets approach. While many approaches assume that REDD would be based on national-level accounting for forest carbon, some researchers cite the need for efforts by actors other than central governments. One key example is the "Nested Approach" where countries would implement individual projects over time, eventually to build up to a national, large-scale system (Pedroni et al., 2007).

Regardless of the specific level of action (national, sub-national or project) envisioned, implementation of REDD will require local actions wherein intermediary actors work directly with landholders to avoid deforestation on precise parcels of land, with the associated carbon reductions included in the national or sub-national aggregate reduction. In this regard, recent discussions and actions with respect to REDD have included strategies for implementing REDD pilot projects on the ground, developing and testing measurement and verification methodologies, and working to build and enhance national and local capacity to undertake REDD projects in developing countries. One key example is the World Bank's Forest Carbon Partnership Facility, which to date has selected 37 countries in which to develop and finance REDD demonstration projects.

While mechanisms to ensure adequate financing for REDD projects and national deforestation programs have received a great deal of attention in international forums, recently an increased focus has been placed on efforts to identify and develop strategies to assist recipient countries in the design and implementation of REDD policies. In 2007, the Woods Hole Research Center released a report presenting bottom-up costs for implementing REDD in the Amazon (see Box 1). The centerpiece of this analysis is an evaluation of the compensation that would be required to encourage landholders to maintain and preserve forest lands. The report includes a proposal for differentiated funds based on the types of land targeted by the REDD program (public and private land, extractive reserves, indigenous

territories) which would be used to pay for opportunity costs, monitoring, management and social services. The authors acknowledge the need for an analysis of the specific form that a REDD program for Brazil might take. The Woods Hole and other similar reports thus demonstrate the need for a detailed discussion of potential policy options developing countries might employ to implement REDD internally. A payment for environmental services program is one promising alternative.

Box 1: Woods Hole Research Center's analysis of REDD payments in the Brazilian Amazon

In December 2007 at COP 12 in Bali, Indonesia, the Woods Hole Research Center released a major report, *The Costs and Benefits of Reducing Carbon Emissions from Deforestation and Forest Degradation in the Brazilian Amazon*. Using models developed for timber production, soy farming and cattle ranching, the authors conducted a bottom-up analysis of the opportunity costs of foregone profits from these activities associated with forest conservation. They estimate that the cost of preserving the remaining forests of the Brazilian Amazon would total \$257 billion over 30 years, an investment that would preserve 47 billion tons of carbon at \$5.5 per ton. Protecting only the forests remaining outside protected areas and excluding those with the highest opportunity costs (6% of these forests) is estimated to preserve 22 billion tons at a cost of just \$2.75 per ton.

Based on these results and land ownership patterns, the Woods Hole report proposes a REDD system for delivering payments through three fund components. A fund to compensate inhabitants of public forested lands, the "Public Forest Stewardship Fund," would support the indigenous peoples, rubber tappers and other groups that control 26% of the Brazilian Amazon's forests. The fund would compensate families with an annual equivalent of one-half the minimum salary (\$180 million annually), support them in patrolling the boundaries of their reserves (\$13 million), and enable smallholder families in government agricultural settlements to restore forests on degraded land (\$60 million). Payments would diminish over time. The "Private Forest Steward Fund" would compensate private landholders with legal title to their land. Landholders would receive partial compensation for maintaining 80% of the land in forest as required under current law, and 100% compensation for the opportunity costs on the remainder. Annual compensation would begin at \$9 million and rise up to tenfold after ten years. A third "Government Fund" (up to \$190 million annually) would support activities necessary to undertake the REDD program, such as monitoring, protecting and managing existing forests, development of a forest monitoring and licensing system, and providing additional support to forest stewards for improved health, educational, and technical support. The report concludes with suggestions for insuring the expected level of reductions is obtained and improving transparency, oversight and monitoring, but does not provide specific details on how such a system might be implemented. It indicates, however, that if a PES REDD system can be effectively implemented in Brazil, the overall costs may be relatively low.

Source: Nepstad, D., et al., 2007. *The Costs and Benefits of Reducing Carbon Emissions from Deforestation and Forest Degradation in the Brazilian Amazon*. United Nations Framework Convention on Climate Change (UNFCCC), Conference of the Parties (COP), Thirteenth Session, Bali, Indonesia. The Woods Hole Research Center. Available at: http://whrc.org/Brazilcarbonsupplement/assets/WHRC_Amazon_REDD.pdf.

B. PES OVERVIEW

While PES programs can take different forms, in general, payment for environmental services is a voluntary transaction wherein a well-defined environmental service is purchased by a buyer from a provider, if the provider agrees to safeguard the service. What is bought – the environmental service -- should be well-defined and, ideally, measurable. Payment may be made directly to buyers, although often payment is made through an intermediary. Buyers usually monitor compliance with the agreement, and provide the payment if and only if the environmental service is kept intact/provided. This proviso, known as conditionality, is an important distinguishing feature of PES programs (Center for International Forestry Research [CIFOR], Wunder, 2005, Occasional Paper n. 42, p.10-11).

Payments for environmental services can have more expansive goals that may involve development of institutions for monitoring and enforcement. An additional and important guiding principle for PES programs is the need for simplicity of performance payments, focusing on a small number of activities with the highest likelihood of success. According to Laarman (1995), these activities are selected to: achieve short- and long-term conservation on an ecosystem scale; provide clear incentives for residents to participate actively and protect their surroundings; discourage immigration to the region; and reduce sociopolitical conflicts over resources (as cited in Ferraro, P., 2000, p. 993).

PES is a different model than integrated conservation and development projects (ICDPs), which aim to promote conservation by introducing new, more sustainable economic activities in targeted areas. Ecotourism is a common example of an ICDP in forest areas (Honey, 1999). PES also differs from traditional command-and-control conservation approaches, where the government enforces protection of an area and which can occasionally displace those currently living on the land (Terbough 1999; Schwartzman et al 2000). Instead, PES is based on a user buying a service from the provider, conditional upon the provider effectively securing the service under a contract with a price agreed upon beforehand. PES programs thus explicitly acknowledge the existence of trade-offs between environmental protection goals and activities which are profitable (from an individual perspective) but environmentally damaging, and seek to provide incentives for individuals to abstain from the latter.

PES programs have been used to protect and preserve a range of environmental services including water, land and forests. A special issue of *Ecological Economics* (Volume 65, Issue 4, 1 May 2008) outlines 12 PES case-study programs (Wunder et. al, 2008), some of which apply to a REDD scenario. Nevertheless, PES is still relatively untested and these examples are among the only ones worldwide. The United States and Canada have long-standing PES programs for farmers to maintain land that is under pressure for conversion to agriculture. For example, the United States spends over \$1.5 billion each year on contracts to farmers and landholders to keep land out of production and encourage alternative land uses (Ferraro, 2001, p. 994). Fewer comprehensive PES schemes have been introduced in developing countries. Costa Rica's PES program for forest conservation, initiated in the 1990s, is one of the most studied (see Box 2). Similar programs have also

been undertaken in Brazil and Mexico. In Brazil, *Proambiente* was a cross-sector initiative of different ministries to incentivize small farmers in the Amazon to provide environmental services. These include the reduction or avoidance of deforestation and carbon sequestration (Hall, 2008). In Mexico, the Payments for Hydrological Environmental Services (PEHS) program was developed by the Ministry of Environment with the participation of the National Forestry Commission (Comisión Nacional Forestal, or CONAFOR). The environmental service targeted is watershed and aquifer protection, the overall goal being to develop markets for environmental services in Mexico.

Box 2: Case Study: Payments for environmental services for forest conservation in Costa Rica

During the latter half of the 20th century, Costa Rica's deforestation rate was among the highest in the world. Its primary forest coverage fell dramatically, dropping from 67% in 1940 to just 17% in 1983 (Sader & Joyce, 1988). Forest loss was driven by rapid expansion of the road system, cheap credit for cattle, and land titling laws that encouraged deforestation (Peuker, 1992). Conservation policies in later years slowed deforestation rates considerably, but the country's forests remained under threat from illegal logging and agricultural expansion. In 1996, the country adopted a new forestry law (No. 7575) that explicitly recognized the environmental services provided by forests. This law laid the groundwork for the introduction the following year of a new policy, the *Pagos por Servicios Ambientales* (PSA). The PSA program recognizes four environmental services provided by the forest: carbon fixation; hydrological services; biodiversity protection; and provision of scenic beauty. PSA goals are met through site-specific contracts with individual farmers, who are eligible to receive annual payments for forest protection, reforestation, sustainable forest management (discontinued in 2003), agroforestry, and natural forest regeneration (beginning in 2006).

In Costa Rica, since timber sales in national forests were made illegal, the available opportunities for income generation in forest areas have consisted mainly of pastures. Most PSA applications have come from small- to medium-size landholders (those with less than 300 ha), with intermediaries handling most of the applications. To apply for the PSA payments, private forest owners need to present a sustainable forest management plan certified by *regents* (licensed foresters). The National Fund for Forest Financing (*Fondo Nacional de Financiamiento Forestal*, or FONAFIFO), a semi-autonomous agency with independent legal status, disburses payments to land and forest owners after project approval. FONAFIFO selects sites that have a participation cost of less than the fixed program rate (originally set at \$40 per hectare) and that form part of a priority area (an area designated by program administrators as important for conservation/environmental services) (Karousakis, K. 2007 [OECD], p.25). Efforts have been made to charge various users for the services they are receiving, but the bulk of PSA program financing has been obtained from a share of the fossil fuel sales tax (about 3.5%) -- about US\$10 million a year or two-thirds of total program costs. The initial payment can be requested at contract signing, but subsequent annual payments are made only after compliance has been verified by the *regents*. Payment amounts are set annually, typically by adjusting the previous amounts for inflation. Participants receive payments for five years but commit to manage or protect the forest for 20 years. Those deemed to be in non-compliance forfeit further payments.

Continuation Box 2:

According to Ortiz (2004), from 1997 to 2003, more than 375,000 ha were included in the nearly 5,500 PSA contracts with a total cost of \$96 million (as cited by Karousakis, K. 2007, p. 21). By 2006, the area had increased to half a million ha, with at least 8,000 beneficiaries and about 10% of the country included in the program. Some studies have also found that PSA recipients have higher forest cover than non-recipients (Pagiola, 2008). The overall effectiveness of the program is difficult to determine, however. The PSA program was instituted at the same time as a package of other measures, including a ban on clearing forest. Changes in the profitability of livestock production had also reduced pressure to convert forests to pasture, particularly in marginal areas. In addition, many PSA participants stated they would have protected their forest even in the absence of the PSA program. Several studies indicate that many of the funded projects may not have been additional, given that the selection process does not consider differences regarding risk of deforestation and opportunity costs. The bulk of program benefits also tend to go to larger and relatively better-off farmers, those more familiar with the forest engineers in charge of promoting the program and with forestry-related subsidies. Costa Rica's national law also forbids using public funds to pay landholders who lack formal title, which discouraged participation of the poor early in the program.

Sources:

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Sader, T. Joyce, 1988. "Deforestation Rates and Trends in Costa Rica, 1940 to 1983." *Biotropica*, Vol.20, No. 1, (Mar. 1988), pp. 11-19.

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In the next section, we present key issues to be considered in the design and implementation of an in-country scheme to reduce deforestation and degradation in developing countries. This discussion assumes the necessary funds are available and provided from developed countries, through international institutions such as the UNFCCC or directly from governments. In this discussion, many of the examples given for illustration are focused on the Brazilian Amazon, but nearly all of the issues considered here would be applicable and important in the consideration of an appropriate design of a PES program for REDD in any country. This intention of this paper is to detail a range of potential policy options for addressing each of the issue areas discussed, and to encourage further analysis and discussion of the internal mechanisms that can enable the successful implementation of REDD in the post-2012 period.

III. Designing PES: Key Elements and Considerations

III.A. BASELINES AND ADDITIONALITY

The development of accurate and credible baselines is a crucial element of any PES scheme. For PES programs to work effectively, buyers of PES services must have confidence that they will actually receive the full value of the service they are paying for. In the REDD and climate policy context this has two key implications. First, accurate baselines are needed to ensure that the marginal costs of reducing CO₂ emissions from deforestation do not end up higher than expected (i.e. the total reductions are lower than estimated), which would reduce the appeal of REDD as a mitigation measure among developed countries and jeopardize future REDD investment flows to developing countries.² This would also increase the risk that international GHG reduction targets would not be met. The proof of additionality is also critically important in this regard, since non-additional activities (those that would have happened even without the project) essentially provide zero benefits at an infinite cost per unit. The inclusion of a large number of non-additional projects can thus undermine the credibility and effectiveness of a PES system significantly.

The development of local or regional REDD baselines within a country could be challenging in many cases. Techniques to measure existing carbon stocks and deforestation accurately and methods to estimate historical emissions have improved significantly in recent years, but while such techniques are necessary they are not sufficient. One key concern is the relationship between the baselines of individual REDD projects and activities and the national REDD baseline. In the UNFCCC negotiations both modeled (below estimated future BAU emission levels) and absolute historical (below a historical emissions level, potentially averaged over multiple years) baselines have been proposed. Brazil, for example, has proposed the use of a national historical baseline that would be a four-year average of a country's national LUCF emissions, taken over a ten-year period (Brazilian Approach, UNFCCC/SBSTA/2007/MISC.). The use of a modeled baseline would by definition make developing credible emission reduction estimates very challenging, but it should be kept in mind that the country need not use the same method for all REDD projects. It could instead elect to adopt a combination of the two depending on the situation. For example, a country might choose to use historical baselines for some projects, assigning reduction targets for high-value projects with large emissions reduction potential that would exceed each project's proportional share of the national target. This would then allow the country to include other projects that would use either a less aggressive historical level or a modeled baseline for the target, which it might want to do for reasons of necessity (e.g., meeting international agreements may require higher levels of reductions at some sites), equity, a desire to capture co-benefits such as biodiversity protection, or other concerns.

² It should be noted that while actions that reduce deforestation under national REDD programs will be credited with achieving emission reductions under historical or modeled future baselines, PES programs are designed to maintain existing forest carbon stocks. In this paper, references to "reductions" achieved under PES REDD programs should therefore be understood to refer to the contribution such programs would make (in combination with other REDD efforts) to reducing emissions overall.

Regardless of which type of baseline is used for crediting national REDD emission reductions under the UNFCCC, a country will need to decide how to set local reduction baselines/targets vis-à-vis higher-level (i.e. national) targets, and how to account for regional variability. If for example the national baseline was set at the average of the annual emissions from 1990-2000, should each individual project also use the same baseline period? This could be problematic in cases where the 1990 to 2000 emissions trend for individual PES REDD projects differed significantly from the national trend. For instance, in areas where local deforestation and/or emission rates were much higher than the national average in the past (on a proportional basis) but where present rates mirror the national average, program goals would be easier to achieve. In such cases the money spent under the PES scheme might be better spent on projects with larger reduction potential. Using modified baselines based on local conditions might be more effective, but would be more difficult to administer and would require a methodology for reconciling the reductions achieved at the local level with the national baseline.

Procedures for establishing additionality would also have to be carefully designed, to discourage sellers of REDD services from simply claiming payments for actions they would have undertaken anyway. This should be easier to accomplish in the case of mid- to high-cost activities where the difference between the forgone profits and the value of the activity paid for through the PES (e.g., keeping the forest intact) are relatively large. It will be more difficult in cases where the activities being avoided by PES payments are only marginally more profitable than conservation or other REDD activities, such as improved ranching and some annual crops (CIFOR N. 42, Wunder, S. 2005). In all cases, it is essential that payments are coupled with realistic estimates of other potential constraints based on detailed research of the existing and historical situation. For example, changes in international demand may lower commodity prices and reduce the profitability of cattle ranching, soy farming or palm oil production. In such cases it will be necessary to monitor recent trends prior to beginning PES programs. Other factors such as reduced access to credit, poor infrastructure etc. can inhibit development of forest areas and deforestation, which should be accounted for to establish additionality. Another example concerns areas where deforestation is already declining, or where expansion of agriculture into new forest areas with less fertile soil characteristics may lead landholders to curtail their activities even without PES payments. Countries will need to develop a detailed additionality methodology to address such circumstances.

III.B. DEFINING THE ELIGIBLE FORESTRY ACTIVITIES

Among the elements identified in the popular definitions of PES in the academic literature, the provision and purchase of a well-defined service is key. PES schemes have been proposed and implemented for a range of services, including forest preservation, water conservation and utilization, biodiversity conservation, and carbon sequestration. The latter is the goal of REDD; however, a number of forestry activities could enable a country to achieve this. Activities that have been discussed in the UNFCCC process include afforestation and reforestation, reduced deforestation and degradation, sustainable forest

management, forest conservation, and enhancement of existing carbon stocks. In theory, each activity should be included only if carbon stocks can be measured and costs estimated accurately over time.

The design of a domestic PES REDD scheme would involve several decisions with respect to the scope of activities allowed after the program begins. A PES program could require full conservation -- each landholder/participant would then have to keep 100% of the forest intact. While appealing for environmental purposes, however, such a requirement might reduce the effectiveness of a PES REDD program. For example, asking landholders to forsake all of their existing revenues from logging or agriculture could discourage participation if they lack the confidence that the government will follow through on making future payments due to economic volatility or political changes. A better option might be to require all participants to agree to maintain a specific minimum portion of the forest land to be conserved under a REDD scheme, and permit some development on the remainder. In Brazil, for example, landowners are required by law to keep 80% of their land as forests (Art. 16, Law 4771/1965, Forestry Code). Payments for conservation beyond the 80% could then be allowed as an optional incentive for additional conservation, at the discretion of the landholder.

Another important design element concerns the activities to be allowed in the forest areas included in the PES protection scheme, which could potentially increase or decrease carbon stocks and forest viability. This raises a number of relevant questions. For example, should PES participants be allowed to harvest non-timber products from the protected forest? Should forest holders be allowed to conduct tourism in them? Allowing such activities would increase the appeal of PES, but could also reduce its effectiveness if harvesting or tourism increase forest degradation. Should enrichment planting in preserved forests be allowed and compensated? Should such activities be allowed but only up to a specific limit? Should landholders wishing to undertake activities in these areas be required to hold certain minimum qualifications? Should landholders in areas with little deforestation but where the development frontier is rapidly approaching be eligible for compensation merely to maintain standing forests, which could again risk compensation of non-additional activities? Should the program allow only those projects that move from highly environmentally damaging activities to environmentally beneficial ones, or should the PES design also cover shifting from a beneficial to a more beneficial activity (e.g., moving from certified selective harvesting methods or reduced impact logging to conservation) – a provision that could risk lowering the use of the former if the needed knowledge, training and capacity become more scarce?

The inclusion of specific REDD activities will have important implications for additionality and the overall effectiveness of a PES program. Countries will also need to consider potential international requirements when making this decision. For example, under a UNFCCC REDD agreement monitoring and verification requirements for degradation will likely be more stringent than measures that address clear-cutting and are more easily tracked by monitoring changes in the forest canopy. A country would therefore need to ensure that local capacity exists to effectively monitor and estimate the reductions from PES projects at a

level that meets international standards, lest these activities produce reductions that are then not credited under the international agreement.

III.C. MONITORING, VERIFICATION AND PENALTIES

A distinguishing feature of PES schemes is their reliance on conditionality: sellers get paid only if they actually deliver the environmental service contracted for. Conditionality thus requires careful monitoring and verification by the buyer. A PES REDD scheme would require a detailed plan to monitor compliance, which may include use of satellite data, remote sensing, GIS analyses, periodic on-site checks and central database development and tracking. Data collected could include forest cover, soil conditions, forest and soil carbon content, tree health, evidence of road development or illegal activities, etc. Evaluation could be done on an annual basis, with payments withheld in case of non-compliance. While necessary, such a detailed program could be difficult and expensive in poor or remote areas such as the Amazon. One alternative to address this issue would be to screen the projects to allow only those with adequate satellite data and tracking potential, the approach used in the Mexico PEHS program (Karousakis, K. 2007 [OECD], p.27). In case of noncompliance, another decision to be reached in the program design concerns whether the entire payment is withheld, or is pro-rated in some fashion (e.g., ratio of area deforested to total area under contract).

III.D. DEFINE THE BUYER AND SELLER

Another key question concerns the players to be involved. With respect to buyers, once international REDD funding is available PES in-country programs will need to decide whether to make the system government-based, user-financed, or an intermediary structure for distribution of funds. In the case of Costa Rica, both NGOs and government officials sought out participants, and eventually the government found it efficient to use NGO intermediaries. Project implementers such as private companies or conservation-oriented NGOs could act as intermediaries (Karousakis, K. 2007 [OECD], p.19). A potentially more difficult challenge is to define the eligible participants. A key question in this regard is whether participants would be required to have formal legal title to the land under protection. On the one hand, insecure land tenure and antiquated titling systems are widely acknowledged to encourage deforestation; resolution of land title issues is thus crucial to slowing deforestation and ultimately to the success of REDD in many countries. Requiring legal rights to the land would also ensure that only those who have “played by the rules” are compensated, and might therefore help to strengthen forest governance. On the other hand, however, informal but widely accepted control of forests through traditional or community-based arrangements is widespread in many areas. In addition, illegal logging and clearing for agriculture are significant causes of deforestation in Brazil and other countries. In Brazil, for example, some 80% of deforestation is caused by illegal activities. (Karousakis, K. 2007 [OECD], p.34) Requiring land titles would thus likely fail to cover many important actions. For a PES system, administrators will therefore face a difficult decision on whether to require program applicants to have official title to qualify.

In the PES literature it is generally accepted that for such schemes to be successful the criterion for participation should be effective control of land rather than formal rights or legal

title. Central to this requirement is excludability, the ability to control access to the resource and enforce the terms of the PES agreement. For example, Costa Rica's PES program paid landholders not to deforest despite the fact that deforestation was already illegal (Munoz et al, 2005 as cited by Karousakis, K. 2007 [OECD], p.25). Yet implementing a PES system based on "effective control" would run several risks. By rewarding illegal activities it could create a perverse incentive for others to undertake such actions (or to move from legal to illegal ones) to qualify for payments (Pagiola et al. 2004 as cited by CIFOR, 2005, Occasional Paper n. 42, p 14). It is also unclear whether such a scheme would encourage participation on the scale needed, given that individuals currently violating the law may fear arrest if they come forward. Rewarding violators would also likely be controversial and encounter popular opposition.

To address these issues, a country has several options. One would be to restrict the PES scheme to areas or regions where most of the land is under title, if possible. Another is to compensate any landholders who actually control territory, regardless of whether or not they hold official title to the land. The existing legal framework in Brazil further requires landowners to develop the land, making it productive through their own work for five uninterrupted years, as a prerequisite to obtaining its title (*usucapião*).³ A PES scheme in that country may thus require modification of the law. In areas where forests are often controlled and utilized under informal or illegal arrangements, the PES program could incorporate an "amnesty" provision, whereby those who agree to join are guaranteed eventual legal title to the land upon the satisfactory completion of the contract. The risk of a PES program encouraging illegal activities could be reduced by requiring applicants to document some level of prior activity on the land in question. It might also be necessary to adjust the payment structure, since the opportunity costs for legal and illegal deforestation may be different for a given activity.

Another factor in Brazil is the practice of illegal sales of public lands commonly known as "*grilagem*." *Grilagem* reflects several factors, including: lack of adequate supervision in the public sector of notaries, which frequently recognize illegal land transactions; fragility in the process of verification of land ownership; and political-electoral interests, normally with support from officials that provide positive incentives with promises of future land concessions. This practice is very common in the Amazon, and is considered to be one of the main reasons for illegal logging in the region (CCAP, 2006). Research would be needed to determine the appropriate mix of incentives (e.g., the needed level of payments given the benefit of title guarantees) that would be necessary to encourage participation, as well the requirements to ensure that legal activities are not compensated by this mechanism.

³ "The person not being the landowner of rural or urban property, having possessed as his for 5 uninterrupted years, without opposition (if rural property with area less than 50 hectares), making it productive through his own or his family's work, having it as his home, will acquire its formal ownership." Translation of the Art. 1239 of the Law n 10406/2002: "Aquele que nao sendo proprietario de imovel rural ou urbano, possua como sua, por cinco anos ininterruptos, sem oposicao, area de terra em zona rural nao superior a cinquenta hectares, tornando-a produtiva por seu trabalho ou de sua familia, tendo nela sua moradia, adquirir-lhe-a a propriedade."

The performance of such a program could be further improved through a carrot and stick approach whereby PES is coupled with enhanced enforcement of existing laws, which would increase the likelihood that violators would participate. An interesting example of law enforcement initiative was the Action Plan for the Prevention and Control of the Deforestation in the Amazon in Brazil. Actions coordinated by IBAMA (Brazilian Institute of Environment and Renewable Natural Resources) through 15 operational bases distributed along the arc of deforestation helped to optimize enforcement, increasing the rate of apprehensions of illegal activities between 2005 and 2007.⁴ In a similar fashion, countries considering the creation of new protected areas to reduce illegal activities could offer PES programs as a public alternative, providing an incentive for violators to participate in a voluntary payment scheme rather than lose all income from the forest.

Another issue that should be considered in the design is the number of participants and the size of each project. Under a PES scheme, transaction and enforcement costs will typically increase with the number of participants; there may also be economies of scale that would lower opportunity costs to landholders as the size of the project increases. From a pure efficiency point of view, a PES scheme with a small number of large projects would clearly be preferred to a larger number of smaller projects. Favoring the latter would tend to exclude the poor and favor wealthier landholders and corporations, however, potentially undermining public support for the program. A useful alternative that could help lower costs would be to set a minimum project size but allow “bundling” of actors, where individual small farmers and families in a region could be bundled together, with benefits distributed on a communitywide scale (Karousakis, K. 2007 [OECD], p. 35). This would require that community infrastructure, local governments, and/or institutions exist that can distribute the benefits properly, which may have to be designed in some cases. Other possible systems include allocating benefits to an indigenous group as a whole, or to an entire territory occupied by smallholders (Griffiths, 2007, p.10).

III.E. SELLER RESPONSIBILITIES

A PES REDD scheme will also need to decide upon and spell out the specific responsibilities required of the participant, the minimum capabilities required, and the method of demonstrating the latter. One question concerns to what extent a PES participant will be required to simply refrain from damaging activities (negative responsibility), or also engage in proactive measures to protect and maintain forests (positive responsibility). For example, should logging companies in fire-prone areas be required to monitor weather conditions and impacts, and to report risks or even engage in fire prevention activities? How will natural disasters such as fires or flooding be treated under the agreement if such events damage or destroy forest area? A related issue concerns enforcement responsibility. The participant may have legal title or recognized control of forest land, but their ability to prevent others from using the land may be minimal. In the Amazon, for example, the sheer size of the region and the existence of large tracts of undisturbed forest may make it very difficult for

⁴ Source: Publication from the Brazilian Ministry of Environment: “Cutting down deforestation in the Brazilian Amazon: How Brazilian policies were able to reduce deforestation in the world’s largest tropical forest,” presented at COP 13, Bali, December 2007.

even the most well-intentioned participant to prevent illegal logging. In such cases a PES scheme might therefore succeed only in replacing a damaging activity with a more short-term and less enforceable activity such as illegal logging.

PES schemes could potentially incorporate a range of allowed activities and responsibilities for which participants would be eligible to receive payments. For example, a PES program could require participants to end all forest-damaging activities (in effect establishing a private reserve), or just maintain a minimum amount of canopy (and possibly understory) while limiting road development in the reserve. Participants could be paid not to sell the land to cattle farmers, soy producers, or timber companies or to accept payments from illegal loggers. One approach to negative vs. positive responsibility would be to focus on projects where the participant has the knowledge and expertise to engage in active forest protection activities. One example would be a large logging company operating in a timber concession; in such cases it makes sense to include some positive efforts as explicit requirements of the contract. The issue of accounting for natural disasters and fires would be more difficult. One possibility is to simply not pay the sellers for any forest destroyed regardless of the cause, as in the Mexico PEHS program (Karousakis, K. 2007 [OECD], p. 28). Another option would be to include an agreement to pay participants all or part of the contracted payments if in return they agree to reforest a portion of the damaged land (again this would be most appropriate with logging companies).

A related issue is the question of carbon content, which could pose a vexing problem assuming that payments are made on a per hectare basis. Should the seller be responsible for maintaining the carbon content of the forest? For example, should sellers be required to engage in enrichment planting if forest carbon content decreases due to weather changes, illegal third-party activities, etc.? With smallholder projects it might be necessary to exclude participants from such requirements, and the responsibility for enforcement against non-participant actions will likely need to be left to the buyer (i.e. most likely the national or local government under a REDD scheme). PES contracts could however include requirements for regular on-the-ground self-evaluation checks to identify potential deforestation by third-party violators (in addition to official inspections to verify participant compliance by the government) and reporting of violations to the REDD program administrator.

III.F. SETTING THE PAYMENT

The setting of the payment presents an additional set of design issues for a PES program. Two aspects would need to be considered: the basis upon which the payment is to be made (i.e. the unit to be “bought” with a given amount of money), and the estimation and magnitude of the payment per unit.⁵ It is important to remember that under an international REDD scheme, developed countries would be making payments for reductions in CO₂

⁵ In theory, payments could be made either in cash or in-kind. In this paper we assume that payments would be made in cash, although in-kind payments could be particularly useful in certain niche cases, especially where local economies are largely organized on a subsistence basis. (e.g., indigenous communities). Such payments can provide significant benefits at the community level, such as providing a school to a village.

emissions, in effect creating a price per unit of emissions reduced. Internal PES payments within a country could be made on the same basis, paying landholders per unit of carbon preserved. REDD payments for environmental services could potentially be made on other bases, however. For example, a country might make payments on the basis of forest area protected (per hectare), as in the Costa Rica PES program, where payments ranged from US \$210/ha for forest protection to US \$537 for reforestation (Karousakis, K. 2007 [OECD], p. 20). Other standards used have included payments based on a portion of minimum monthly household income, as in the Brazil *Proambiente* program, and fixed amounts per provider or family, as in the Amazonas State Government Bolsa Floresta program, which includes payments to families at a flat rate of R\$50 per month.⁶

The specific scheme chosen could be complicated, and will depend upon national priorities. If a per carbon preserved basis is used, the amounts paid to landholders for maintaining the same area of land could vary significantly across the country if the range of carbon content of forest land is large. At a minimum, such issues are liable to raise questions of equity and fairness, especially among lower income participants. But a more serious problem would arise from the fact that the payments would no longer be tied to the opportunity cost of the activity being discontinued (e.g., agriculture). In such cases, payments in some low-carbon areas would be too low to lead landholders to change their behavior, reducing program effectiveness, while some participants in high-carbon areas would receive a windfall far in excess of what is actually needed to encourage forest protection. Paying for REDD activities on a per-hectare basis with payments indexed to the opportunity cost of the activity would avoid this problem. Since a large portion of the payments would presumably be made *ex post*, however, accurate forecasting of potential emission reductions at the beginning of the project is crucial to ensuring that the total funding allotted by the government to cover program costs (landholder payments, transaction costs and administrative expenses) at the beginning matches the agreed funding (and reductions) by the developed country at the conclusion of the project. Because economic circumstances and prices often change quickly, it may not always be possible to predict opportunity costs in advance.

A potential solution to these difficulties would be to make payments on an opportunity cost per hectare basis, but target them to areas with the highest carbon content and reduction potential. Under such a scheme, minimum carbon content per hectare could be set as a requirement for participation in the program, but once in participants with lower carbon values and similar forgone activities and opportunity costs receive the same compensation. This would maintain the overall environmental benefit while reducing or eliminating the potential economic and equity problems that could be associated with payments made on a per carbon reduced basis. Carbon reductions would not be paid for directly, but would be estimated during the application process. The country could then rank order projects in each class (e.g., cattle ranching, soy farming) and select projects to ensure that the desired reduction levels are met. In doing so the country effectively works through the site selection

⁶ For more information see Secretary of Environment and Sustainable Development of the Amazonas Government website: http://www.vortexmidia.com.br/sds2008/pagina_interna.php?cod=120, last accessed on Sept. 26, 2008.

process to match its expected national aggregate reductions, total payments and program costs to the reductions and funding agreed with the developed country actor(s). The PES program may further want to develop a prioritization scheme for projects that combine carbon reduction potential with other criteria, such as high-risk forests and projects with potential co-benefits (e.g., watershed protection, erosion prevention, biodiversity protection, etc.).

A separate issue concerns the range of benefits that are to be included in the cost calculations. For example, if landholders are able to harvest valuable non-timber forest products from the protected areas in the program which would be unavailable if the forest were cleared, should participants receive a lower payment? If so, should these be deducted from the opportunity cost or should the final payments be reduced *ex post*? How would revenue from harvests (or offsets of other income if products are consumed instead of sold) be estimated? On the one hand, adjusting payments to account for such revenues could reduce the cost of the program (but may require the establishment of a system for tracking non-timber harvests). On the other hand, allowing such harvests in addition to the program payments would provide another incentive to preserve the land and help to ensure permanence (see discussion below).

III.G. STATIC VS. DYNAMIC PAYMENTS

When considering the payment structure, in addition to the setting of the payment level and schedule it will also be necessary to consider whether and to what extent payments will need to be updated. The opportunity costs of logging or agriculture or even the nature of the activities themselves will likely change over time, in which case the use of a static payment would either decrease the cost effectiveness of the program (if the opportunity cost falls) or discourage participation and compliance (if the cost rises). One example would be if the uses and demand for forest land shift over time; should the potential value of forest clearing increase (e.g., demand for the agricultural commodity upon which the PES is based falls but timber demand rises), a static payment system would not work well. Ideally, PES contracts would incorporate an updating clause to account for this possibility.

In practice, designing such a system could prove difficult. One complication is that in some areas opportunity costs may fluctuate significantly and/or frequently (potentially due to changes in demand for agricultural products or exchange rate volatility), making it difficult and impractical to develop a credible updating schedule and procedure. In Brazil, a good example is the opportunity cost associated with cattle ranching. After years of constant growth, from January-August 2008 Brazil's beef exports fell by 22%, which affected both prices and market participation.⁷ Such fluctuations would directly affect the cost effectiveness of a PES REDD program.

A potential middle-ground solution would be to utilize a set of benchmarks for the activity displaced under the contract with a "fluctuation trigger." Under such a system, PES contracts would guarantee updated payments over a certain period (e.g., every two years). However, the magnitude of the payment would be mapped to a key indicator (e.g., change in

⁷ For more information: <http://www.mercopress.com/vernoticia.do?id=14448&formato=HTML>.

international price of beef, soy or palm oil), and the payments would be updated only if the change in the indicator exceeded a set minimum level over a minimum period (say, 5% over 6 months). This could be combined with a provision for retroactive payments if funding allows. While not a guarantee, utilization of such a system would provide some level of assurance to participants that their payments would cover their lost potential income, without forcing PES administrators to adopt a complicated and potentially costly updating methodology. At a minimum, PES systems should include procedures to adjust payments for inflation over some interval.

III.H. LEAKAGE

Like any REDD program, a PES scheme would run the risk of internal leakage. In Brazil, the issue is further complicated by the enormous size and remoteness of the Amazon, which makes tracking of activities much more challenging. One promising path to dealing with leakage under a PES program would be to incorporate site selection and land characteristics into the eligibility criteria for participation. This could be particularly useful in cases where forest land is being cleared by smallholders for local use of fuel wood or subsistence crops. For example, projects where forest is being cleared for local use of fuel wood or subsistence crops could receive priority if the forest is isolated, or if geographic barriers would make utilization of nearby forest areas difficult. In such cases it is likely that payments might be used by participants to purchase substitutes for the former products rather than migrate and continue their activities elsewhere. Another possibility in these cases is to give priority to projects that can be combined with end-use measures (e.g., improved efficiency of wood-fired stoves, improved agricultural productivity, allowing some agroforestry projects on protected forest lands) that reduce local demand. Expanding the official project boundaries (potentially combined with careful site selection) is another option (Schwarze, R. et al. 2002, p. 20).

In cases where the participant is a larger actor such as a cattle ranch or a logging firm, leakage would be more difficult to deter. One possible approach would be to include leakage contracts as part of the PES agreement (Schwarze, R. et al. 2002, p.19). The program could also include requiring individual companies that participate in a PES to include all of their major operations in the PES plan, which would help to ensure that activities are not simply transferred from one facility to another. This would be difficult but might be applicable in cases where the number of facilities is not too large. Another option that governments might consider including in the PES program is incentives for “positive leakage,” in which a firm would agree to transfer existing operations from high- to low-carbon areas. Payments would then be used to cover re-location expenses and other cost increases. Regardless of the approach selected, it will in all cases be important to monitor the PES scheme and other components of the national REDD plan, to ensure that interim and final carbon reduction goals are being met and not undermined through leakage, especially from high- to low-carbon content areas.

III.I. PERMANENCE

Ensuring the permanence of forest preservation actions and associated emission reductions is another crucial challenge to be faced in the design of an effective PES REDD system. It is widely acknowledged that to be credible and environmentally effective, an international REDD mechanism will have to incorporate provisions to ensure that reductions in deforestation rates in developing countries will continue for a minimum length of time (e.g., through 2050 or 2100), and that countries compensated for forest carbon saved will not later increase deforestation. At a national level, some propose that the government should maintain an insurance bank of carbon credits in case of deforestation or fires (Pedroni et al. 2007, Nepstad et al. 2007). With respect to PES programs, most research to date indicates the need for sustaining payments over time. For example, in PES programs for reforestation where timber is sustainably harvested after a certain amount of time, replanting is unlikely if payments stop (Wunder 2008, p.371). A national PES scheme would thus need to include specific mechanisms to ensure permanence.

One possibility would be to continue the payments over a long period, to provide a long-term incentive for participants to maintain their land as forest. For example, the REDD report from Woods Hole has as a premise a century-long payment schedule, over which some modeling projections suggest that the Amazon would have been largely deforested (Nepstad, D., et al. 2007). A related issue concerns the frequency of payments. In the UNFCCC REDD negotiations, many REDD negotiators and proposals specify annual payments to developing countries. Distribution of these funds within countries as part of a national PES program would need to be mapped to the international disbursements, but could potentially be done annually or through a more staggered schedule at multiple-year intervals (say every two or three years). In general, a regular cash flow will be important to many participants; monthly or annual payments appear more likely to induce behavioral change than one-time or staggered payments. Annual distribution may be more likely to ensure permanence, particularly in cases where economic hardship or natural catastrophes increase the incentive to deforest, but would incur higher administrative costs.

While any PES scheme should in theory cover a reasonable time period, guaranteeing long-term payments into the future would be difficult as the funds needed over the time period could be prohibitively large. In addition, changes in governments and laws could also shift national priorities, which could in turn reduce confidence among participants that they will in fact receive future payments (and thus reduce participation). Perhaps most importantly, long-term payments will not guarantee permanence in all cases. It would therefore be optimal for PES systems to include additional mechanisms. International proposals for permanence include reserve accounts for carbon reductions, in which a certain percentage of reductions would have to be held by the government as insurance against future emission increases. Such a program would not be applicable in a PES scheme where payments are made on a per-hectare basis. One possible approach would be to offer participants the option of receiving a higher up-front (or front-loaded) payment in return for agreeing to maintain forest areas beyond the period of the contract for a certain number of years, in effect increasing the payment in real terms. This incentive could be enhanced by

indexing the level of the initial payment to the length of the permanence commitment. Another option would be to include a long-term commitment to maintain the forests beyond the life of the contract. For example, the Costa Rica program includes a requirement that participants maintain forests for about 15 years even though the payments are disbursed only a over five-year period (Karousakis, K. 2007 [OECD], p.20).

In local smallholder communities, a potential option to ensure permanence would be to prioritize projects that produce multiple benefits. Examples would include forest-based water services or non-timber forest products, in which intact forests provide concrete benefits to communities. These could also include agroforestry projects where small-scale and environmentally benign agricultural production would be allowed on the area protected under the PES agreement. Another option would be to require individuals living together in a community or village to participate as a single group. Under this arrangement, participants would be responsible for maintaining their own PES agreements as individuals, but would be collectively responsible for additional “permanence commitments” over some time period after expiration of the agreements. These commitments would consist of pledges, and would not have associated penalties for noncompliance. Instead, by making each participant responsible to each other and to the broader community for maintaining permanence, community and societal bonds would increase the likelihood that forests would be preserved. A similar approach was successfully employed by the famous Grameen Bank in Bangladesh to ensure repayment of development loans.⁸ Some researchers have also suggested the possibility of coupling PES payments with other development benefits, such as construction of schools or infrastructure. Here the carrot would be the promise of maintenance of the development project over time, although concerns have been raised about the potential ethical questions of discontinuing such support in case of noncompliance (Rosa, Kandel, and Dimas 2003; van Noordwijk, Chandler, and Tomich 2004 as cited by CIFOR, 2005, Occasional Paper n. 42, p 16). It is possible, however, that the simple provision of such benefits could generate goodwill and a commitment to continue the forest protection scheme, even when it is clear there is virtually no prospect of penalties being imposed.

III.J. INTEGRATING WITH SOCIAL DEVELOPMENT AND CREATING POLITICAL SUPPORT

In some countries, there is concern that PES programs may be viewed negatively as “paying people to do nothing.” While most or all of the funding for PES REDD programs would presumably be supplied from external sources, opposition to such spending could develop if the perception that the government or the international community values saving trees more than alleviating poverty becomes widespread. PES REDD program administrators should therefore pay close attention to public relations, and should undertake pro-active efforts to educate the public on the benefits of the program and the contributions to mitigating both local and global climate change. Administrators can stress the local benefits of the project (e.g., clean water) and showcase local “success stories” where possible; they could also potentially package them together with local development projects. Making a communications and public outreach program an integral component of the PES design

⁸ For more information:

http://www.grameen-info.org/index.php?option=com_content&task=view&id=19&Itemid=114.

would help to build public understanding of and support for the program, and for REDD efforts in general.

III.K. CO- BENEFITS

Often PES schemes contain objectives beyond provision of the environmental service (also called co-benefits), such as poverty alleviation, biodiversity protection, local or regional development, and others. PES tends to benefit the poor even if specific targeting of the poor is not part of the scheme. In many cases, such programs generate small gains over and above the opportunity costs to landholders. Governments may therefore wish to prioritize projects likely to produce co-benefits. PES programs can also enhance external relations, becoming a source of national pride and attracting external donors. Furthermore, they can help to build local capacity for planning and implementation in difficult to govern rural regions. For a REDD program dependent on foreign investment, a reputation for responsible and effective PES administration will thus be crucial to helping developing country governments succeed.

III.L. INDIGENOUS PEOPLES

In many countries significant areas of forests are legally owned or controlled in fact by indigenous peoples. In Brazil, such areas total over one-fifth of the Amazon. While these forest lands are owned by the central government, native groups have permanent usage rights. Indigenous peoples using traditional forestry and agricultural methods have been shown to be effective stewards in the past (Griffiths, 2007, p.21). However, PES schemes for REDD will likely face certain challenges in indigenous areas. One issue is that the PES program must be compatible with relevant sovereignty laws and arrangements. For example, such laws might prohibit buyers from specifying certain actions or requirements as a condition of REDD payments. In addition, for a PES agreement to be enforceable in areas where local groups have sovereignty, the indigenous group may have to be a party to the agreement. On-the-ground or intrusive monitoring or verification could create a backlash among indigenous groups against PES administrators and the government, a major concern given that in some areas of the world relations between such groups and the broader society and government have often been tense (the result of conflicts over forests and other resources in many cases). Imposing penalties for noncompliance could have the same effect.

In countries with significant indigenous populations living in forest areas, PES schemes should therefore be carefully evaluated at the design stage to ensure compatibility with informal as well as formal legal arrangements for indigenous groups. It might be useful to identify and screen out areas where existing disputes or tensions between indigenous groups and other actors could potentially derail implementation of a PES project. PES programs can benefit from having representatives of such groups in the administration, helping to design and implement the national program using indigenous knowledge and experience. This would be a step toward using PES REDD programs in indigenous areas in a positive way, as a means of reducing tensions and strengthening bonds between indigenous peoples and society. The FUNAI (National Foundation of Indigenous People) in Brazil has broad experience in managing and assisting tribes and communities with policies in terms of

conservation in the Amazon. An example of such actions was FUNAI's participation on the Project of Conservation and Sustainable Use of Biodiversity of Forests initiated in Mato Grosso in 2001.⁹ Other important instruments to implement projects within indigenous lands include coordination with NGOs that have been created to represent the interests of indigenous peoples. These organizations are assisted by the Coordination of the Indigenous Organizations in the Brazilian Amazon (COIAB). One example of these types of associations is Associacao Halitina, which represents the interests of the indigenous group Pareisi in Mato Grosso. A pro-active approach that considers the interests of indigenous peoples and invites participation from their representatives at the start can increase the likelihood of the success of PES programs for REDD.

IV. Conclusion

In this paper, we have examined a range of key policy issues that will be important for developing countries wishing to utilize payment for environmental services programs to reduce deforestation under a post-2012 REDD framework to consider. While many of the challenges with respect to implementation of domestic REDD programs will be country-specific, this analysis suggests several broad lessons.

First, it is crucial that countries develop robust systems and procedures for reconciling international REDD payments based on carbon emissions reduced with domestic PES payments per area of land. This methodology must be made a fundamental basis of the system from the start. It is also important that countries develop accurate estimates of opportunity costs that reflect possible changes over time, so that they can then focus the PES program on the most cost-effective areas. This will need to be matched with estimates of carbon preservation potential, so that the forest areas most rich in carbon and most likely to be deforested over the long term will be protected in the most cost-effective manner possible. When coupled with sound policies for implementation of the PES program as suggested in this report, and with other broad programs to address drivers of deforestation that may be less amenable to PES-based measures, this can provide a solid basis for developing an efficient REDD program under a future climate change agreement.

⁹ For more information see: <http://www.sema.mt.gov.br/noticia/mostraNoticia.aspx?cod=1402>, last accessed September 26, 2008.

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